

# IV - INTERNATIONAL RURAL AREAS AND ECOLOGY CONGRESS

WITHIN THE FRAMEWORK OF  
SUSTAINABLE DEVELOPMENT  
(RUDESU2023)

**OCTOBER 05-06,2023/GİRNE**  
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Conference Proceedings Book

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Framework of Sustainable Development**

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Assoc. Prof. Dr. Ömer Lütfi ÇORBACI, Recep Tayyip Erdoğan University  
Assoc. Prof. Dr. Pervin YEŞİL, Ordu University  
Assoc. Prof. Dr. Salih SALBACAK, Fatih Sultan Mehmet Foundation University  
Assoc. Prof. Dr. Sara DEMİR, Bursa Technical University  
Assoc. Prof. Dr. Sefa AKBULUT, Karadeniz Technical University  
Assoc. Prof. Dr. Sema MUMCU, Karadeniz Technical University  
Assoc. Prof. Dr. Serap YILMAZ, Karadeniz Technical University  
Assoc. Prof. Dr. Serhat CENGİZ, İnönü University  
Assoc. Prof. Dr. Sertaç GÜNGÖR, Selçuk University  
Assoc. Prof. Dr. Sibel SARIÇAM, Osman Gazi University  
Assoc. Prof. Dr. Sima POUYA, İnönü University  
Assoc. Prof. Dr. Sultan S. KURT KONAKOĞLU, Amasya University  
Assoc. Prof. Dr. Süheyla Üçışık Erbilin, Eastern Mediterranean University

Assoc. Prof. Dr. Şebnem ERTAŞ BEŞİR, Akdeniz University  
Assoc. Prof. Dr. Şule KISAKÜREK, Kahramanmaraş Sütçü İmam University  
Assoc. Prof. Dr. Tendü Hilal GÖKTUĞ, Adnan Menderes University  
Assoc. Prof. Dr. Tuğba DÜZENLİ, Karadeniz Technical University  
Assoc. Prof. Dr. Ufuk Fatih KÜÇÜKALİ, İstanbul Aydın University  
Assoc. Prof. Dr. Ufuk Çoşgun, Karabük University  
Assoc. Prof. Dr. Uzay KARAHALİL, Karadeniz Technical University  
Assoc. Prof. Dr. Ümit ARPACIOĞLU, Mimar Sinan Fine Arts Üniversitesi  
Assoc. Prof. Dr. Yasin DÖNMEZ, Karabük University  
Assoc. Prof. Dr. Yaşar Bahri ERGEN, Aksaray University  
Assoc. Prof. Dr. Yıldız AKSOY, İstanbul Civilization University  
Assoc. Prof. Dr. Zeynep PİRSELİMOĞLU BATMAN, Uludağ University  
Assoc. Prof. Dr. Zuhâl DİLAVER, Ankara University  
Ass.Prof.Dr.Ahmet FİDAN, Ordu University  
Ass.Prof.Dr.Ayhan KARADAYI, Karadeniz Technical University  
Ass.Prof. Dr.Bahar Başer KALYONCUOĞLU, Medipol University  
Ass.Prof.Dr.Bora YILDIRIM, Kırıkkale University  
Ass.Prof.Dr.Didem Eylem DİZDAR, Bilkent University  
Ass.Prof.Dr.Duygu DOĞAN, Denizli Pamukkale University  
Ass.Prof.Dr.Elif AKYOL ŞATIROĞLU, Recep Tayyip Erdoğan University  
Ass.Prof.Dr.Dr.Elif SAĞLIK, Çanakkale 18 March University  
Ass.Prof.Dr.Eylül MALKOÇ, Trakya University  
Ass.Prof. Dr.Gökhan Hüseyin ERKAN, Karadeniz Technical University  
Ass.Prof.Dr.Gümüş Funda GÖKÇE, Düzce University  
Ass.Prof.Dr. Halil DAŞKESEN, Atatürk University  
Ass.Prof.Dr.Halil DUYMUŞ, Çukurova University  
Ass.Prof.Dr.İbrahim HOŞAFLIOĞLU, Iğdır University  
AssProf.Dr.Kıymet Pınar KIRKIK AYDEMİR, Bolu Abant İzzet Baysal University  
Ass.Prof.Dr.Kumru ARAPKİROĞLU, Bilkent University  
Ass.Prof.Dr.Mehmet Sinan YUM, İstanbul Ticaret Üniversitesi  
Ass.Prof.Dr.Mert ÇAKIR, Süleyman Demirel University  
Ass.Prof.Dr.Meryem Bihter BİNGÜL BULUT, Kırıkkale University  
Ass.Prof.Dr.Dr.Muhammed Ali ÖRNEK, İstanbul Technical University  
Ass.Prof.Dr.Mustafa ATMACA, Mustafa Kemal University  
Ass.Prof.Dr.Mustafa Reşat SÜMERKAN, Karadeniz Technical University  
Ass. Prof. Dr. Merih KASAP, Altınbaş University  
Ass.Prof.Dr.Orkun AKTAŞ, Kırıkkale University  
Ass.Prof.Dr.Osman ÜÇÜNCÜ, Karadeniz Technical University  
Ass.Prof.Dr.Ömer Faruk UZUN, Sakarya University of Applied Sciences  
Ass.Prof.Dr.Özgür Kamer AKSOY, Adnan Menderes University  
Ass.Prof.Dr.Özlem ERDOĞAN, Kırklareli University  
Ass.Prof.Dr.Saliha TAŞCIOĞLU, Kilis 7 Aralık University  
Ass.Prof.Dr.Simay KIRCA, İstanbul University

Ass.Prof.Dr.Şeyma ŞENGÜR, Ordu University  
Ass.Prof.Dr.Şirin Gülçen EREN, Süleyman Demirel University  
Ass.Prof.Dr.Taki Can METİN, Kırklareli University  
Ass.Prof.Dr.Dr. Volkan ATEŞ, Tarsus University  
Dr. Tuğba ÜSTÜN TOPAL, Tekirdağ Namık Kemal University  
Dr. Tuğba TOMBAL, Adana Alparslan Türkeş Science and Technology University  
Yıldırım LİSE, Nature Conservation Center Foundation  
Uğur ZEYDANLI, Head of Nature Conservation Center  
Dr.Oktan NALBANTOĞLU, Bilkent University  
Inst. Dr. Gülşah BİLGE, Ordu University  
Dr. Mariana GOLUMBEANU, National Institute for Marine Research "Grigore Antipa"  
Dr.Elif TOPÇU, Ministry of Agriculture and Forestry  
Dr.Sahar POUYA  
Dr.Sheyda MAHARRAMOVA, Azerbaijan Food Safety Institute  
Inst.Sibel AKTEN, Isparta University of Applied Sciences



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*4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.*

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**4<sup>th</sup> International Rural Areas Congress Within the  
Framework of Sustainable Development  
(RUDESU2023)**

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**October, 05-06, 2023  
Kyrenia, Turkish Republic of Northern Cyprus**

**CONGRESS SCHEDULE**

**Face to Face**

**PARTICIPATING COUNTRIES**

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Türkiye, Turkish Republic of Northern Cyprus, Algeria, Ethiopia, Bangladesh, Greece, Georgia, Hungary, India, Iran, Kosovo, Macedonia, Malaysia, Morocco, Moldova, Nigeria, Pakistan, Philippines, Poland, Romania, Ukraine

**TOTAL ACCEPTED ARTICLES:**

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Türkiye: 83  
Other Countries: 105





**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

**Date: 05.10.2023  
Ankara Time: 09:30 -10:45**

**OPENING SPEECHES**

**Announcer: Assoc.Prof.Dr. Elif TOKDEMİR DEMİREL**

	<b><u>SPEAKERS</u></b>	<b><u>AFFILIATION</u></b>
1	<b>Prof.Dr.Öner DEMİREL</b>	Chair of Congress, Kırıkkale University
2	<b>Salih GÜNEŞ</b>	Forest Department Manager, “Forestry Activities in the Turkish Republic of Northern Cyprus”
3	<b>Mustafa Kemal MERAKLI</b>	TRNC Ministry of Tourism and Environment Department of the Environmental Protection “Rich biological Values in the Turkish Republic of Northern Cyprus”
4	<b>Cemil KARZAOĞLU</b>	Landscape Architect, Former Forest General Manager “Conservation Activities in the Turkish Republic of Northern Cyprus”
5	<b>Fikri ATAĞLU</b>	Deputy Prime Minister, Ministry of Tourism, Youth, Culture and Environment “Tourism and Promotional Activities in the Turkish Republic of Northern Cyprus”
6	<b>Hüseyin Çavuş KELLE</b>	Minister of Agriculture and Natural Resources
7	<b>Serdar DENKTAŞ</b>	Former Deputy Prime Minister, Minister of Tourism and Economy “Th Policy of the Turkish Republic of Northern Cyprus on Rural Areas”
8	<b>Ersin TATAR</b>	President of the Turkish Republic of Northern Cyprus



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**


## **OPENING SPEECHES**

# RUDESU2023


## IV-INTERNATIONAL RURAL AREAS AND ECOLOGY CONGRESS

Within The Framework of Sustainable Development


### OPENING SESSION




**Prof. Dr. Oner DEMİREL**  
Chair of Ecogeography  
Kırıkkale University




**Salih GÜNEŞ**  
Forest Department Professor,  
Taslısuu Arboretum in the Turkish Republic of  
Northern Cyprus




**Mustafa Kemal MERAKLI**  
TRNC Ministry of Environment, Forestry and  
Climate Change, Director of the Environmental Protection  
Technological Hub in the Turkish Republic of  
Northern Cyprus




**Cemil KARZAĞLI**  
Landscape Architect, Former Forest General  
Manager, General Manager, Agriculture in the  
Turkish Republic of Northern Cyprus




**Filiz ATAĞLI**  
Dean of Fine Arts Faculty, Ministry of Culture,  
Youth, Culture and Environment  
Tourism and Heritage, Architect in the  
Turkish Republic of Northern Cyprus




**Hüseyin Çarış KELLE**  
Minister of Agriculture and Natural Resources



**Serdar DENKTAŞ**  
Former Deputy Prime Minister, Minister of  
Tourism and Economy, The Policy of the  
Turkish Republic of Northern Cyprus on Rural  
Areas



**Ersin TATAR**  
President of the  
Turkish Republic of Northern Cyprus



Announcer  
**Assoc. Prof. Dr. Elif TOKDEMİR DEMİREL**  
Kırıkkale University

**Date: 05.10.2023**  
**TRNC Time: 11<sup>00</sup> : 13<sup>00</sup>**  
**Place: The Olive Tree Hotel**  
Inonu Caddesi 89, Çatalköy 99370,  
Kyrenia, North Cyprus



4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)

October 05-06, 2023, Kyrenia, T.R.N.C.

**(RUDESU2023)**

The Olive Tree Hotel, Kyrenia, TRNC

## INVITED SPEAKERS

**Moderator: Prof. Dr.Atila GÜL**  
Süleyman Demirel University

## PANEL

Date: 05.10.2023

K.K.T.C. Time: 11.<sup>00</sup> : 13.<sup>00</sup>

**Face-to-Face**

**Name of Panel 1#:** SÜRDÜRÜLEBİLİR KIRSAL GELİŞME PERSPEKTİFİ ÇERÇEVESİNDE EKOLOJİ, EKONOMİ, KORUMA VE SANAT/ ECOLOGY, ECONOMY, PROTECTION and ART WITHIN THE PERSPECTIVE OF SUSTAINABLE RURAL DEVELOPMENT

**Panel Moderator:** Prof. Dr. Atila GÜL (Süleyman Demirel University, Faculty of Architecture, Department of Landscape Architecture)

**Panel Moderator Assistant:** Assoc. Prof. Dr. Sultan Sevinç KURT KONAKOĞLU (Amasya University School of Fine Arts, Design and Architecture Urban Design and Landscape Architecture Department)

### **Panelists:**

- 1. Prof. Dr. Deniz İŞÇİOĞLU**, Vice Rector, Political Science and Public Administration (Eastern Mediterranean University, Faculty of Business&Economy)  
*"THE EFFECTS OF RURAL TO URBAN MIGRATION"*  
KIRDAN KENTE GÖÇÜN ETKİLERİ
- 2. Prof. Dr. Şerife GÜNDÜZ**, Biologist, Dean, Faculty of Pharmacy (Final International University, Faculty of Pharmacy, Environmental Research Center Manager)  
*"BEYOND BORDERS: THE CLIMATE CRISIS' GLOBAL REACH AND CYPRUS'S RESILIENCE"*  
SINIRLARIN ÖTESİNDE: İKLİM KRİZİNİN KÜRESEL ERIŞİMİ VE KIBRIS'IN DAYANIKLILIĞI
- 3. Assoc. Prof. Dr. Oğuz KURDOĞLU**, Forest Engineer (Karadeniz Technical University Faculty of Forestry, Department of Forest Engineering)  
*"WHY SHOULD MOUNTAINS BE PROTECTED? AN EVALUATION WITHIN THE SCOPE OF GREEN ROAD,"*  
DAĞLAR NEDEN KORUNMALIDIR? YEŞİL YOL KAPSAMINDA BİR DEĞERLENDİRME"



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

**4. Prof. Dr. Kağan GÜNCE**, Faculty Member, Architect, (Eastern Mediterranean University, Faculty of Architecture)  
"CONSERVATION AND DEVELOPMENT OF TRADITIONAL ARCHITECTURE IN RURAL SETTLEMENTS WITH TOURISM"  
KIRSAL YERLEŞİMLERDE GELENEKSEL MİMARİNİN TURİZMLE KORUNMASI VE GELİŞTİRİLMESİ

**5. Prof. Dr. Muhammet Emin KAYSERİLİ**, Painter, (Atatürk University, Kazım Karabekir Faculty of Education, Department of Fine Arts, Education Department of Painting Education)  
"COUNTRYSIDE AND ART"  
KIR VE SANAT

# PANEL

## INVITED PRESENTATIONS

**RUDESU2023**  
**IV-INTERNATIONAL RURAL AREAS AND ECOLOGY CONGRESS**  
Within The Framework of Sustainable Development  
**PANEL SESSION**

**1**   
**Prof. Dr. Deniz İşçioğlu**  
Faculty Member, Political Science and Public Administration (Eastern Mediterranean University, Faculty of Business & Economy)  
"THE EFFECTS OF RURAL TO URBAN MIGRATION"

**2**   
**Prof. Dr. Şerife GÜNDÜZ**  
Biologist, Dean, Faculty of Pharmacy (Finnish International University, Faculty of Pharmacy, Environmental Research Center-Manager)  
"BEYOND BORDERS: THE CLIMATE CRISIS - GLOBAL REACH AND CYPRUS'S RESILIENCE"

**3**   
**Assoc. Prof. Oğuz KURDOĞLU**  
Forest Engineer (Karadeniz Technical University Faculty of Forestry, Department of Forest Engineering)  
"WHY SHOULD MOUNTAINS BE PROTECTED? AN EVALUATION WITHIN THE SCOPE OF GREEN ROAD"

**4**   
**Prof. Dr. Kağan GÜNCE**  
Faculty Member, Architect, (Eastern Mediterranean University, Faculty of Architecture)  
"CONSERVATION AND DEVELOPMENT OF TRADITIONAL ARCHITECTURE IN RURAL SETTLEMENTS WITH TOURISM"

**5**   
**Prof. Dr. M. Emin KAYSERİLİ**  
Painter, (Atatürk University, Kazım Karabekir Faculty of Education, Department of Fine Arts, Education Department)  
"COUNTRYSIDE AND ART"

**Panel Moderator**  
**Prof. Dr. Atilla GÜL**  
Süleyman Demirel University, Faculty of Architecture, Department of Landscape Architecture

**Panel Moderator Assistant**  
**Assoc. Prof. Sultan Sevinç KURT KONAKOĞLU**  
Anıyasa University School of Fine Arts, Design and Architecture Urban Design and Landscape Architecture Department

**Date: 05.10.2023**  
**TRNC Time: 11<sup>00</sup> : 13<sup>00</sup>**  
**Place: The Olive Tree Hotel**  
Inonu Caddesi 89, Çatalköy 99370,  
Kyrenia, North Cyprus



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023</b>		
<b>Ankara Time 13:30-15:30</b>		
<b>The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-1 / YÜZ-YÜZE OTURUM-1</b>		
<b>SALON 1/HALL 1</b>		
<b>MODERATOR: Assoc.Prof.Dr.Elif TOKDEMİR DEMİREL</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>The depiction of nature in literature: The case of Emily Bronte's Wuthering Heights</b>	<ul style="list-style-type: none"><li>• Elif TOKDEMİR DEMİREL</li></ul>	Kırıkkale University (Türkiye)
<b>Symbiotic Synergy: Exploring Waterfront Architecture Theory, Rural Areas, and Environmental Harmony</b>	<ul style="list-style-type: none"><li>• Doğa ÜZÜMCÜOĞLU</li></ul>	Rauf Denktas University (TRNC)
<b>Transforming Historic Buildings For Modern Purpose (Case Study: England)</b>	<ul style="list-style-type: none"><li>• Nafiseh ZAMANZADEH</li><li>• Elnaz FARJAMI</li><li>• Shabnam GOLKARIAN</li></ul>	Near East University (TRNC)
<b>Nature Based Urban Structure; Transformation of the Leaf to the City</b>	<ul style="list-style-type: none"><li>• Ömer ATABEYOĞLU</li><li>• Özge ŞİMŞEK YILMAZ</li></ul>	Ordu University (Türkiye)
<b>Sustainable Management of Protected Areas</b>	<ul style="list-style-type: none"><li>• Oktay YILDIZ</li></ul>	Düzce University (Türkiye)
<b>Stormwater Management Concept And Rain Gardens</b>	<ul style="list-style-type: none"><li>• Mertkan F. TEKİNALP</li><li>• Zeki DEMİR</li></ul>	Düzce University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
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October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023 Ankara Time 13:30-15:30 The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-1 / YÜZ-YÜZE OTURUM-1 SALON 2/HALL 2 MODERATOR: Prof.Dr.Atila GÜL</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Ecology-Economy Conflict In The Context Of Sustainability; (Green Economy, Ecological Economy, Economic Ecology)</b>	<ul style="list-style-type: none"><li>• Atila GÜL</li><li>• İskender Emre GÜL</li><li>• Hatice Eda GÜL</li></ul>	Süleyman Demirel University (Türkiye)
<b>Physical Impact Assessment of Tourism in Traditional Bellapais Village</b>	<ul style="list-style-type: none"><li>• Aliye MENTEŞ</li></ul>	Arkin University of Creative Arts and Design (TRNC)
<b>The Effect of Reflective Moral Attentiveness on Voluntary Green Work Behavior of Employees</b>	<ul style="list-style-type: none"><li>• Ayşen Berberoğlu</li><li>• Tolga Öz</li><li>• Risalat Rahmedova</li></ul>	University of Mediterranean Karpasia (TRNC)
<b>Assessing The Integration of Ecological Conscious Building Design Techniques In Architecture Pedagogy</b>	<ul style="list-style-type: none"><li>• Pooya Lotfabadi</li><li>• Aminreza Iranmanesh</li></ul>	Final International University (TRNC)
<b>Alevî-Bektâşî Hagiography Texts in the Context of Ecocritical Theory</b>	<ul style="list-style-type: none"><li>• Serdar GÜRÇAY</li></ul>	İstanbul Kültür University (Türkiye)
<b>From Ibn Khaldun's Assabiyah to Sen and Nussbaum's Capability Theory: Exploring the Dynamics of Sustainable Developmenté</b>	<ul style="list-style-type: none"><li>• M. Semih SUMMAK</li></ul>	Gaziantep University (Türkiye)
<b>Prospects for Ecotourism in Gülnar and Aydıncık (Cilicia): The Historical Dimension</b>	<ul style="list-style-type: none"><li>• Ayşe ÇALIK ROSS</li></ul>	Kocaeli University (Türkiye)
<b>Plants As Subject Materials In Contemporary Art</b>	<ul style="list-style-type: none"><li>• Yıldız ÖZER</li><li>• Önder YAĞMUR</li></ul>	Atatürk University (Türkiye)





**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023 Ankara Time 16.00-17:30 The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-2 / YÜZ-YÜZE OTURUM-2 SALON 1/HALL 1 MODERATOR: Assoc.Prof.Dr. Oğuz KURDOĞLU</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Climate Change, Aridity And Afforestation Practices In Central Anatolia</b>	<ul style="list-style-type: none"><li>• Oktay YILDIZ</li></ul>	Düzce University (Türkiye)
<b>Functions of Rain Gardens In Rural Areas</b>	<ul style="list-style-type: none"><li>• Mertkan F. TEKİNALP</li><li>• Zeki DEMİR</li></ul>	Düzce University (Türkiye)
<b>Examination of The Life Studies Curriculum in Terms of Sustainable Environmental Awareness</b>	<ul style="list-style-type: none"><li>• Barış KALENDER</li></ul>	Gaziantep University (Türkiye)
<b>Ecosystem Services And Resilience: Two Key Concepts Complementing Each Other</b>	<ul style="list-style-type: none"><li>• Afşin AYHAN</li><li>• Banu ÇİÇEK KURDOĞLU</li></ul>	Kastamonu University (Türkiye)
<b>Documentation of Edible And Ornamental Cypriot Plants In Lapta Village In Kyrenia District: A Qualitative Analysis</b>	<ul style="list-style-type: none"><li>• Burcu Toker</li><li>• Ehsan Daneshyar</li></ul>	Arkin University of Creative Arts and Design (TRNC)
<b>Bellapais Monastery and Its Surroundings: A Case Study in Cultural Tourism Sustainability</b>	<ul style="list-style-type: none"><li>• Sevil AYDINLIK BAŞAR</li><li>• Sertaç İLTER</li></ul>	Cyprus International University (TRNC)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023 Ankara Time 16:00-18:00 The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-2 / YÜZ-YÜZE OTURUM-2 SALON 2/HALL 2 MODERATOR: Assoc. Prof. Dr. Sultan Sevinç KURT KONAKOGLU</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>The Impact Of Culture On Foreign Policy And Political Science</b>	<ul style="list-style-type: none"><li>• Murat BAYAR</li></ul>	İstanbul Esenyurt University (Türkiye)
<b>Greywater Use in Landscape Architecture</b>	<ul style="list-style-type: none"><li>• Özgür KAMER AKSOY</li></ul>	Aydın Adnan Menderes University (Türkiye)
<b>Determination of the Ecotourism Potential of Beşparmak (Latmos) Mountains</b>	<ul style="list-style-type: none"><li>• Tendü Hilal GÖKTUĞ</li><li>• Bahattin SÜRÜCÜ</li></ul>	Aydın Adnan Menderes University (Türkiye)
<b>Interaction Between Energy And Environment of Mogan And Eymir Lakes in Ankara Urban Settlement And Analysis Problems</b>	<ul style="list-style-type: none"><li>• Yaşar Bahri ERGEN</li></ul>	Aksaray University (Türkiye)
<b>Rural Area Planning and Its Ecological Foundations</b>	<ul style="list-style-type: none"><li>• Öner DEMİREL</li><li>• Meryem Bihter BİNGÜL BULUT</li><li>• Tuğba ÜSTÜN TOPAL</li></ul>	Kırıkkale University (Türkiye)
<b>Soil Moisture Differences Between Micro Catchments And Terraces</b>	<ul style="list-style-type: none"><li>• Bülent TOPRAK</li><li>• Yasin KARAŞIN</li><li>• Derya EŞEN</li><li>• Aydın ÇÖMEZ</li><li>• Süleyman AKBULUT</li><li>• Hasan Ali DEMİR</li><li>• Ayhan AKYOL</li><li>• Melis ÇERÇİOĞLU</li><li>• Aylin GÜNEY</li><li>• Muhammed Ali AYDIN</li><li>• Burak BAHAR</li><li>• Mehmet Ali ÜNLÜ</li></ul>	İzmir Katip Çelebi University (Türkiye)
<b>Examination of Green Chemistry Technologies in the Characterization of Protein-Based Drugs</b>	<ul style="list-style-type: none"><li>• Hacı Mehmet KAYILI</li></ul>	Karabük University (Türkiye)
<b>Importance of Integrated Use of Geographical Information Systems (GIS) and Remote Sensing Methods in the Planning of Rural Areas</b>	<ul style="list-style-type: none"><li>• Yaşar Selçuk ERBAS</li><li>• Sultan Sevinç KURT KONAKOGLU</li><li>• Kadir Tolga CELİK</li></ul>	Trabzon University (Türkiye)





**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023 Ankara Time 18.00-20.00 The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-3 / YÜZ-YÜZE OTURUM-3 SALON 1/HALL 1 MODERATOR: Prof.Dr. Kağan GÜNÇE</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Applying Bedzed's Sustainable Community Strategies In Yenikent: A Case Study Of Sustainable Development In North Cyprus</b>	<ul style="list-style-type: none"><li>• George Onome Akpojevwe</li><li>• Monzer Jaghlit</li><li>• Elnaz Farjami</li></ul>	Near East University (TRNC)
<b>Balancing Rural Serenity and Urban Development: Analyzing the Impact of High-Rise Buildings on Rural Residential Areas</b>	<ul style="list-style-type: none"><li>• Monzer Jaghlit</li><li>• Ayten Özsavaş Akçay</li><li>• Mustafa Eyyamoğlu</li></ul>	Near East University (TRNC)
<b>Exploring Perception of Residents Regarding the Open Green Spaces in Güzelyurt, Cyprus</b>	<ul style="list-style-type: none"><li>• Buket ASILSOY</li><li>• Sinem YILDIRIM</li><li>• Özge ÖZDEN</li></ul>	Near East University (TRNC)
<b>Meta-Modernism In Architecture And Gender Equality: A Critical Review of Women In Public Space</b>	<ul style="list-style-type: none"><li>• Gözde Buğday</li><li>• Rafooneh Mokhtarshahi Sani</li></ul>	Eastern Mediterranean University (TRNC)
<b>The Effect of Design Decisions on Energy Performance in Residential Buildings: Example of Local Housing Projects</b>	<ul style="list-style-type: none"><li>• Rahman SERTYAMAÇ</li><li>• Merve TUNA KAYILI</li></ul>	Karabük U (Türkiye)
<b>Crystalline Nanocomposites of Organic Linkers and Metal Ions with Rich Chemical Tunability: Nanoscale Metal–Organic Frameworks (NanoMOFs)</b>	<ul style="list-style-type: none"><li>• Nihayet KOÇYIĞİT</li></ul>	Batman University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>THURSDAY - 05.10.2023 Ankara Time 18:00-20.00 The Olive Tree Hotel</b>		
<b>IN PERSON SESSION-3 / YÜZ-YÜZE OTURUM-3 SALON 2/HALL 2 MODERATOR: Assoc.Prof.Dr.Ertan DÜZGÜNEŞ</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>The Critical Role of Resilience for the Management of Social-Ecological Landscapes: An Empirical Evidence from Lefke Region of TRNC</b>	<ul style="list-style-type: none"><li>• Gülay ÇETİNKAYA ÇİFTÇİOĞLU</li></ul>	Arkin University of Creative Arts and Design (TRNC)
<b>The Importance of Environmental Graphic Design for Rural Tourism</b>	<ul style="list-style-type: none"><li>• Elif ATAMAZ</li></ul>	European University of Lefke (TRNC)
<b>Responding To Sdg 11, Women's Use of Public Space: The Case Of İsmet Pasha Street In Uşak, Turkey</b>	<ul style="list-style-type: none"><li>• Gözde Buğday</li><li>• Rafooneh Mokhtarshahi Sani</li></ul>	Eastern Mediterreanean University (TRNC)
<b>A Two-Pronged Approach to Climate Change and Crop-Livestock Production</b>	<ul style="list-style-type: none"><li>• İsmail Ahmet UYGUN</li><li>• Dilek ARSOY</li></ul>	Near East University (TRNC)
<b>Being a University Student During The Covid-19 Pandemic: A Qualitative Study on the Academic and Daily Life Experiences of Social Work Department / Programme Students Studying at a Foundation University in Istanbul</b>	<ul style="list-style-type: none"><li>• Esra SOĞANCI</li></ul>	Ankara University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b>		
<b>Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-1 / OTURUM-1, SALON-1</b>		
<b>MODERATOR: Assoc.Prof.Dr.Ufuk COŞGUN</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>The Temporal Dynamics of Solid Litter Pollution in Rural Tourism Areas of The Southeastern Black Sea</b>	<ul style="list-style-type: none"><li>• Koray ÖZŞEKER</li><li>• Coşkun ERÜZ</li><li>• Neira Purwanty İSMAİL</li><li>• Bilal ONMAZ</li></ul>	KTU Institute of Marine Sciences and Technolgies (Türkiye)
<b>A Critique of Protected Areas Management Effectiveness Assessments in Turkey</b>	<ul style="list-style-type: none"><li>• Ufuk Cosgun</li><li>• Damla YILDIZ</li></ul>	Karabük University (Türkiye)
<b>Beach Litter Pollution Post-Pandemic Covid-19 Period (2020-2022) In The Southeast Black Sea</b>	<ul style="list-style-type: none"><li>• Neira Purwanty İSMAİL</li><li>• Koray ÖZŞEKER</li><li>• Coşkun ERÜZ</li></ul>	KTU Institute of Marine Sciences and Technolgies (Türkiye)
<b>Bibliometric Analysis of Postgraduate Thesis on Protected Areas in Turkey (1987-2023)</b>	<ul style="list-style-type: none"><li>• Damla YILDIZ</li><li>• Ufuk COŞGUN</li></ul>	Karabük University (Türkiye)
<b>Examining the Conservation-Tourism Relationship in Rural Areas in Anatolia with SWOT Analysis</b>	<ul style="list-style-type: none"><li>• Tuba Nur OLĞUN</li></ul>	Fırat University (Türkiye)
<b>Cooling Load in Buildings in the Context of Climate Change: Literature Review</b>	<ul style="list-style-type: none"><li>• Şükran YEMİŞÇİOĞLU</li><li>• Filiz ŞENKAL SEZER</li></ul>	Bursa Uludağ University (Türkiye)
<b>Archaeo-Village As A Rural Development Strategy, Uzuncaburç-Diocaesarea, Silifke-Mersin</b>	<ul style="list-style-type: none"><li>• Züleyha Sara BELGE</li><li>• Ümit AYDINOĞLU</li><li>• Burak BELGE</li></ul>	Mersin University (Türkiye)
<b>Tourism Sector In Balanced And Sustainable Development</b>	<ul style="list-style-type: none"><li>• Şeymus DEMİRCAN</li><li>• Onur ATAK</li></ul>	Muğla Sıtkı Kocman University (Türkiye)
<b>Sustaining Traditional Architecture In Contemporary Design Of International Architects: Cases From Rwanda And Zambia</b>	<ul style="list-style-type: none"><li>• Serge NTEZIYAREMYE</li><li>• Jordan BANDA</li><li>• Huriye GÜRDALLI</li></ul>	Near East University (TRNC)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-2 / OTURUM-1, SALON-2 MODERATOR: Assoc.Prof.Dr.Sima POUYA</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
Henry Moore's Sheep: Reflections on Drawing-Sculpture and Sculpture-Landscape	<ul style="list-style-type: none"><li>Yıldız Güner</li></ul>	Mimar Sinan Fine Arts University (Türkiye)
Maggi Hambling: The Art of Immortalizing	<ul style="list-style-type: none"><li>Yıldız Güner</li></ul>	Mimar Sinan Fine Arts University (Türkiye)
Reevaluating a "Rural Area Spatial Design Project" Implemented in Tekirdağ, in 2006 On Its 17th Anniversary in Terms of Sustainability	<ul style="list-style-type: none"><li>Jülide EDİRNE</li></ul>	Haliç University (Türkiye)
Cartographic Presentation of Landscape Plans: A Comparative Analysis of Mapping Techniques For Various Scales	<ul style="list-style-type: none"><li>Şükran ŞAHİN</li><li>Kevser Sena CEYLAN</li><li>Zeynep ÇETİNER</li></ul>	Ankara University (Türkiye)
Creating An Barrier-Free Route With The Navigation System For Wheelchair Users	<ul style="list-style-type: none"><li>Hatice KOCAASLAN</li><li>Sima POUYA</li></ul>	İnönü University (Türkiye)
Horticultural Therapy To Children With Mental Disability	<ul style="list-style-type: none"><li>Sima POUYA</li><li>Sahar POUYA</li></ul>	İnönü University (Türkiye)
Build Back Better For A More Resilience Environment	<ul style="list-style-type: none"><li>Sahar POUYA</li><li>Sima POUYA</li></ul>	Istanbul Technical University (Türkiye)
Effect of Energy Consumption and GDP on Environmental Quality in the Context of the Environmental Kuznets Curve Hypothesis	<ul style="list-style-type: none"><li>Fatma Türüç</li><li>Süheyla Üçışık Erbilin</li></ul>	Eastern Mediterranean University (TRNC)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b>		
<b>Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-3 / OTURUM-1, SALON-3</b>		
<b>MODERATOR: Assoc.Prof.Dr.Ahmet BENLİAY</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Making Landscape Design Easier: Blender Add-ons</b>	<ul style="list-style-type: none"><li>Ahmet BENLİAY</li><li>Orhun SOYDAN</li></ul>	Akdeniz University (Türkiye)
<b>Investigation of Pre-Freeze, Freeze and Post-Freeze Unconfined Compressive Strength Changes in Clays Subjected to Freeze-Thaw Cycles</b>	<ul style="list-style-type: none"><li>Yasemin PEKDEMİR</li><li>Ahmet Şahin ZAIMOĞLU</li><li>Fatih ARTUK</li></ul>	Atatürk University (Türkiye)
<b>Evaluation of Living Walls in the Example of Antalya City Center</b>	<ul style="list-style-type: none"><li>Ahmet BENLİAY</li><li>Orhun SOYDAN</li></ul>	Akdeniz University (Türkiye)
<b>Early period features of silage sorghum as affected by deficit irrigation and nitrogen fertilizer</b>	<ul style="list-style-type: none"><li>Emre KARA</li><li>Mustafa SÜRMEK</li></ul>	Aydın Adnan Menderes University (Türkiye)
<b>Evaluation on Electricity Energy Consumption of Kahramanmaraş Sütçü İmam University Medical Faculty And Market Electricity Prices</b>	<ul style="list-style-type: none"><li>Furkan DİNÇER</li><li>Demet ODABAŞ</li></ul>	Kahramanmaraş Sütçü İmam University (Türkiye)
<b>Winter cover crops as green manure in Mediterranean conditions: the effects on yield of silage maize</b>	<ul style="list-style-type: none"><li>Emre KARA</li><li>Mustafa SÜRMEK</li></ul>	Aydın Adnan Menderes University (Türkiye)
<b>Improving The Thermal Performance Of Lightweight Concrete Facade Panels: Aggregate Type</b>	<ul style="list-style-type: none"><li>Hatice Elif BEYTEKİN</li><li>Yahya KAYA</li><li>Ali MARDANI</li><li>Filiz ŞENKAL SEZER</li></ul>	Bursa Uludag University (Türkiye)
<b>Cultural Heritage Evaluation within the Context of Resilience: Bağlıköy Case</b>	<ul style="list-style-type: none"><li>Fatma BILDIR</li><li>M. Selen ABBASOĞLU ERMİYAGİL</li></ul>	European University (TRNC)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-4 / OTURUM-1, SALON-4 MODERATOR: Rozina Khattak</b>		
TITLE	AUTHORS	AFFILIATION
Climate Variable Rainfall Forecasting Using Arima Model In The Agra District	<ul style="list-style-type: none"> <li>Bob Stanley Gardner</li> </ul>	Bhimrao Ambedkar University
An Investigation Into The Physical Parameters Affecting The Exergy Efficiency Of Pvt Air Collectors	<ul style="list-style-type: none"> <li>Shalomin Gardner</li> </ul>	Bhimrao Ambedkar University
Influence of social media on banditry among farming rural communities in Giwa Local Government Area, Kaduna State	<ul style="list-style-type: none"> <li>Babasanya, Bankole,</li> <li>Ganiyu, L</li> <li>Omodona, S</li> </ul>	Federal College of Forestry Mechanization
Perceived Effect Of Soil Erosion On Arable Crop Production In Abia State, Nigeria	<ul style="list-style-type: none"> <li>Ukoha, J.C.I.,</li> <li>Kalu, U.</li> <li>Anyanwu, E. V.</li> </ul>	Michael Okpara University of Agriculture
Environmental Management Trainees' Green Entrepreneurial Intentions, Events And Fears In Nigeria	<ul style="list-style-type: none"> <li>Adebayo, O. A.,</li> <li>Oyewo, I.O.,</li> <li>Azeez, F.A</li> <li>Farayola C.O</li> </ul>	Federal College of Forestry
Removal of Brilliant Pink B Dye from Water for Environmental Remediation	<ul style="list-style-type: none"> <li>Rozina Khattak</li> </ul>	Shaheed Benazir Bhutto Women University
Redox Mechanism of Ferrocene Derivatives	<ul style="list-style-type: none"> <li>Rozina Khattak</li> </ul>	Shaheed Benazir Bhutto Women University



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b> <b>Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-5 / OTURUM-1, SALON-5</b> <b>MODERATOR: Skender DEMAKU</b>		
TITLE	AUTHORS	AFFILIATION
An examination of the environmental conditions and biodiversity at the Fontaine of Gazelle Dam in Biskra	<ul style="list-style-type: none"> <li>• Djellouli Amir</li> <li>• Berredjem Yamina</li> <li>• Hattab Zhor</li> <li>• Guesmia Hadjer</li> <li>• Mokhtar Mhenni</li> <li>• Azri Naima</li> <li>• Sara Ncibi</li> </ul>	Université mohammed chérif mesaadia de Souk-Ahras
Air Pollution In Indonesia	<ul style="list-style-type: none"> <li>• Alya Nisrina Huwaida</li> <li>• Hendri Hermawan ADINUGRAHA</li> <li>• M. Shulthoni</li> </ul>	UIN K.H. Abdurrahman Wahid Pekalongan
Chemical Analysis Of The River Of Prizren, Through Instrumental Analytical Methods	<ul style="list-style-type: none"> <li>• Skender DEMAKU</li> <li>• Donika SYLEJMANI</li> <li>• Arbnorë ALIU</li> <li>• Bahrije DOBRA</li> <li>• Jeton Halili</li> </ul>	University of Pristina
Chemical, physical and biological analysis of river water and sediment; Sitnica, Ibri, Trepça and Drenica - correlation with EU standards - for surface waters	<ul style="list-style-type: none"> <li>• Skender Demaku</li> <li>• Donika Sylejmani</li> <li>• Ermond Frangu</li> <li>• Lumturi Shkodra</li> <li>• Leonita Dugolli</li> <li>• Arbnorë Aliu</li> </ul>	University of Pristina
Conventional and non-conventional disinfection approaches to purifying drinking water	<ul style="list-style-type: none"> <li>• Zeba Ali Mumtaj</li> <li>• Abdul Rahman Khan</li> <li>• Saimah Khan</li> </ul>	Integral University
Visible-light driven photocatalytic effectiveness for solid-state synthesis of Bi <sub>24</sub> O <sub>31</sub> Br <sub>10</sub> nanophotocatalyst towards complete decolorization of rhodamine B from water.	<ul style="list-style-type: none"> <li>• L. Mllaoy</li> <li>• B. Akhsassi</li> <li>• B. Bakiz</li> <li>• S. Villain</li> <li>• F. Guinneton</li> <li>• A. Benlhachemi</li> </ul>	Université Ibn Zohr
Alleviation Of Phytotoxicity To Pea Plant Irrigated With Waste Water From Pharmaceutical Industry By Using Bacillus Cereus As Bio-Fertilizer	<ul style="list-style-type: none"> <li>• Iqra HAREEM</li> <li>• Sammina MAHMOOD</li> <li>• Umair ASHRAF</li> <li>• Rabia GHAFAR</li> <li>• Adeel SATTAR</li> </ul>	University of Education
Waste Production Makes Money In Pekalongan City	<ul style="list-style-type: none"> <li>• Rizqi Amelia Ramadina</li> <li>• Hendri Hermawan ADINUGRAHA</li> <li>• Muhammad SHULTHONI</li> </ul>	UIN K.H. Abdurrahman Wahid Pekalongan
Removing both inorganic and organic aqueous effluents with affordable bio-adsorbents	<ul style="list-style-type: none"> <li>• "Djellouli Amir</li> <li>• Berredjem Yamina</li> <li>• Hattab Zhor</li> <li>• Guesmia Hadjer</li> <li>• Mokhtar Mhenni</li> <li>• Azri Naima</li> <li>• Sara Ncibi"</li> </ul>	Université mohammed chérif mesaadia de Souk-Ahras



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b> <b>Ankara Time 09:00-11:00</b>		
<b>SESSION-1, HALL-6 / OTURUM-1, SALON-6</b> <b>MODERATOR: Subhashish Dey</b>		
TITLE	AUTHORS	AFFILIATION
Community Development Association: A Panacea For Rural Development In Ogun State	<ul style="list-style-type: none"> <li>• Salako, Oluwaseun Adewale</li> <li>• Bamiro, Tolulope Oluwatosin</li> </ul>	The Federal Polytechnic
An updated checklist of Meloidae Mylabrini (Coleoptera) and host plants in a Saharan oasis ecosystem in Algeria	<ul style="list-style-type: none"> <li>• Nacima DEGHCHE-DIAB</li> <li>• Marco Alberto BOLOGNA</li> <li>• Tesnim DEGHCHE</li> </ul>	Roma Tre University
Biosorptions Technology Applications for Treatment of Water by Using Flower Waste Biosorbents	<ul style="list-style-type: none"> <li>• Subhashish Dey</li> </ul>	Gudlavalleru Engineering College
Adsorption of methylene blue from textile industrial wastewater using bio- materials from barley bran plant	<ul style="list-style-type: none"> <li>• Mohamed RAOUI</li> <li>• Meriem KHELIF</li> <li>• Naima BOUCHENAFSA-SAIB</li> </ul>	University Center of Tipaza
Phenthoate toxicity evaluation in root meristem of <i>Pisum sativum L.</i>	<ul style="list-style-type: none"> <li>• Sazada Siddiqui</li> <li>• Habab Merghani Yassin Babikera</li> <li>• Mouna Jeridia</li> </ul>	King Khalid University
Replacement of fish meal with canola meal supplemented with citric acid to check the impact on Proximate Composition and Growth Parameters of <i>Cirrhinus mirgala</i> Fingerling	<ul style="list-style-type: none"> <li>• Muhammad Zubair Ul Hassan Arsalan</li> <li>• Syed Makhdoom Hussain</li> <li>• Arooba Mansoor</li> <li>• Malaika Aurangzaib</li> <li>• Sadia Tabassam</li> <li>• Zeshan Yousaf</li> <li>• Muhammad Amjad</li> </ul>	Khwaja Fareed University
Knowledge Of Farmers On Pesticide Safety Practices In Nsukka Local Government Area, Enugu State, Nigeria	<ul style="list-style-type: none"> <li>• Sundry Alagba OBAZI</li> <li>• Chiamaka Eucharua UBACHUKWU</li> <li>• Samuel Esheya ESHEYA</li> </ul>	University of Nigeria
Recent Advances Intercropping Approches For Stress Tolerance In Plants For Sustainable Agriculture	<ul style="list-style-type: none"> <li>• Rana Choukri</li> <li>• Mohamed Faize</li> <li>• Maria Manuela Rigano</li> <li>• Manuel Rodriguez-Concepcion</li> <li>• Jaime F. Martinez-Garcia</li> <li>• Michel Havaux</li> <li>• Mourad Baghour</li> </ul>	University Mohammed I
Parameter optimization of cationic dye adsorption on natural kaolinite clay based on central composite design, desirability function, and artificial neural network	<ul style="list-style-type: none"> <li>• Abdelali Aboussabek</li> <li>• Latifa Boukarma</li> <li>• Rachid Aziam</li> <li>• Abdellah Ousaa</li> <li>• Mohamed Zerbet</li> <li>• Mohamed Chiban</li> </ul>	Ibnou Zohr University
Anti-infertility Potentials of Hexane Extracts and Fractions of <i>Sesamum indicum</i> seeds on Cyclophosphamide-induced Spermatotoxicity in Male Wistar Albino Rats.	<ul style="list-style-type: none"> <li>• Ukpabi-Ugo, Jacinta Chigozie</li> <li>• Anosike, Chioma Assumpta</li> <li>• Ugwu, Obiora Celestine</li> </ul>	Michael Okpara University of Agriculture





**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b>		
<b>Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-1 / OTURUM-2, SALON-1</b>		
<b>MODERATOR: Prof.Dr.Mustafa BULAT</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Nature and Art</b>	<ul style="list-style-type: none"><li>Mustafa BULAT</li><li>Serap BULAT</li></ul>	Atatürk University (Türkiye)
<b>The Contribution of Art to Interdisciplinary Collaboration in the Production and Design of Artificial Reefs</b>	<ul style="list-style-type: none"><li>İlhan KAYA</li></ul>	Atatürk University (Türkiye)
<b>Transformation of Environmental Problems Into Art</b>	<ul style="list-style-type: none"><li>Esra TAŞAR</li></ul>	Üsküdar University (Türkiye)
<b>Sculpture As A Sign In The Natural Environment</b>	<ul style="list-style-type: none"><li>Muhammet Hanifi ZENGİN</li></ul>	Kafkas Univesity
<b>Land Art</b>	<ul style="list-style-type: none"><li>Mustafa BULAT</li><li>Maryam KARADAĞ</li></ul>	Atatürk University (Türkiye)
<b>The Existence Of The Desert In Art In Civilizations</b>	<ul style="list-style-type: none"><li>Mustafa BULAT</li><li>Gülümser ÖZLÜTÜRK</li></ul> BEYAZTAŞ	Atatürk University (Türkiye)
<b>Art Nouveau and Jewelry Artists Who Used Nature as Their Inspiration</b>	<ul style="list-style-type: none"><li>Önder YAĞMUR</li><li>Mehmet KARAMANOĞULLARI</li></ul> Arif	Atatürk University (Türkiye)
<b>Bread And Puppet Theatre Sustainable Aesthetics In Rural Areas</b>	<ul style="list-style-type: none"><li>Çağla Tulukçu Arkman</li></ul>	Mimar Sinan Fine Arts University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**

**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b>		
<b>Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-2 / OTURUM-2, SALON-2</b>		
<b>MODERATOR: Assoc.Prof.Dr.Murat YEŞİL</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>Distribution of Bungalow Type Accommodation Facilities in the Fırtına Basin According to Land Characteristics and Their Possible Effects on the Ecosystem</b>	<ul style="list-style-type: none"><li>• Turan YÜKSEK</li><li>• Ali Erdem ÖZÇELİK</li><li>• Filiz YÜKSEK</li><li>• Gülçay ERCAN OĞUZTÜRK</li></ul>	Recep Tayyip Erdoğan University (Türkiye)
<b>Evaluation Of Landscape Character And Tourism And Recreation Potential Of Gümüşhane Tomara Waterfall Nature Park</b>	<ul style="list-style-type: none"><li>• Elif ŞATIROĞLU</li><li>• Fatih BEKİRYAZICI</li><li>• Nursema YILMAZ</li></ul>	Recep Tayyip Erdoğan University (Türkiye)
<b>Examining The Tourism And Recreation Potential of Istanbul Neşet Suyu Nature Park In Terms of Conservation And Usage Principles</b>	<ul style="list-style-type: none"><li>• Fatih BEKİRYAZICI</li><li>• Elif ŞATIROĞLU</li><li>• Emine AYDIN</li></ul>	Recep Tayyip Erdoğan University (Türkiye)
<b>Intellectual Construction of Ecovillages As A Sustainable Development Model</b>	<ul style="list-style-type: none"><li>• Yelda Altunal Gürgen</li></ul>	Haliç University (Türkiye)
<b>Sustainable Water Management: The Role of University Campuses and Comparative Implementation Approach</b>	<ul style="list-style-type: none"><li>• Kadir GEZİCİ</li><li>• Erdal KESGİN</li></ul>	Atatürk University (Türkiye)
<b>Sustainability In Living Cultural Heritage: Topkapı Palace Gardeni</b>	<ul style="list-style-type: none"><li>• Betül Rüveyda Ay Ak</li><li>• Hande Sanem Çınar</li></ul>	İstanbul University-Cerrahpaşa (Türkiye)
<b>Rain Gardens; Example of The Ministry of Environment, Urbanism And Climate Change</b>	<ul style="list-style-type: none"><li>• Bilgenur AK</li></ul>	Ministry of Culture and Tourism (Türkiye)
<b>Router Green Network Elements on The Streets of The City</b>	<ul style="list-style-type: none"><li>• Seyhan SEYHAN</li><li>• Elif BAYRAMOĞLU</li><li>• Pınar Özge PARLAK</li></ul>	Karadeniz Technical University



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b>		
<b>Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-3 / OTURUM-2, SALON-3</b>		
<b>MODERATOR: Prof.Dr.Banu ÖZTÜRK</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
<b>A Situation Assessment Study for the Development of Strategies That Support Pedestrian Use: Bingol Capakcur Valley, Eskisaray Street</b>	<ul style="list-style-type: none"><li>Müge YURTCAN</li><li>Alperen MERAL</li><li>Banu Çiçek KURDOĞLU</li></ul>	Bingöl University (Türkiye)
<b>Kahramanmaraş Sütçü İmam University Faculty Of Medicine Solar Power Plant Design And Simulation For Electrical Energy Needs</b>	<ul style="list-style-type: none"><li>Furkan DİNÇER</li><li>Demet ODABAŞ</li></ul>	Kahramanmaraş Sütçü İmam University (Türkiye)
<b>Rural Landscapes in Cinematic Narratives</b>	<ul style="list-style-type: none"><li>Pınar ZEĞEREK ALTUNBEY</li></ul>	Akdeniz University (Türkiye)
<b>Examining the Alterations caused by Immigration in Rural Heritage Areas; As a Case Study Yenice Village, Muğla</b>	<ul style="list-style-type: none"><li>Funda GENÇER</li></ul>	Manisa Celal Bayar University (Türkiye)
<b>A Proposal For The Function Planning Process: An Example of Traditional Housing in Sille</b>	<ul style="list-style-type: none"><li>Şebnem ERTAŞ BEŞİR</li><li>Alper TORUN</li></ul>	Akdeniz University (Türkiye)
<b>Evaluation of Monumental Masjids Belonging to the Anatolian Seljuk Period in Konya in the Scope of Energy Efficiency</b>	<ul style="list-style-type: none"><li>Neriman Gül ÇELEBİ</li><li>Ümit ARPACIOĞLU</li></ul>	Mimar Sinan Fine Arts University (Türkiye)
<b>Evaluation of early age compressive and flexural strength performance of sustainable 3D printable concrete mixtures having high-volume fly ash</b>	<ul style="list-style-type: none"><li>Hatice Gizem Şahin</li><li>Ali Mardani</li></ul>	Bursa Uludag University (Türkiye)
<b>Influence of the Main Chain Length of Polycarboxylate-Based Water-Reducing Additives on Certain Fresh State Properties in Fly Ash-Substituted Systems</b>	<ul style="list-style-type: none"><li>Veysel Kobya</li><li>Ali Mardani</li></ul>	Bursa Uludag University (Türkiye)
<b>Evaluation of Traditional Houses in the Context of Sustainability; Case of Lefke</b>	<ul style="list-style-type: none"><li>M. Selen ABBASOĞLU ERMİYAGİL</li><li>Cemaliye SUNALP GÜRÇINAR</li></ul>	European University of Lefke (TRNC)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b> <b>Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-4 / OTURUM-2, SALON-4</b> <b>MODERATOR: • Vaibhav Kant Singh</b>		
TITLE	AUTHORS	AFFILIATION
Analysis of the soil composition of the substance and improvement of its quality using new data processing approaches	<ul style="list-style-type: none"> <li>Alexandrov V.S</li> </ul>	Kazan National Research Technical University named after A.N. Tupolev
Confirmation of Sanctuary Protocol in VANET utilizing SCYTHER	<ul style="list-style-type: none"> <li>Vaibhav Kant Singh</li> </ul>	Central University
A Disaster Tweet Manager doing Prediction Using Machine Learning Technology	<ul style="list-style-type: none"> <li>Vaibhav Kant Singh</li> </ul>	Central University
A Novel Procedure for Image Encryption	<ul style="list-style-type: none"> <li>Vaibhav Kant Singh</li> </ul>	Central University
A Genuine-time traffic surveillance Identification utilizing YOLO a state of the art Algorithm	<ul style="list-style-type: none"> <li>Vaibhav Kant Singh</li> </ul>	Central University
Analysis Of Outsourcing Services As A Tool For Organizational Sustainability	<ul style="list-style-type: none"> <li>Akintola, Akinwumi Kabir</li> <li>Akintola, Kafayat Adenike</li> </ul>	Oyo State College of Agriculture and Technology
Design, development & evaluation of Terbinafine loaded nanoemulgel for the treatment of Dermatophytosis	<ul style="list-style-type: none"> <li>Manvi Singh</li> <li>Rahmuddin khan</li> </ul>	SGT University
The possible pathway of water-borne species invasion in Malaysia: Where danger overthrows beauty	<ul style="list-style-type: none"> <li>Abdulla-Al-Asif</li> <li>Abu Hena Mustafa Kamal</li> <li>Hadi Hamli</li> <li>Mohd Hanafi Idris</li> <li>Geoffery James Gerusu</li> <li>S. M. Lutful Kabir</li> </ul>	Universiti Putra Malaysia
A Meshless Method For The Solutions Of Variable Order Fractional Partial Differential Equations Via Radial Bases Functions	<ul style="list-style-type: none"> <li>Zahid Ali</li> </ul>	Atlantic Technological University



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-5 / OTURUM-2, SALON-5 MODERATOR: Moses Adeolu AGOI</b>		
TITLE	AUTHORS	AFFILIATION
Exploring The Impact Of Iot-Based Irrigation System On Crop Farming: Implication For Smart Agricultural Practices	<ul style="list-style-type: none"> <li>• Moses Adeolu AGOI</li> <li>• Oluwanifemi Opeyemi AGOI</li> <li>• Oluwadamilola Peace AGOI</li> </ul>	Lagos State University of Education
Molecular approaches for detection of antibiotic residues in dairy milk	<ul style="list-style-type: none"> <li>• Sehrish Firyal</li> <li>• Rumisha Raza</li> </ul>	University of Veterinary and Animal Sciences
Iron deficiency anaemia in pregnancy: reexamining the nature and magnitude of this public health concern	<ul style="list-style-type: none"> <li>• Sheila Ojei Michael</li> </ul>	Admiralty University of Nigeria
Anticipating Risk Mapping for Land Movements in Morocco's Middle Rif Region	<ul style="list-style-type: none"> <li>• Hammouti Marwane</li> <li>• El Haim Mohamed</li> </ul>	Abdelmalek Essaâdi University
Enhanced Performance of Adiponectin – Linked Flavonoids Anti-Obesity Drug Target: An In-Silico Discovery	<ul style="list-style-type: none"> <li>• Idoko Alexander</li> <li>• Parker Joshua</li> </ul>	Caritas University
The Significance of Digital Marketing and Machine Learning in Shaping Ecotourism Behavior	<ul style="list-style-type: none"> <li>• Ihor PONOMARENKO</li> <li>• Dmytro PONOMARENKO</li> </ul>	State University of Trade and Economics
Development of pineapple jam incorporated with chia seed and honey	<ul style="list-style-type: none"> <li>• Rudro Deb Sardar</li> </ul>	Bangladesh Agriculture University
The effect of irrigation on Syrah (Vitis vinifera L.) juice composition	<ul style="list-style-type: none"> <li>• sould imen</li> </ul>	Bangladesh Agriculture University
Experimental study on borided AISI H13 steel	<ul style="list-style-type: none"> <li>• Zahra Nait Abdellah</li> <li>• Mourad Keddami</li> </ul>	Université Mouloud Mammeri
Antioxidant Effect of Ethanol Fraction of Terminalia ivorensis Roots on Croton oil Induced Haemorrhoid in Albino Rats	<ul style="list-style-type: none"> <li>• Ugwoke, F. I.,</li> <li>• Okey, E. N,</li> <li>• Ozioko, Juliet N,</li> <li>• Ugwu, O. C .</li> <li>• Joshua, P. E.</li> </ul>	University of Nigeria
Molecular Identification and Characterization of Bovine Ephemeral Fever (BEF) virus in Bovines	<ul style="list-style-type: none"> <li>• Ahmed Riaz Khan</li> <li>• Sehrish Firyal</li> <li>• Muddassir Ali</li> </ul>	University of Veterinary and Animal Sciences



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development (RUDESU2023)**  
**October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023</b> <b>Ankara Time 11:30-13:30</b>		
<b>SESSION-2, HALL-6 / OTURUM-2, SALON-6</b> <b>MODERATOR: Muhammad Imran</b>		
TITLE	AUTHORS	AFFILIATION
Induced Chemical Mutation In <i>Crocsmia Crocosmiiflora</i>	<ul style="list-style-type: none"> <li>Krupa-Mańkiewicz Marcelina</li> <li>Ochmian Ireneusz</li> </ul>	West Pomeranian University of Technology Szczecin
Optimization of Culture Conditions for Production of Lipase from <i>Aspergillus</i> sp.	<ul style="list-style-type: none"> <li>Ezenwelu, Chijioke O.,</li> <li>Oladejo Afeez, A.,</li> <li>Oparaji, E.H</li> </ul>	Nnamdi Azikiwe University
Sunflower Oilseeds Importance And Applications	<ul style="list-style-type: none"> <li>Muhammad Imran</li> </ul>	Government College University
Rooibos Tea Is One Of The New Types Of Food Products	<ul style="list-style-type: none"> <li>I. S. Burlaka</li> </ul>	Kharkiv International Medical University
Modern-Agri Technology Usage And Challenges Among Young Agropreneur In Kedah, Malaysia.	<ul style="list-style-type: none"> <li>Nur Syazwani Binti Mohd Nawil</li> <li>Siti Najatul Ajierah Binti Beng Adzeman</li> </ul>	Universiti Utara Malaysia
Study of the Effects of Occupational Exposure to Volatile Organic Compounds (VOCs) Content of Automobile Spray Paint in Albino Rats	<ul style="list-style-type: none"> <li>Ogbodo, John Onyebuchi</li> <li>Njoku, Obioma Uzoma</li> <li>Onwurah, Ikechukwu Noel Emmanuel</li> </ul>	University of Nigeria
Assessing Disease Prevalence and Antibiotic Usage in Pond Aquaculture: A Public Health Concern in Narsingdi, Bangladesh	<ul style="list-style-type: none"> <li>Abu Kawsar</li> </ul>	Sylhet Agricultural University
Evaluating The Environmental Impact Of A Drinking Water Production Plant Using The Life Cycle Assessment Approach	<ul style="list-style-type: none"> <li>Nihade Bensitel</li> <li>Khadija Haboubi</li> <li>Achraf El Kasmi</li> </ul>	Abdelmalek Essaadi University,
Classification Of Second Order Ordinary Differential Equations Using Lambda Symmetries	<ul style="list-style-type: none"> <li>Maliha Gohar</li> </ul>	Kohat University of Science and Technology
Emergenc of Polyglot Entrainment in the Hodgkin-Huxley Model	<ul style="list-style-type: none"> <li>Rakhshanda qasim</li> </ul>	Kohat University of Science & Technology



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 14:00-16:00</b>		
<b>SESSION-3, HALL-1 / OTURUM-3, SALON-1 MODERATOR: Assoc.Prof.Dr.Muberra PULATKAN</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
Determination of The Usage Areas of Rhodothamnus sessilifolius P. Plant in Landscape	<ul style="list-style-type: none"><li>Müberra PULATKAN</li><li>Gülçay ERCAN OĞUZTÜRK</li></ul>	Karadeniz Technical University (Türkiye)
Some Threatened Endemic Species in Ankara and Studies on Their Protection	<ul style="list-style-type: none"><li>Necati Yalçın</li><li>Mehmet Tunçer</li><li>Mecit Vural</li></ul>	Çankaya University (Türkiye)
Understanding the Design Principles of Vernacular Architecture: Spatial Analysis of Traditional Safranbolu Houses	<ul style="list-style-type: none"><li>Rüveyda ŞAHİN</li><li>Ahmet Emre DİNÇER</li></ul>	Sakarya University of Applied Sciences (Türkiye)
An Architectural Criticism on Contemporary Housing in North Cyprus- Nicosia by Investigating Projection Typology	<ul style="list-style-type: none"><li>Feriha URFALI DOĞU</li><li>Erçim ULUĞ</li></ul>	European University of Lefke (TRNC)
Investigation of Worship Buildings in Turkey in the Context of Cultural Heritage: The Case of İstanbul and İznik	<ul style="list-style-type: none"><li>Ayşenur KANDEMİR</li><li>Turgut KALAY</li></ul>	İstanbul Nişantaşı University (Türkiye)
A New Model Proposal In Rural Development: Mudurnu Virtual Museum Project	<ul style="list-style-type: none"><li>Meral VURAL</li><li>Pınar ÖZAYAN</li><li>Burcu BOSTANCI</li><li>Ceren BALMUMCU</li><li>Ayşe Ege YILDIRIM</li></ul>	Bolu Abant İzzet Baysal University (Türkiye)
An Assessment Of The Benefits Of Incorporating Public Art Into Public Spaces	<ul style="list-style-type: none"><li>Mustapha Abdulmumini</li><li>Shabnam Golkarian</li></ul>	Near East University (TRNC)





**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 14:00-16:00</b>		
<b>SESSION-3, HALL-2 / OTURUM-3, SALON-2 MODERATOR: Sibel AKTEN</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
Examination of Edible Flowers In Terms Of Different Culinary Cultures	<ul style="list-style-type: none"><li>Sibel AKTEN</li><li>Gülsüm KASAP</li></ul>	Isparta University of Applied Sciences (Türkiye)
Evaluation of Spatial Planning Policies and Practices in Rural Settlements from Past to Present of Türkiye	<ul style="list-style-type: none"><li>Çağla AYDEMİR</li><li>Atıla GÜL</li></ul>	Süleyman Demirel University (Türkiye)
Plant Biodersity and Maintenance Practices in Tourism Facilities: The Example of Antalya	<ul style="list-style-type: none"><li>Ceren SELİM</li><li>Beyza KOCA</li></ul>	Akdeniz University (Türkiye)
Eco-museum Approach for Sustainable Rural Tourism Development	<ul style="list-style-type: none"><li>Meryem Bihter BİNGÜL BULUT</li><li>Tuğba ÜSTÜN TOPAL</li><li>Öner DEMİREL</li></ul>	Kırıkkale University (Türkiye)
Monitoring of Sünnet Lake Natural Park through Geographic Information Systems and Remote Sensing Methods	<ul style="list-style-type: none"><li>Tuğba ÜSTÜN TOPAL</li><li>Meryem Bihter BİNGÜL BULUT</li><li>Öner DEMİREL</li></ul>	Namık Kemal University (Türkiye)
Ekolojik Restorasyonda Bir Köprü: Yaban Hayatı Geçitleri	<ul style="list-style-type: none"><li>Elvan ADA</li></ul>	İstanbul Galata University (Türkiye)
Assessing the Relationship between Plant Species Diversity and Land Heterogeneity: The Case of Düzce	<ul style="list-style-type: none"><li>Tuba Gül DOĞAN</li><li>Nermin BAŞARAN</li><li>Engin EROĞLU</li></ul>	Duzce University (Türkiye)
Environmental Problems in The Sustainability of Medicinal and Aromatic Plants Growing Spontaneously in Nature: Sultanmurat Region Plateaus	<ul style="list-style-type: none"><li>Bilgin GÜNER</li><li>Emrah KARA</li><li>Emine YILMAZ</li><li>Hüseyin ÇEKEN</li></ul>	Muğla Sıtkı Koçman University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 14:00-16:00</b>		
<b>SESSION-3, HALL-3 / OTURUM-3, SALON-3 MODERATOR: Prof.Dr.Turan YÜKSEK</b>		
<b>TITLE</b>	<b>AUTHORS</b>	<b>AFFILIATION</b>
Evaluation of City Images Through The Cognitive Maps Of City Residents: The Example Of Ordu Province	<ul style="list-style-type: none"><li>• Rabia Nurefşan KARABÖRK</li><li>• Murat YEŞİL</li></ul>	Ordu University (Türkiye)
Suitable Growing Environment And Ecological Planning Of The 'Walnut Tree' With Geographical Information Systems Based Multi-Direction Decision Analysis	<ul style="list-style-type: none"><li>• G. Funda GÖKÇE</li><li>• Ömer ÖZTOPRAK</li><li>• Öner DEMİREL</li></ul>	Düzce University (Türkiye)
Modeling the Solar Energy Gain of Buildings with Fuzzy Logic Method	<ul style="list-style-type: none"><li>• Gonca ÖZER YAMAN</li></ul>	Bingöl University (Türkiye)
A Field Study on the Effect of Crown Area of Individual Trees on Throughfall	<ul style="list-style-type: none"><li>• Betül ÖZER</li><li>• Huseyin SENSOY</li><li>• İlyas BOLAT</li><li>• Akın KAMIŞ</li></ul>	Bartın University (Türkiye)
Effects Of Road Planning On Economic And Social Structure: The Case of Ordu City Centre (D010 Highway)	<ul style="list-style-type: none"><li>• Murat YEŞİL</li><li>• Mesut GUZEL</li></ul>	Ordu University (Türkiye)
Serçeme Valley Unique Rural Landscape Character Areas; Possible Recreational Tourism Opportunities	<ul style="list-style-type: none"><li>• Meryem ŞENGÜL KAPLAN</li><li>• Hasan YILMAZ</li></ul>	Atatürk University (Türkiye)
A New Approach to Determining Protected Area Management Effectiveness: IUCN Green List Criteria	<ul style="list-style-type: none"><li>• Oğuz KURDOĞLU</li><li>• Nazlı ÖĞÜT</li></ul>	Karadeniz Technical University (Türkiye)
Loss of Identity in the Interaction of Rural Tourism and Traditional Housing	<ul style="list-style-type: none"><li>• İrem BEKAR</li><li>• Mert ÇAKIR</li></ul>	Karadeniz Technical University (Türkiye)



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 14:00-16:00</b>		
<b>SESSION-3, HALL-4 / OTURUM-3, SALON-4 MODERATOR: Athanasios Sotirios Dounavis</b>		
TITLE	AUTHORS	AFFILIATION
Biofuels production in a continuous system from waste biomass valorization	<ul style="list-style-type: none"> <li>Athanasios Sotirios Dounavis</li> </ul>	University of Western Macedonia
Adaptation strategies to herders' farm intrusion of female-headed households' in Nsukka Agricultural zone in Enugu state, Nigeria.	<ul style="list-style-type: none"> <li>Ngwu Blessing Sochima</li> <li>Okoro, John Chukwuma</li> </ul>	University of Nigeria
Fixed points of set-valued mappings in Menger probabilistic metric spaces endowed with an amorphous binary relation	<ul style="list-style-type: none"> <li>Gopi Prasad</li> </ul>	Dr Shivanand Nautiyal Govt. P.G. College
Bacterial Endophytes: A Natural Defence Against Collar Rot Pathogen <i>Sclerotium rolfsii</i> in Brinjal	<ul style="list-style-type: none"> <li>AJAYDESOUZA V</li> <li>VIGNESH K</li> <li>LOKESH R</li> <li>SATHIYA ARAVINDAN V</li> <li>SABARI GRISH P</li> </ul>	Annamalai University
Adaptation strategies to herders' farm intrusion of female-headed households' in Enugu-Ezike Agricultural zone in Enugu state, Nigeria	<ul style="list-style-type: none"> <li>Umeojiaku, Eucharia Ogechukwu</li> <li>Okoro, John Chukwuma</li> </ul>	University of Nigeria
Extension needs of farmers in the sustainable production of future smart foods in Nsukka Agricultural Zone, Enugu State.	<ul style="list-style-type: none"> <li>Okoroegbe, Adaobi Pearl</li> <li>Okoro, John Chukwuma</li> </ul>	University of Nigeria
Ecology And Restoration Of Natural Heritage In Rural Areas: A Path Towards Sustainable Development	<ul style="list-style-type: none"> <li>OISHI BISWAS</li> </ul>	Indian National Trust For Art and Cultural Heritage
Waste Management Practices Among Poultry Farmers In Enugu North Senatorial Zone, Enugu State, Nigeria	<ul style="list-style-type: none"> <li>Udoye, Charles Ekene</li> <li>Okwor, Juliet Nneka</li> </ul>	University of Nigeria



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

FRIDAY - 06.10.2023 Ankara Time 14:00-16:00		
SESSION-3, HALL-5 / OTURUM-3, SALON-5 MODERATOR: Giuli Keshelashvili		
TITLE	AUTHORS	AFFILIATION
Exploring the Impact of Industrial Discharges on Soil Contamination by Heavy Metals: A Case Study in the Soil of Mohammedia, Morocco	<ul style="list-style-type: none"> <li>• Safaa Khattabi Rifi Khadija Zahidi</li> <li>• Salah Souabi</li> <li>• Ilham Nassri</li> <li>• Latifa Mouhir</li> </ul>	University Hassan II
An Review on Antioxidants: Solution to Oxidative Stress	<ul style="list-style-type: none"> <li>• Adan Naeem</li> <li>• Syed Makhdoom Hussain</li> <li>• Danish Riaz</li> <li>• Zubair-ul-Hassan Arsalan</li> <li>• Adnan Khalid</li> <li>• Muhammad Faisal</li> <li>• Zeeshan Yousaf</li> <li>• Eman Naeem</li> </ul>	Government College University
A Review on Harmful Algal Blooms: Its Causes, Impacts and Mitigation	<ul style="list-style-type: none"> <li>• Eman Naeem</li> <li>• Syed Makhdoom Hussain</li> <li>• Danish Riaz</li> <li>• Zubair-ul-Hassan Arsalan</li> <li>• Adnan Khalid</li> <li>• Muhammad Faisal</li> <li>• Muhammad Amjad</li> <li>• Adan Naeem</li> </ul>	Government College University
Effect of the Methanol Fraction of Cuminum cyminum Leaves on Acetaminophen-Induced Hepatotoxicity in Wistar Rats	<ul style="list-style-type: none"> <li>• Chinedu Happiness Uzoagulu</li> <li>• Obioma Uzoma Njoku</li> <li>• Ugochi Olivia Njoku</li> <li>• Anthony Amaechi Attama</li> <li>• Benjamin Uchenna Modozie</li> </ul>	University of Nigeria Nsukka
Analysis Of Heavy Metals In A Typical Constructed Pond	<ul style="list-style-type: none"> <li>• Edith Nwakaego Okey</li> <li>• Omagbemi Omololu Yaya</li> <li>• Ugwoke F.I.</li> <li>• Okoro J.P.</li> <li>• Okey P.C.</li> </ul>	Kwame Nkrumah University of Science and Technology
Distribution And Importance Of Lactuca Saligna L. (Willow-Leaf Lettuce) From The Azerbaijani Flora	<ul style="list-style-type: none"> <li>• Shukurlu Emil Namig</li> </ul>	Institute of Botany
Adaptation strategies to herder's farm intrusion of female headed households in Agbani Agricultural zone of Enugu state, Nigeria.	<ul style="list-style-type: none"> <li>• Ezema, Cynthia Odinaka</li> <li>• Okoro, John Chukwuma</li> </ul>	University of Nigeria
Business Concentration And Determining Factors Of Agglomeration	<ul style="list-style-type: none"> <li>• Giuli Keshelashvili</li> <li>• Mariami Jibuti</li> </ul>	Tbilisi State University
Dynamics Of Supra-Urban Land Hoarding Activities In Nigeria	<ul style="list-style-type: none"> <li>• Kazeem .B. AKINBOLA</li> <li>• Toluwalase. G. OLUWOLE</li> <li>• Iyabo .A. OLADENI</li> </ul>	The Federal Polytechnic



**4<sup>th</sup> International Rural Areas Congress Within the Framework of Sustainable Development  
(RUDESU2023)  
October 05-06, 2023, Kyrenia, T.R.N.C.**

<b>FRIDAY - 06.10.2023 Ankara Time 14:00-16:00</b>		
<b>SESSION-3, HALL-6 / OTURUM-3, SALON-6 MODERATOR: Adhy Firdaus</b>		
TITLE	AUTHORS	AFFILIATION
Valuation Of Argan Leaves Extract As Green Corrosion Inhibitor For Steel In 1m Hcl	<ul style="list-style-type: none"> <li>• Laila AFIA</li> <li>• Abdelileh MABROUK</li> </ul>	Ibnou Zohr University
Implementation Of Fiscal Decentralization In Indonesia	<ul style="list-style-type: none"> <li>• Sigit Pramono</li> <li>• Hendri Hermawan Adinugraha</li> </ul>	UIN K.H. Abdurrahman Wahid Pekalongan
Water safety information needs of rural women farmers in Nsukka Agricultural zone Enugu state, Nigeria	<ul style="list-style-type: none"> <li>• Aguorah, Ogechi Loveth</li> <li>• A. E Agwu</li> <li>• Okoro, John Chukwuma</li> </ul>	University of Nigeria
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Promotion of Green Infrastructure to Enhance Urban Resilience to Climate Change	<ul style="list-style-type: none"> <li>• Afsana Mimi</li> <li>• Akhi Nandi</li> </ul>	Jahangirnagar University
Chemical Compozition And Nutritional Value Of Taraxacum Officinale	<ul style="list-style-type: none"> <li>• Ala FULGA</li> </ul>	State University of Medicine and Pharmacy
A Study On Indian Agriculture And Agriculture Policy – Achievements, Challenges And Way Ahead	<ul style="list-style-type: none"> <li>• PL. Vallimayil</li> <li>• Jayashankar.J</li> </ul>	Chettinad Academy of Research and Education



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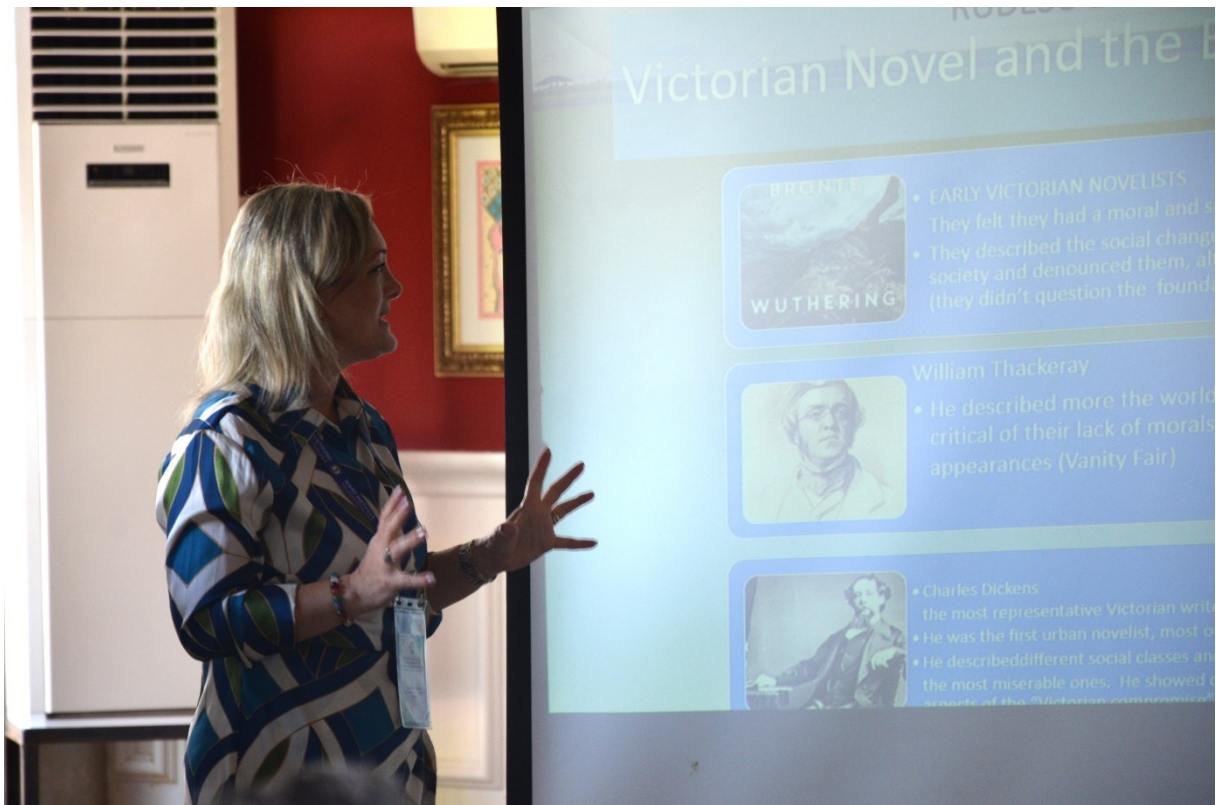




























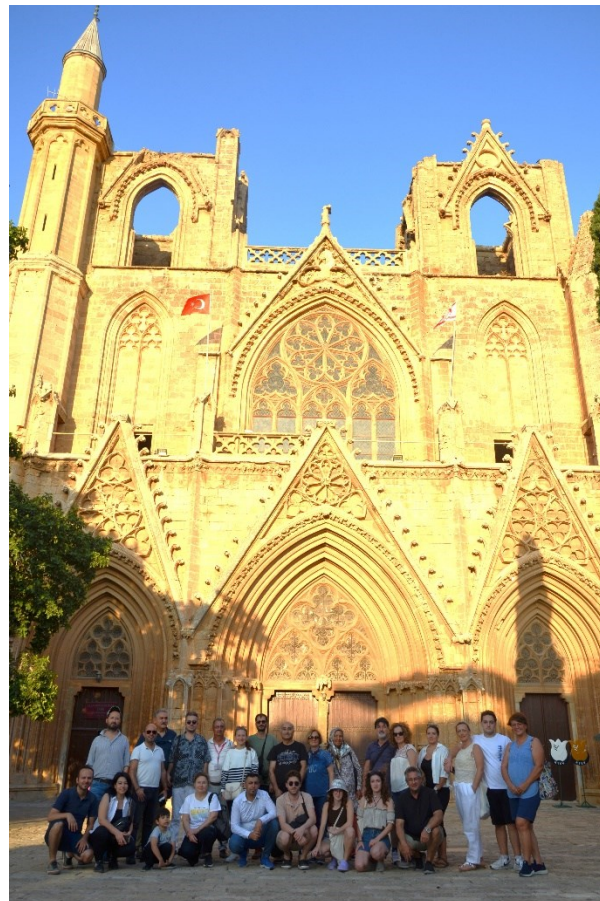












# CONTENTS

<b>CONGRESS ID</b>		
<b>PROGRAM</b>		
<b>PHOTO GALLERY</b>		
<b>CONTENTS</b>		
<b>Authors</b>	<b>TITLE</b>	<b>Page Number</b>
<b>ABSTRACTS</b>		
Edith Nwakaego Okey Omagbemi Omolaju Yaya Ugwoke F.I. Okoro J.P. Okey P.C.	Analysis Of Heavy Metals In A Typical Constructed Pond	1
Shukurlu Emil Namig	Distribution And Importance Of Lactuca Saligna L. (Willow-Leaf Lettuce) From The Azerbaijani Flora	2
Ezema, Cynthia Odinaka Okoro, John Chukwuma	Adaptation strategies to herder's farm intrusion of female headed households in Agbani Agricultural zone of Enugu state, Nigeria.	3
Giuli Keshelashvili Mariami Jibuti	Business Concentration And Determining Factors Of Agglomeration	4
Kazeem .B. Akinbola Toluwalase. G. Oluwole Iyabo A. Oladeni	Dynamics Of Supra-Urban Land Hoarding Activities In Nigeria	5
Laila Afia Abdelileh Mabrouk	Valuation Of Argan Leaves Extract As Green Corrosion Inhibitor For Steel In 1m Hcl	6
Sigit Pramono Hendri Hermawan Adinugraha	Implementation Of Fiscal Decentralization In Indonesia	7
Aguorah, Ogechi Loveth A. E Agwu Okoro, John Chukwuma	Water safety information needs of rural women farmers in Nsukka Agricultural zone Enugu state, Nigeria	8
Adhy Firdaus Putri Noor Ramayanti Sukardi	Leadership Style Of The First Four Islamic Leaders: A View Of Indonesian Islamic Communities	10
Adhy Firdaus Hendra Candra Tohiroh	Business Ethics In The View Of Culinary Business Entrepreneurs: A Qualitative Study On The Msme's Street Food Stall Business Management In Jakarta	11
Arruje Hameed Mariyam Aslam Tahir Farooq Amjad Hameed	Chitosan-based nanopriming elicit tolerance against ionic toxicity in wheat seedlings	12
Afsana Mimi Akhi Nandi	Promotion of Green Infrastructure to Enhance Urban Resilience to Climate Change	13
Pl. Vallimayil Jayashankar.J	A Study On Indian Agriculture And Agriculture Policy – Achievements, Challenges And Way Ahead	14
Souid İmen	The effect of irrigation on Syrah (Vitis vinifera L.) juice composition	15
Doğa Üzümcüoğlu	Symbiotic Synergy: Exploring Waterfront Architecture Theory, Rural Areas, and Environmental Harmony	16
Nafiseh Zamanzadeh Elnaz Farjami	Transforming Historic Buildings For Modern Purpose (Case Study: England)	18

Shabnam Golkarian		
Ömer Atabeyoğlu Özge Şimşek Yılmaz	Nature Based Urban Structure; Transformation of the Leaf to the City	20
Aliye Menteş	Physical Impact Assessment of Tourism in Traditional Bellapais Village	21
Ayşen Berberoğlu Tolga Öz Risalat Rahmedova	The Effect of Reflective Moral Attentiveness on Voluntary Green Work Behavior of Employees	23
Pooya Lotfabadi Aminreza Iranmanesh	Assessing The Integration of Ecological Conscious Building Design Techniques In Architecture Pedagogy	24
Serdar Gürçay	Alevî-Bektâşî Hagiography Texts in the Context of Ecocritical Theory	25
M. Semih Summak	From Ibn Khaldun's Assabiyah to Sen and Nussbaum's Capability Theory: Exploring the Dynamics of Sustainable Developmenté	27
Ayşe Çalik Ross	Prospects for Ecotourism in Gülnar and Aydıncık (Cilicia): The Historical Dimension	28
Bariş Kalender	Examination of The Life Studies Curriculum in Terms of Sustainable Environmental Awareness	29
Afşin Ayhan Banu Çiçek Kurdoğlu	Ecosystem Services And Resilience: Two Key Concepts Complementing Each Other	30
Burcu Toker Ehsan Daneshyar	Documentation of Edible And Ornamental Cypriot Plants In Lapta Village In Kyrenia District: A Qualitative Analysis	31
Sevil Aydinlik Başar Sertaç Ilter	Bellapais Monastery and Its Surroundings: A Case Study in Cultural Tourism Sustainability	32
Murat Bayar	The Impact Of Culture On Foreign Policy And Political Science	33
Özgür Kamer Aksoy	Greywater Use in Landscape Architecture	34
Bülent Toprak Yasin Karaşin Derya Eşen Aydın Çömez Süleyman Akbulut Hasan Ali Demir Ayhan Akyol Melis Çerçioğlu Aylin Güney Muhammed Ali Aydın Burak Bahar Mehmet Ali Ünlü	Soil Moisture Differences Between Micro Catchments And Terraces	35
George Onome Akpojevwe Monzer Jaghlit Elnaz Farjami	Applying Bedzed's Sustainable Community Strategies In Yenikent: A Case Study Of Sustainable Development In North Cyprus	37
Monzer Jaghlit Ayten Özsvaş Akçay Mustafa Eyyamoğlu	Balancing Rural Serenity and Urban Development: Analyzing the Impact of High-Rise Buildings on Rural Residential Areas	38
Buket Asilsoy Sinem Yildirim Özge Özden	Exploring Perception of Residents Regarding the Open Green Spaces in Güzelyurt, Cyprus	39
Gözde Buğday Rafooneh Mokhtarshahi Sani	Responding To Sdg 11, Women's Use of Public Space: The Case Of İsmet Pasha Street In Uşak, Turkey	40

Gözde Buğday Rafooneh Mokhtarshahi Sani	Meta-Modernism In Architecture And Gender Equality: A Critical Review of Women In Public Space	41
Gülây Çetinkaya Çiftçioğlu	The Critical Role of Resilience for the Management of Social- Ecological Landscapes: An Empirical Evidence from Lefke Region of TRNC	42
Elif Atamaz	The Importance of Environmental Graphic Design for Rural Tourism	43
İsmail Ahmet Uygun Dilek Arsoy	A Two-Pronged Approach to Climate Change and Crop- Livestock Production	44
Ala Fulga	Chemical Compozition And Nutritional Value Of Taraxacum Officinale	45
Tuba Nur Olğun	Examining the Conservation-Tourism Relationship in Rural Areas in Anatolia with SWOT Analysis	46
Şeyhmus Demircan Onur Atak	Tourism Sector In Balanced And Sustainable Development	47
Serge Nteziyaremye Jordan Banda Huriye Gürdalli	Sustaining Traditional Architecture In Contemporary Design Of International Architects: Cases From Rwanda And Zambia	49
Sahar Pouya Sima Pouya	Build Back Better For A More Resilience Environment	50
Hatice Kocaaslan Sima Pouya	Creating An Barrier-Free Route With The Navigation System For Wheelchair Users	51
Sima Pouya Sahar Pouya	Horticultural Therapy To Children With Mental Disability	53
Fatma Türüç Süheyla Üçışık Erbilen	Effect of Energy Consumption and GDP on Environmental Quality in the Context of the Environmental Kuznets Curve Hypothesis	55
Fatma Bildir M. Selen Abbasoğlu Ermiyagil	Cultural Heritage Evaluation within the Context of Resilience: Bağlıköy Case	56
Bob Stanley Gardner	Climate Variable Rainfall Forecasting Using Arima Model In The Agra District	58
Shalomin Gardner	An Investigation Into The Physical Parameters Affecting The Exergy Efficiency Of Pvt Air Collectors	59
Babasanya, Bankole, Ganiyu, L Omodona, S	Influence of social media on banditry among farming rural communities in Giwa Local Government Area, Kaduna State	60
Ukoha, J.C.I., Kalu, U. Anyanwu, E. V.	Perceived Effect Of Soil Erosion On Arable Crop Production In Abia State, Nigeria	61
Adebayo, O. A., Oyewo, I.O., Azeez, F.A Farayola C.O	Environmental Management Trainees' Green Entrepreneurial Intentions, Events And Fears In Nigeria	62
Rozina Khattak	Removal of Brilliant Pink B Dye from Water for Environmental Remediation	63
Rozina Khattak	Redox Mechanism of Ferrocene Derivatives	64
Djellouli Amir Berredjem Yamina Hattab Zhor Guesmia Hadjer Mokhtar Mhenni Azri Naima	Removing both inorganic and organic aqueous effluents with affordable bio-adsorbents	65

Sara Ncibi"		
Djellouli Amir Berredjem Yamina Hattab Zhor Guesmia Hadjer Mokhtar Mhenni Azri Naima Sara Ncibi	An examination of the environmental conditions and biodiversity at the Fontaine of Gazelle Dam in Biskra	67
Alya Nisrina Huwaida Hendri Hermawan Adinugraha M. Shulthoni	Air Pollution In Indonesia	69
Skender Demaku Donika Sylejmani Arbnorë Aliu Bahrije Dobra Jeton Halili	Chemical Analysis Of The River Of Prizren, Through Instrumental Analytical Methods	70
Skender Demaku Donika Sylejmani Ermond Frangu Lumturi Shkodra Leonita Dugolli Arbnorë Aliu	Chemical, physical and biological analysis of river water and sediment; Sitnica, Ibri, Trepça and Drenica - correlation with EU standards - for surface waters	71
Zeba Ali Mumtaj Abdul Rahman Khan Saimah Khan	Conventional and non-conventional disinfection approaches to purifying drinking water	72
L. Mllaoiy B. Akhsassi B. Bakiz S. Villain F. Guinneton A. Benlhachemi	Visible-light driven photocatalytic effectiveness for solid-state synthesis of Bi <sub>24</sub> O <sub>31</sub> Br <sub>10</sub> nanophotocatalyst towards complete decolorization of rhodamine B from water.	73
Iqra Hareem Sammina Mahmood Umair Ashraf Rabia Ghaffar Adeel Sattar	Alleviation Of Phytotoxicity To Pea Plant Irrigated With Waste Water From Pharmaceutical Industry By Using Bacillus Cereus As Bio-Fertilizer	75
Rizqi Amelia Ramadina Hendri Hermawan Adinugraha Muhammad Shulthoni	Waste Production Makes Money In Pekalongan City	77
İlhan Kaya	The Contribution of Art to Interdisciplinary Collaboration in the Production and Design of Artificial Reefs	78
Elif Şatiroğlu Fatih Bekiryazici Nursema Yilmaz	Evaluation Of Landscape Character And Tourism And Recreation Potential Of Gümüşhane Tomara Waterfall Nature Park	80
Fatih Bekiryazici Elif Şatiroğlu Emine Aydın	Examining The Tourism And Recreation Potential of Istanbul Neşet Suyu Nature Park In Terms of Conservation And Usage Principles	81
Yelda Altunal Gürgen	Intellectual Construction of Ecovillages As A Sustainable Development Model	82
Betül Rüveyda Ay Ak Hande Sanem Çınar	Sustainability In Living Cultural Heritage: Topkapı Palace Gardeni	84
Müge Yurtcan Alperen Meral Banu Çiçek Kurdoğlu	A Situation Assessment Study for the Development of Strategies That Support Pedestrian Use: Bingol Capakcur Valley, Eskisaray Street	86
Pınar Zeğerek Altunbey	Rural Landscapes in Cinematic Narratives	87



M. Selen Abbasoğlu Ermiyagil Cemaliye Sunalp Gürçinar	Evaluation of Traditional Houses in the Context of Sustainability; Case of Lefke	88
Nacima Deghiche-Diab Marco Alberto Bologna Tesnim Deghiche	An updated checklist of Meloidae Mylabrini (Coleoptera) and host plants in a Saharan oasis ecosystem in Algeria	89
Subhashish Dey	Biosorptions Technology Applications for Treatment of Water by Using Flower Waste Biosorbents	90
Mohamed Raoui Meriem Khelif Naima Bouchenafa-Saib	Adsorption of methylene blue from textile industrial wastewater using bio- materials from barley bran plant	91
Sazada Siddiqui Habab Merghani Yassin Babikera Mouna Jeridia	Phenthoate toxicity evaluation in root meristem of <i>Pisum sativum L.</i>	92
Muhammad Zubair Ul Hassan Arsalan Syed Makhdoom Hussain Arooba Mansoor Malaika Aurangzaib Sadia Tabassam Zeshan Yousaf Muhammad Amjad	Replacement of fish meal with canola meal supplemented with citric acid to check the impact on Proximate Composition and Growth Parameters of <i>Cirrhinus mirgala</i> Fingerling	93
Sundy Alagba Obazi Chiamaka Eucharia Ubachukwu Samuel Esheya Esheya	Knowledge Of Farmers On Pesticide Safety Practices In Nsukka Local Government Area, Enugu State, Nigeria	95
Rana Choukri Mohamed Faize Maria Manuela Rigano Manuel Rodriguez-Concepcion Jaime F. Martinez-Garcia Michel Havaux Mourad Baghour	Recent Advances Intercropping Approches For Stress Tolerance In Plants For Sustainable Agricululture	96
Abdelali Aboussabek Latifa Boukarma Rachid Aziam Abdellah Ousaa Mohamed Zerbet Mohamed Chiban	Parameter optimization of cationic dye adsorption on natural kaolinite clay based on central composite design, desirability function, and artificial neural network	97
Ukpabi-Ugo, Jacinta Chigozie Anosike, Chioma Assumpta Ugwu, Obiora Celestine	Anti-infertility Potentials of Hexane Extracts and Fractions of <i>Sesamum indicum</i> seeds on Cyclophosphamide-induced Spermatotoxicity in Male Wistar Albino Rats.	99
Idoko Alexander Parker Joshua	Enhanced Performance of Adiponectin – Linked Flavonoids Anti-Obesity Drug Target: An In-Silico Discovery	101
Alexandrov V.S	Analysis of the soil composition of the substance and improvement of its quality using new data processing approaches	103
Vaibhav Kant Singh	Confirmation of Sanctuary Protocol in VANET utilizing SCYTHET	104
Vaibhav Kant Singh	A Disaster Tweet Manager doing Prediction Using Machine Learning Technology	105

Vaibhav Kant Singh	A Novel Procedure for Image Encryption	106
Vaibhav Kant Singh	A Genuine-time traffic surveillance Identification utilizing YOLO a state of the art Algorithm	107
Manvi Singh Rahmuddin Khan	Design, development & evaluation of Terbinafine loaded nanoemulgel for the treatment of Dermatophytosis	109
Abdulla-Al-Asif Abu Hena Mustafa Kamal Hadi Hamli Mohd Hanafi Idris Geoffery James Gerusu S. M. Lutful Kabir	The possible pathway of water-borne species invasion in Malaysia: Where danger overthrows beauty	110
Zahid Ali	A Meshless Method For The Solutions Of Variable Order Fractional Partial Differential Equations Via Radial Bases Functions	112
Sehrish Firyal Rumisha Raza	Molecular approaches for detection of antibiotic residues in dairy milk	113
Sheila Ojei Michael	Iron deficiency anaemia in pregnancy: reexamining the nature and magnitude of this public health concern	114
Hammouti Marwane El Haim Mohamed	Anticipating Risk Mapping for Land Movements in Morocco's Middle Rif Region	115
Ihor Ponomarenko Dmytro Ponomarenko	The Significance of Digital Marketing and Machine Learning in Shaping Ecotourism Behavior	116
Rudro Deb Sardar	Development of pineapple jam incorporated with chia seed and honey	117
Zahra Nait Abdellah Mourad Keddad	Experimental study on borided AISI H13 steel	118
Ugwoke, F. I., Okey, E. N., Ozioko, Juliet N, Ugwu, O. C . Joshua, P. E.	Antioxidant Effect of Ethanol Fraction of Terminalia ivorensis Roots on Croton oil Induced Haemorrhoid in Albino Rats	119
Ahmed Riaz Khan Sehrish Firyal Muddassir Ali	Molecular Identification and Characterization of Bovine Ephemeral Fever (BEF) virus in Bovines	120
Krupa-Małkiewicz Marcelina Ochmian Ireneusz	Induced Chemical Mutation In Crocosmia Crocosmiiflora	121
Ezenwelu, Chijioke O., Oladejo Afeez, A., Oparaji, E.H	Optimization of Culture Conditions for Production of Lipase from Aspergillus sp.	122
Muhammad Imran	Sunflower Oilseeds Importance And Applications	123
I. S. Burlaka	Rooibos Tea Is One Of The New Types Of Food Products	124
Nur Syazwani Binti Mohd Nawi Siti Najatul Ajierah Binti Beng Adzeman	Modern-Agri Technology Usage And Challenges Among Young Agropreneur In Kedah, Malaysia.	125
Ogbodo, John Onyebuchi Njoku, Obioma Uzoma Onwurah, Ikechukwu Noel Emmanuel	Study of the Effects of Occupational Exposure to Volatile Organic Compounds (VOCs) Content of Automobile Spray Paint in Albino Rats	126
Abu Kawsar	Assessing Disease Prevalence and Antibiotic Usage in Pond Aquaculture: A Public Health Concern in Narsingdi, Bangladesh	127

Nihade Bensitel Khadija Haboubi Achraf El Kasmi	Evaluating The Environmental Impact Of A Drinking Water Production Plant Using The Life Cycle Assessment Approach	128
Maliha Gohar	Classification Of Second Order Ordinary Differential Equations Using Lambda Symmetries	129
Rakhshanda Qasim	Emergenc of Polyglot Entrainment in the Hodgkin-Huxley Model	130
Necati Yalçın Mehmet Tunçer Mecit Vural	Some Threatened Endemic Species in Ankara and Studies on Their Protection	131
Feriha Urfali Doğu Erçim Uluğ	An Architectural Criticism on Contemporary Housing in North Cyprus- Nicosia by Investigating Projection Typology	132
Ayşenur Kandemir Turgut Kalay	Investigation of Worship Buildings in Turkey in the Context of Cultural Heritage: The Case of İstanbul and İznik	133
Meral Vural Pınar Özayan Burcu Bostancı Ceren Balmumcu Ayşe Ege Yıldırım	A New Model Proposal In Rural Development: Mudurnu Virtual Museum Project	134
Mustapha Abdulmumini Shabnam Golkarian	An Assessment Of The Benefits Of Incorporating Public Art Into Public Spaces	136
Çağla Aydemir Atıla Gül	Evaluation of Spatial Planning Policies and Practices in Rural Settlements from Past to Present of Türkiye	138
Bilgin Güner Emrah Kara Emine Yılmaz Hüseyin Çeken	Environmental Problems in The Sustainability of Medicinal and Aromatic Plants Growing Spontaneously in Nature: Sultanmurat Region Plateaus	139
G. Funda Gökçe Ömer Öztoprak Öner Demirel	Suitable Growing Environment And Ecological Planning Of The 'Walnut Tree' With Geographical Information Systems Based Multi-Direction Decision Analysis	141
Gonca Özer Yaman	Modeling the Solar Energy Gain of Buildings with Fuzzy Logic Method	144
İrem Bekar Mert Çakır	Loss of Identity in the Interaction of Rural Tourism and Traditional Housing	146
Umeojiaku, Eucharia Ogechukwu Okoro, John Chukwuma	Adaptation strategies to herders' farm intrusion of female-headed households' in Enugu-Ezike Agricultural zone in Enugu state, Nigeria	147
Athanasios Sotirios Dounavis	Biofuels production in a continuous system from waste biomass valorization	148
Ngwu Blessing Sochima Okoro, John Chukwuma	Adaptation strategies to herders' farm intrusion of female-headed households' in Nsukka Agricultural zone in Enugu state, Nigeria.	149
Gopi Prasad	Fixed points of set-valued mappings in Menger probabilistic metric spaces endowed with an amorphous binary relation	150
Ajaydesouza V Vignesh K Lokesh R Sathiya Aravindan V Sabari Grish P	Bacterial Endophytes: A Natural Defence Against Collar Rot Pathogen Sclerotium rolfsii in Brinjal	151
Okoroegbe, Adaobi Pearl Okoro, John Chukwuma	Extension needs of farmers in the sustainable production of future smart foods in Nsukka Agricultural Zone, Enugu State.	152
Oishi Biswas	Ecology And Restoration Of Natural Heritage In Rural Areas: A Path Towards Sustainable Development	153

Udoye, Charles Ekene Okwor, Juliet Nneka	Waste Management Practices Among Poultry Farmers In Enugu North Senatorial Zone, Enugu State, Nigeria	154
Safaa Khattabi Rifi Khadija Zahidi Salah Souabi Ilham Nassri Latifa Mouhir	Exploring the Impact of Industrial Discharges on Soil Contamination by Heavy Metals: A Case Study in the Soil of Mohammedia, Morocco	155
Adan Naeem Syed Makhdoom Hussain Danish Riaz Zubair-Ul-Hassan Arsalan Adnan Khalid Muhammad Faisal Zeeshan Yousaf Eman Naeem	An Review on Antioxidants: Solution to Oxidative Stress	156
Eman Naeem Syed Makhdoom Hussain Danish Riaz Zubair-Ul-Hassan Arsalan Adnan Khalid Muhammad Faisal Muhammad Amjad Adan Naeem	A Review on Harmful Algal Blooms: Its Causes, Impacts and Mitigation	157
Chinedu Happiness Uzoagulu Obioma Uzoma Njoku Ugochi Olivia Njoku Anthony Amaechi Attama Benjamin Uchenna MODOZIE	Effect of the Methanol Fraction of Cuminum cyminum Leaves on Acetaminophen-Induced Hepatotoxicity in Wistar Rats	158
<b>FULL TEXT</b>		
Esra Taşar	Transformation of Environmental Problems Into Art	160
Rahman Sertyamaç Merve Tuna Kayılı	The Effect of Design Decisions on Energy Performance in Residential Buildings: Example of Local Housing Projects	168
Tuğba Üstün Topal Meryem Bihter Bingül Bulut Öner Demirel	Monitoring of Sünnet Lake Natural Park through Geographic Information Systems and Remote Sensing Methods	179
Öner Demirel Meryem Bihter Bingül Bulut Tuğba Üstün Topal	Rural Area Planning and Its Ecological Foundations	196
Ufuk Coşgun Damla Yıldız	A Critique of Protected Areas Management Effectiveness Assessments in Turkey	206
Mustafa Bulat Serap Bulat	Nature and Art	220
Önder Yağmur Mehmet Arif Karamanoğulları	Art Nouveau and Jewelry Artists Who Used Nature as Their Inspiration	237
Neriman Gül Çelebi Ümit Arpacıoğlu	Evaluation of Monumental Masjids Belonging to the Anatolian Seljuk Period in Konya in the Scope of Energy Efficiency	259
Şebnem Ertaş Beşir Alper Torun	A Proposal For The Function Planning Process: An Example of Traditional Housing in Sille	270
Damla Yıldız Ufuk Coşgun	Bibliometric Analysis of Postgraduate Thesis on Protected Areas in Turkey (1987-2023)	285
Hacı Mehmet Kayılı	Examination of Green Chemistry Technologies in the Characterization of Protein-Based Drugs	308

Yıldız Özer Önder Yağmur	Plants As Subject Materials In Contemporary Art	319
Atila Gül Iskender Emre Gül Hatice Eda Gül	Ecology-Economy Conflict In The Context Of Sustainability; (Green Economy, Ecological Economy, Economic Ecology)	331
Mustafa Bulat Gülümser Beyaztaş Özlütürk	The Existence Of The Desert In Art In Civilizations	353
Ahmet Benliyay Orhun Soydan	Making Landscape Design Easier: Blender Add-ons	371
Ahmet Benliyay Orhun Soydan	Evaluation of Living Walls in the Example of Antalya City Center	381
Mustafa Bulat Maryam Karadağ	Land Art	393
Tuba Gül Doğan Nermin Başaran Engin Eroğlu	Assessing the Relationship between Plant Species Diversity and Land Heterogeneity: The Case of Düzce	406
Yaşar Bahri Ergen	Interaction Between Energy And Environment of Mogan And Eymir Lakes in Ankara Urban Settlement And Analysis Problems	426
Sibel Akten Gülsüm Kasap	Examination of Edible Flowers In Terms Of Different Culinary Cultures	438
Mertkan F. Tekinalp Zeki Demir	Stormwater Management Concept And Rain Gardens	456
Mertkan F. Tekinalp Zeki Demir	Functions of Rain Gardens In Rural Areas	462
Yasemin Pekdemir Ahmet Şahin Zaimoğlu Fatih Artuk	Investigation of Pre-Freeze, Freeze and Post-Freeze Unconfined Compressive Strength Changes in Clays Subjected to Freeze-Thaw Cycles	469
Rabia Nurefşan Karabörk Murat Yeşil	Evaluation of City Images Through The Cognitive Maps Of City Residents: The Example Of Ordu Province	479
Funda Gençer	Examining the Alterations caused by Immigration in Rural Heritage Areas; As a Case Study Yenice Village, Muğla	494
Rüveyda Şahin Ahmet Emre Dinçer	Understanding the Design Principles of Vernacular Architecture: Spatial Analysis of Traditional Safranbolu Houses	507
Jülide Edirne	Reevaluating a “Rural Area Spatial Design Project” Implemented in Tekirdağ, in 2006 On Its 17th Anniversary in Terms of Sustainability	522
Bilgenur Ak	Rain Gardens; Example of The Ministry of Environment, Urbanism And Climate Change	533
Turan Yüksek Ali Erdem Özçelik Filiz Yüksek Gülçay Ercan Oğuztürk	Distribution of Bungalow Type Accommodation Facilities in the Firtına Basin According to Land Characteristics and Their Possible Effects on the Ecosystem	551
Emre Kara Mustafa Sürmen	Winter cover crops as green manure in Mediterranean conditions: the effects on yield of silage maize	563
Emre Kara Mustafa Sürmen	Early period features of silage sorghum as affected by deficit irrigation and nitrogen fertilizer	571
Muhammet Hanifi Zengin	Sculpture As A Sign In The Natural Environment	578
Tendü Hilal Göktuğ Bahattin Sürücü	Determination of the Ecotourism Potential of Beşparmak (Latmos) Mountains	598

Ceren Selim Beyza Koca	Plant Biodersity and Maintenance Practices in Tourism Facilities: The Example of Antalya	635
Hatice Elif Beytekin Yahya Kaya Ali Mardani Filiz Şenkal Sezer	Improving The Thermal Performance Of Lightweight Concrete Facade Panels: Aggregate Type	645
Hatice Gizem Şahin Ali Mardani	Evaluation of early age compressive and flexural strength performance of sustainable 3D printable concrete mixtures having high-volume fly ash	653
Veysel Kobya Ali Mardani	Influence of the Main Chain Length of Polycarboxylate-Based Water-Reducing Additives on Certain Fresh State Properties in Fly Ash-Substituted Systems	660
Kadir Gezici Erdal Kesgin	Sustainable Water Management: The Role of University Campuses and Comparative Implementation Approach	667
Yildiz Güner	Henry Moore's Sheep: Reflections on Drawing-Sculpture and Sculpture-Landscape	684
Yildiz Güner	Maggi Hambling: The Art of Immortalizing	694
Müberra Pulatkan Gülcaý Ercan Oğuztürk	Determination of The Usage Areas of Rhodothamnus sessilifolius P. Plant in Landscape	708
Esra Soğancı	Being a University Student During The Covid-19 Pandemic: A Qualitative Study on the Academic and Daily Life Experiences of Social Work Department / Programme Students Studying at a Foundation University in Istanbul	716
Meryem Şengül Kaplan Hasan Yılmaz	Serçeme Valley Unique Rural Landscape Character Areas; Possible Recreational Tourism Opportunities	734
Betul Ozer Huseyin Sensoy Ilyas Bolat Akın Kamış	A Field Study on the Effect of Crown Area of Individual Trees on Throughfall	759
Yaşar Selçuk Erbas Sultan Sevinç Kurt Konakoglu Kadir Tolga Celik	Importance of Integrated Use of Geographical Information Systems (GIS) and Remote Sensing Methods in the Planning of Rural Areas	768
Koray Özşeker Coşkun Erüz Neira Purwanty İsmail Bilal Onmaz	The Temporal Dynamics of Solid Litter Pollution in Rural Tourism Areas of The Southeastern Black Sea	778
Neira Purwanty İsmail Koray Özşeker Coşkun Erüz	Beach Litter Pollution Post-Pandemic Covid-19 Period (2020-2022) In The Southeast Black Sea	798
Şükran Yemişçioğlu Filiz Şenkal Sezer	Cooling Load in Buildings in the Context of Climate Change: Literature Review	817
Züleyha Sara Belge Ümit Aydınoglu Burak Belge	Archaeo-Village As A Rural Development Strategy, Uzuncaburç-Diocaesarea, Silifke-Mersin	852
Furkan Dinçer Demet Odabaş	Evaluation on Electricity Energy Consumption of Kahramanmaraş Sütçü İmam University Medical Faculty And Market Electricity Prices	860
Furkan Dinçer Demet Odabaş	Kahramanmaraş Sütçü İmam University Faculty Of Medicine Solar Power Plant Design And Simulation For Electrical Energy Needs	868
Çağla Tulukçu Arkman	Bread And Puppet Theatre Sustainable Aesthetics In Rural Areas	880
Seyhan Seyhan Elif Bayramoğlu Pinar Özge Parlak	Router Green Network Elements on The Streets of The City	888

Oğuz Kurdođlu Nazlı Öđüt	A New Approach to Determining Protected Area Management Effectiveness: IUCN Green List Criteria	896
Meryem Bihter Bingöl Bulut Tuđba Üstün Topal Öner Demirel	Eco-museum Approach for Sustainable Rural Tourism Development	906
Şükran Şahin Kevser Sena Ceylan Zeynep Çetiner	Cartographic Presentation of Landscape Plans: A Comparative Analysis of Mapping Techniques For Various Scales	913
Elif Tokdemir Demirel	The depiction of nature in literature: The case of Emily Bronte's Wuthering Heights	933
Salako, Oluwaseun Adewale Bamiro, Tolulope Oluwatosin	Community Development Association: A Panacea For Rural Development In Ogun State	940
Akintola, Akinwumi Kabir Akintola, Kafayat Adenike	Analysis Of Outsourcing Services As A Tool For Organizational Sustainability	960
Moses Adeolu Agoi Oluwanifemi Opeyemi Agoi Oluwadamilola Peace Agoi	Exploring The Impact Of Iot-Based Irrigation System On Crop Farming: Implication For Smart Agricultural Practices	970
Elvan Ada	Ekolojik Restorasyonda Bir Köprü: Yaban Hayatı Geçitleri	978
Murat Yeşil Mesut Guzel	Effects Of Road Planning On Economic And Social Structure: The Case of Ordu City Centre (D010 Highway)	987
Oktay Yıldız	Sustainable Management of Protected Areas	1003
Oktay Yıldız	Climate Change, Aridity And Afforestation Practices In Central Anatolia	1015
Nihayet Koçyiđit	Crystalline Nanocomposites of Organic Linkers and Metal Ions with Rich Chemical Tunability: Nanoscale Metal–Organic Frameworks (NanoMOFs)	1027





**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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# ABSTRACT



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ANALYSIS OF HEAVY METALS IN A TYPICAL CONSTRUCTED POND

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#### ABSTRACT

The concentrations of some heavy metals such as zinc (Zn), iron (Fe), manganese (Mn), cadmium (Cd), chromium (Cr) and lead (Pb) were determined in water samples collected from both pond source water (borehole) and pond water (constructed pond) and the results obtained were compared with WHO/EPA/NSDW (Nigerian Standard for Drinking Water) standards. In addition to the heavy metals, some physiochemical parameters such as pH, turbidity, electrical conductivity (EC), total dissolved solids (TDS), salinity, chloride (Cl<sup>-</sup>), alkalinity and hardness were also determined in both water samples to assess their suitability for fish production. All the heavy metals studied were present in both samples. However, the weekly mean concentrations of these heavy metals are in the following order iron (1.005) > zinc (0.347) > manganese (0.116) > chromium (0.003) > cadmium (0.002) > lead (0.001) (source water) and iron (3.335) > zinc (2.665) > manganese (2.572) > chromium (0.077) > cadmium (0.061) > lead (0.051) mg/L (pond water), respectively. In the source water sample, the average concentrations of all heavy metals analyzed were within the permissible limits of WHO/NSDW while the reverse was the case for pond water. Among all the heavy metals studied, iron present the highest concentrations in both the source water and pond water. This may have resulted from the geology of the area where the pond is located and the corrosion of steel/iron used in borehole casing. In pond water samples, there is significant difference in the concentrations of all the heavy metals ( $p > 0.05$ ) across the weeks with strong correlations in the levels of heavy metal concentrations and some physiochemical parameters. However, regular monitoring of these heavy metals and guard against their influence is recommended due to their potential to bioaccumulate at different tissues of the fish to the detriment of fish consumers.

**Keywords:** Nigerian Standard, Heavy Metals, Source Water, Pond Water



**DISTRIBUTION AND IMPORTANCE OF *LACTUCA SALIGNA* L. (WILLOW-LEAF LETTUCE) FROM THE AZERBAIJANI FLORA**

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**ABSTRACT**

The genus *Lactuca* L. belongs to the family *Asteraceae*. A variety of secondary plant metabolites, including triterpenoids, phenolics, coumarins, saponins, phytosterols, and lignans were found in phytochemical studies of *Lactuca* L. species. East of Greater Caucasus, Kur-Araz lowland and Lankaran are its distribution areas in Azerbaijan. The secondary gene pool of cultivated lettuce includes *L. saligna*. The weedy plant *L. saligna* is characteristic of both lowland and hilly regions. It is widely distributed throughout the Mediterranean region, primarily along the seacoast. Previous investigations demonstrate the presence of sesquiterpene lactones in different parts of willow-leaf lettuce. From the aerial parts of *L. saligna* lactucin, lactucopicrin, and a guaianolide 11 $\beta$ , 13-dihydrolactucopicrin, hexacosan-1-ol acetate, germanicyl acetate,  $\psi$ -taraxasterol acetate, moretenol acetate were identified. In its roots 8-deoxylactucin, jacquinelin, lactuside A, crepidiaside B, salignoside (9 $\alpha$ -hydroxy-11 $\beta$ ,13-dihydrozaluzanin-C-9-O- $\beta$ -D-glucopyranoside) were found. During the collecting expedition carried out in 2013 in Azerbaijan, 5 populations were encountered. They were found to appear in open vegetation on sandy wastelands, in grasslands, and alongside the highways. In our expedition which was carried out summer of 2023, *L. saligna* was found to be distributed in the Kur-Araz lowland, especially in Saatly and Sabirabad regions, and found alongside the railways, roadsides, and in orchards. Amongst *Lactuca* species, willow-leaf lettuce is not elaborately investigated in terms of phytochemical constituents. Our previous investigation demonstrated *L. serriola*, the other species of this genus contains several volatile compounds, fatty acids, and triterpene compounds. In Jordanian traditional medicine the decoction of the root of *L. saligna* was used as an antihelmintic, analgesic, and emollient. Moreover, it also demonstrated a resistance to cucumber mosaic virus. These effects might be attributed to the chemical components that it comprises. The other species of the genus *Lactuca* contain significant chemical constituents that would draw the attention of the pharmaceutical industry and with regards to *L. saligna* available in some parts of Azerbaijan, it is worth further investigation of its usage in the medicinal field.

**Keywords:** *L. saligna*, plant resource, distribution area



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ADAPTATION STRATEGIES TO HERDER'S FARM INTRUSION OF FEMALE HEADED HOUSEHOLDS IN AGBANI AGRICULTURAL ZONE OF ENUGU STATE, NIGERIA

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#### ABSTRACTS

The study was on Adaptation strategies to herders farm intrusion of female headed households in Agbani Agricultural zone in Enugu state, Nigeria. Specifically, the study was designed to describe the socio economic characteristics of the respondent, ascertain the perceived causes of herders' farm intrusion, determine the effects of herders' intrusion in female-headed household agricultural production, ascertain female headed household adaptation strategies to herder's intrusion, identify the challenges to the adaptation strategies of female-headed to herders intrusion. A structured interview schedule was used to collect data from a sample of 60 respondents. Frequency, percentage and mean score were used to analyze data collected. Result revealed that that all (100.0%) of the respondents indicated that the major perceived causes of herders farm intrusion are inability to control cattle, climate change, desertification of the Sahel and northern region and movement of herders and their cattle southwards, lack of political will for government to arrest and punish the offenders adequately respectively. Also 98.0%, 95.0%, and 85.0% indicated that limited grazing lands, population growth, herd size were other major perceived causes of herders farm intrusion respectively. Findings revealed that majority (100.0%) of the respondents indicated that the major effect of herders farm intrusion are destruction of crops and decrease in output and income respectively. While 98.3 %, 96.7 % and 95.0% indicated that the fear of going to farm, reduced human mobility, frustration and abuse of women's fundamental right are other effects of herders intrusion respectively. Also 93.3%, 91.7%, and 90.0% indicated that the other major effect of herders farm intrusion includes destruction of property, contamination of stream by cattle, social insecurity and loss of life respectively. Findings revealed that adaptation strategies to herders' farm intrusion in the study area are early planting and harvesting with ( $\bar{x} = 4.53$ ). Purchasing food on credit ( $\bar{x} = 4.20$ ), buying food for home consumption ( $\bar{x} = 3.53$ ). Result also revealed that the major challenges to the adaptation strategies as indicate by the respondents in the study area includes no legal sanctions of defaulters with ( $\bar{x} = 4.68$ ), poor government policies and regulations ( $\bar{x} = 4.55$ ), language barrier in communicating with herders ( $x = 4.18$ ). The factors causing herders farm intrusion and the effects as indicated by the farmers are inability to control cattle, climate change, desertification of the Sahel and northern region and movement of herders and their cattle southwards, lack of political will for government to arrest and punish the offenders adequately, limited grazing lands, population growth and destruction of crops, decrease in output and income. Women are still the most vulnerable category in the society and deliberate effort by the government or development agencies should ensure that the women have adequate education so as to be employable. Extension agents should make effort to reach out to these women for capacity building and advisory services. This will help to redirect the women to adopt more appropriate adaptation strategies food insecurity. There should be urgent need to restore and demarcate cattle path and grazing reserves.

**Keywords:** Adaptation strategies, female headed households, herders intrusion





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BUSINESS CONCENTRATION AND DETERMINING FACTORS OF AGGLOMERATION**

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#### **ABSTRACT**

Georgia is undoubtedly one of the countries with a high level of inequality between the regions. Inequality is noticeable not only between the regions but also within the majority of regions. The role of the capital in the country's economy is extremely large, almost 50% of the total value added created in Georgia is derived from Tbilisi. Factors and environment that determine the aggregation of the population and the activity of business sector lead the concentration of economic activities into one area. Concentration, in turn, creates the agglomeration effect that benefits residents and firms when operating in the same area. As a result, we face different levels of development and inequality in territorial units. Territorial units may be perceived as different continents, states, regions, municipalities and settlements. The article shows the main factors of the formation of the regions and the theories that explain these processes; characteristics of the regions; spatial concentration of economic activity and key factors influencing the decision when choosing a location; the effect of agglomeration and its impact on economic development concentration; the role of the state in creating the right incentives for business. The article highlights the factors causing the concentration of economic activity and the circumstances that determine the location choice of the population and the business sector (for example, local resources, local demand, transportable raw materials, external demand, etc.). The case studies in the article shows different examples: 1. the business owner decides to start operations close to the raw materials that are subject to transportation; 2. the business owner decides to start production close to the resource that is not subject to transportation; 3. The business entity makes the decision on the location with the intention of being close to the sales markets. The article presents the causes of market failures and the reasons for the different development levels of the regions. The imperfection of information and the costs required to obtain it are considered as an obstacle to the increase business activity. Based on the case study it is shown what the government can do when the information does not allow businesses to receive the right signals and make decision

**Keywords:** concentration, regions, economy



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DYNAMICS OF SUPRA-URBAN LAND HOARDING ACTIVITIES IN NIGERIA

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#### ABSTRACT

Abundance of land in sufficient quantum notwithstanding, the soaring trends of land hoarding activities in the supra-urban spectrum of land market has brought to the fore, a very disturbing situation of rising land scarcity, with attendant price surging of the few available parcels of land, which are becoming increasingly out-of-reach for an average land developer, the far reaching implications of this scenario on real estate development can better be imagined. It is against this backdrop, that this research was conducted to evaluate the factors that are driving the speculative posture of land market players towards hoarding of land, with focus on the supra-urban axis of Ogun and Lagos States along Lagos-Ibadan expressway corridor, with a view to proffering actionable suggestions to nip them in the buds. With a sample frame of roughly about 120 potential respondents comprising land buyers, land owning families with selling notice boards, officials of both Ogun and Lagos States' lands bureaus, firms of Estate Surveyors and Valuers with locations within the study area, as well as leased land occupiers, out of which 78 individuals were considered as sample size. It was upon this population that 5-point Likert scale questionnaire were administered, with the use of admixture of purposive and simple random sampling techniques, out of which 67 copies were retrieved translating to distribution-retrieval rate of 85.90%, from which 54 copies of questionnaire were found to be valid and thus formed the basis for analyses with the deployment of second order descriptive and inferential statistical instruments of mean item score, relative importance index, sample t-test, standard deviation, variance and chi square. With impressive reliability of 0.871 for the Cronbach alpha value and 99.9% value for degree of freedom, the results showed among other things, that lucre and wantonness with MS of 4.95 and RII of 0.991 ranks highest as the driver of land hoarding propensity, while land availability with t-value of 4.395 and 2-mean difference value of 0.528 has an insignificant strength in driving land actors into land hoarding, while mass land buyers and officials of government and agencies with MS of 4.81 and MS of 4.80 respectively are the closest two most involved actors in land hoarding activities within the supra-urban milieu. The research concluded that land hoarding activities are real and are of immense multidimensional implications for meaningful land development, while suggesting among others that deliberate and harsh punitive measures be institutionalised to make land hoarding unattractive, as well as conscious efforts at resetting the minds of Nigerians against amassing enormous wealth at the expense of collective socio-economic growth and development of the country.

**Keywords:** Land Hoarding, Supra-Urban, Negative Impact, Land Development, Nigeria



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### VALUATION OF ARGAN LEAVES EXTRACT AS GREEN CORROSION INHIBITOR FOR STEEL IN 1M HCL

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#### ABSTRACT

Corrosion is a fundamental process playing an important role in economics and safety, particularly for metals and alloys. Mild steel alloys is exposed to the action of acid in industrial processes where acids play important roles such as in oil well acidizing, acid pickling, acid cleaning and acid descaling. The use of inhibitors is the most practical methods of protection against corrosion, especially in acidic solutions. Large numbers of organic compounds were studied and are being studied to investigate here corrosion inhibition potential. But, unfortunately most of these compounds are not only expensive but also toxic to living beings. However, study on the inhibition efficiency of natural products for mild steel in acidic medium is still lacking. In our laboratories, many studies have been investigated on the corrosion inhibition by natural plant extract and their oils on steel in acidic solutions. The effect of Argan leaves extract (ALE) on the corrosion of steel in hydrochloric acid medium was studied using gravimetric, electrochemical polarisation and electrochemical impedance spectroscopy (EIS) measurements. Inhibition efficiency increases with ALE concentration to attain 95%. We note good agreement between gravimetric and electrochemical methods (potentiodynamic polarisation and EIS). Effect of temperature is also made in the 298–328K range. Polarisation measurements show also that ALE act as mixed inhibitors. ALE is adsorbed on the steel surface according to a Langmuir isotherm adsorption model.

**Keywords:** Corrosion, Steel, Inhibition, Argan Leaves, Langmuir



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### IMPLEMENTATION OF FISCAL DECENTRALIZATION IN INDONESIA

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#### ABSTRACT

Fiscal Decentralization is the process of distributing budgets from higher levels of government to lower levels of government with the aim of supporting government functions or tasks and public services in accordance with the amount of government authority delegated. Fiscal decentralization explains transfer and implementation in Indonesia through transfer mechanisms and the Central Government and Regional Government Financial Relations Act (HKPD). Fiscal decentralization aims to fulfill regional aspirations regarding control over state financial resources, encourage accountability and transparency of regional government, increase community participation in the regional development process, reduce inequality between regions, and ensure the implementation of regional government. This research aims to explain the importance of fiscal decentralization in Indonesia. This research is library research with a qualitative approach. The data sources used in this research come from various literature in journal articles that are relevant to the research topic. The method used to analyze the data is content analysis from the literature sources used in the research. The results of the research show that indicators of fiscal decentralization achievements in Indonesia are increasing economic growth, increasing the Human Development Index (HDI), decreasing Gini ratio, decreasing poverty levels and increasing Gross Regional Domestic Product (GRDP) per capita. Apart from the indicators, it also explains the challenges of fiscal decentralization, regional transfer policies and village funds, balancing funds, regional incentive funds, special autonomy funds, use of village funds, distribution of regional transfers and village funds aimed at efficiency, transparency and accountability in their implementation. Optimal fiscal decentralization through the division of central and regional government affairs, government affairs handled by the central government and concurrent affairs including mandatory government affairs and optional government affairs.

**Keywords:** Physical Decentralization, Degree of Fiscal Decentralization, Regional Autonomy





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### WATER SAFETY INFORMATION NEEDS OF RURAL WOMEN FARMERS IN NSUKKA AGRICULTURAL ZONE ENUGU STATE, NIGERIA

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#### ABSTRACT

The study assessed the water safety information needs of rural women farmers in Nsukka agricultural zone, Enugu State, Nigeria. Water is an important resource required in almost of activities of human ranging from domestic to industrial and agricultural use. It is therefore important that this resource is preserved and protected from contamination. culturally, every gender has a role and women are saddled with the responsibility of collecting water for household use. They require the necessary information as regards to water safety so as to ensure that the water used in the home is free from contamination and the household is also free from any diseases associated with water contamination. Using purposive and on the spot sampling technique, 60 rural women farmers were selected and data were collected through the use of a structural interview schedule. Descriptive statistics and factor analysis were used for the analysis. Results of the study showed that majority of the farmers were between the ages of 20-30 years, majority (45%) were married and majority (53.3%) had household size of 6-10 persons. The major sources of water among the respondents were rain (100%), borehole (95%), water vendor (71.7%), well (65%). The major sources of information on water safety were family members (85%), fellow women and Personal Observation (83.3%) respectively, radio (81.7%), health workers (78.3%). Rural women have moderate knowledge 98.3% on water safety. All the respondents (100%) clean their containers, 66.7% clean twice a week, 55% clean on a weekly basis. Majority (95%) use containers with covers in collecting their water, (80%) use cups with handle to fetch water from the storage container, majority (83.3%) keep the item for fetching water from the storage container outside the container. The major information needs were the preventive measures against water contamination ( $\bar{x}=3.57$ ), sanitation and hygiene practices ( $\bar{x}=3.05$ ), prevention of water-borne diseases ad illness ( $\bar{x}=3.20$ ), identification of contaminated water ( $\bar{x}=2.80$ ), to ensure utilization of clean water for household chores ( $\bar{x}=2.75$ ), proper water treatment method ( $\bar{x}=2.72$ ). the major strategy to improve knowledge on water safety were providing affordable and sustainable water supply ( $\bar{x}=2.82$ ), providing easy access to water ( $\bar{x}=2.72$ ), incorporating safe water education in schools ( $\bar{x}=2.47$ ), teaching and training rural women on water safety and hygiene practice ( $\bar{x}=2.45$ ), use of local radio channels ( $\bar{x}=2.32$ ), partnership with local health clinics to integrate safe water education ( $\bar{x}=2.28$ ), promoting the use of appropriate water storage containers ( $\bar{x}=2.27$ ), creating informative and visually appealing materials in local languages ( $\bar{x}=2.23$ ), training on the various water treatment methods such as boiling ( $\bar{x}=2.22$ ). the study recommended that policies and programmes involving the major information needs of the rural women should be developed so as to the address the major needs of rural women on water safety. Also, policy makers, extension agents, non-governmental organisations and related institution should consider the influence of



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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fellow women, women meetings, friends and neighbours as essential sources of information and as such require adequate training so as to disseminate information efficiently and accurately.

**Keywords:** water safety, information needs, rural women farmers



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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### LEADERSHIP STYLE OF THE FIRST FOUR ISLAMIC LEADERS: A VIEW OF INDONESIAN ISLAMIC COMMUNITIES

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#### ABSTRACT

The purpose of this study is to dig deeper concerning the Islamic people view of the leadership style showed by the first four leader in the beginning of Islam era, known as *Khulafaur Rosyidiin*, which was famous of being the role model figure of leaders. Their leadership style is followed and It is always being talked about and set as an example for every generation in the Muslim communities all over the world, especially in Indonesia which is known as the largest moslem country in the world. Since this is the study of community and its culture, the study used qualitative research methods with Grounded Theory approach. Data gathering were using participation observations in the field and interview of 5 qualified main informants who was selected among 25 candidates with criteria of mature in age, minimum of undergraduate degree holder, have sufficient knowledge of the research subject, have organizational experience. Willing to voluntarily become a research informant for nothing. The setting of the study was a natural place of pesantren (religious study group) community in the city of Tangsel, and researchers made observations by living together and participating in community activities both worship and daily community activities. Interview to informants was done on their spare time and in their convenient time and places. Interview recording was transcribed for analysis purposes. To uphold the data validity researcher was using members checking, pier de' briefing, and triangulation procedure. Data analysis was using theme analysis procedure. From data analysis researcher found 4 (four) research findings which are fair, assertive, protective, guide, caring, and responsive. This four findings is characterized leadership style of the first four leaders in Islam after Prophet Muhammad's (pbuh) times.

**Keywords:** Islam, leadership, style, role model



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BUSINESS ETHICS IN THE VIEW OF CULINARY BUSINESS ENTREPRENEURS: A QUALITATIVE STUDY ON THE MSME's STREET FOOD STALL BUSINESS MANAGEMENT IN JAKARTA**

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#### **ABSTRACT**

The purpose of this study is to explore and reveal the extent to which business ethics are still respected and applied by food culinary sector MSME entrepreneurs operating in stalls on the streets. This research also intends to reveal what factors strongly encourage MSME entrepreneurs in the food sector to implement and apply business ethics in their company management so that customers are not harmed. Because this is research in the fields of social, humanities, and business management, the suitable research method is a qualitative research method with a phenomenological approach. The research setting is in a natural place known as Cirendeul Culinary Park (TKC) where the community of street vendors in South Tangerang City close to the capital of the Republic of Indonesia, namely Jakarta, gathers and carries out their business. Data gathering were using participation observations in the field and interview of 5 qualified main informants who was selected among 25 candidates with criteria of mature in age, education minimum of High School graduate, have sufficient knowledge of the research subject, have more than 3(Three) years of street food business experience. Voluntarily willing to become a research informant for nothing. Researchers made observations by visited the setting area at least three times. Interview to informants was done on their spare time and in their convenient time and places. Interview recording was transcribed for analysis purposes. To uphold the data validity researcher was using members checking, pier de' briefing, and triangulation procedure. Data analysis was using theme analysis procedure. From data analysis researcher found 4 (four) research findings which are self-awareness, religious education, caring, and the influence of family or peers. This four findings is characterized management style of the entrepreneurs of MSME culinary sectors to uphold the business ethics.

**Keywords:** business ethics , food culinary sector, management, MSME, stalls on the streets





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CHITOSAN-BASED NANOPRIMING ELICIT TOLERANCE AGAINST IONIC TOXICITY IN WHEAT SEEDLINGS

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#### ABSTRACT

Wheat is an important staple food of Pakistan and its productivity is often encumbered by biotic and abiotic stresses including salinity. Chitosan is a natural biopolymer, biocompatible and non-toxic showing promising applications as a delivery agent for sustainable plant growth and crop productivity. The *Moringa oleifera* (MO) exhibits a broad range of bioactivities including high antioxidant potential. In this study, the chitosan nanoparticles (CNPs) were synthesized through ion gelation method and subsequently coated with extract of MO leaves. The prepared CNPs@MO were characterized using scanning electron microscopy, Fourier transforms infrared spectroscopy and X-ray diffraction analysis. The prepared nanocomposite was used as a wheat seed priming agent (0.02% and 0.04%). The primed, hydroprimed and non-primed control seeds were used for comparative physiological and biochemical analyses under salt stress and stress-free conditions. The CNPs@MO caused a significant increase in enzymatic and non-enzymatic antioxidants to enable the germinating seeds to tolerate salt stress. The nanopriming also induced a significant reduction in MDA contents along with an increase in other important biomolecules including proteins, sugars and osmolytes etc. The CNPs@MO-mediated physio-biochemical alterations in primed seeds invoked resistance to salinity in wheat seeds, a positive outcome for climate-smart agriculture.

**Keywords:** Nanopriming, salinity, sustainable agriculture, wheat, nanocarriers



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PROMOTION OF GREEN INFRASTRUCTURE TO ENHANCE URBAN RESILIENCE TO CLIMATE CHANGE

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#### **ABSTRACT**

The looming climate crisis has highlighted the importance of green infrastructure in and around cities, prompting an urgent call for more functional and sustainable urban planning and design. The purpose of this study was to know about how green infrastructure can increase urban climate resilience. The study also focused on the present scenario of green infrastructure in the study area. Both primary and secondary data were used. Primary data were collected through face-to-face interview from field survey, Focus Group Discussion (FGD) and reconnaissance survey. Secondary data were collected from available published literature. One Ward (Society Gate area of Radio Colony, Savar, Dhaka) of Savar Pourashava within Dhaka Division, Bangladesh had been selected as the study area. Collected data were analyzed by using Microsoft office 2010. The study found that replacing hard paving with permeable and vegetated surfaces is encouraged for decreasing surface runoff. It has been found that Ward 01 of Savar Pourashava is mainly a medium category urbanized area. The matter of sorrow is that, while surveying, hardly found any salient park or playground. However, there are some fields in front of some schools and some small gardens beside the roads, but these seemed inadequate compared to the green infrastructure. Although urban wetlands act as nutrient generators, climate stabilizers and protectors of human settlements from several natural disasters for the specific urban neighborhood. In the study area there is no lake type wetland. There are only some manmade ponds and wetlands. There is medium range urban green space; the study region is thus less sensitive to the negative effects of climate change, particularly during severe heat events. There is limited agricultural land. The survey saw a limited biodiversity in the study area. Moreover, some houses comprise a rooftop garden, this study found only one community garden. All the surface area are not paved. And a large amount of rainwater can easily soak into the soil and can replenishing the groundwater table. A number of nature based infrastructure or buildings have been found. Some challenges regarding green infrastructure were also mentioned in the study. Finally some strategies and recommendations for expanding and improving green infrastructure were provided. Therefore, the result of this study will help the policymakers in making best policies and guidelines to enhance urban resilience to climate change.

**Keywords:** Green Infrastructure, Urban Resilience, Climate Change, Sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### A STUDY ON INDIAN AGRICULTURE AND AGRICULTURE POLICY – ACHIEVEMENTS, CHALLENGES AND WAY AHEAD

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#### **ABSTRACT**

Agriculture is back bone of Indian economy. Food is a basic requirement for every living being. We depend on plant and animal for Food. The history of Agriculture in India dates to Indus Valley Civilization and in some parts of Southern India, it was found to be practised even before the Harappans. Farming is the most important job. About 58% of the Indian population depends on agriculture for their livelihood. Today, India ranks second worldwide in farm output. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth, yet, having nearly 50% of the population dependent on it for livelihood. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). The Department of Agriculture and Cooperation under the Ministry of Agriculture is responsible for the development of the agriculture sector in India. According to the Indian Agriculture policy 2023, the focus is given to green farming. The paper provides insights about achievements made by India in the primary sector. It will also discuss about the challenges faced by the India agriculture sector and will also check various solutions and opportunities in overcoming the challenges. An attempt to analyse the Indian Agriculture Policy and various other policy making procedures are done in this paper.

**Keywords:** Agriculture, Productivity, Irrigation, Farming, Indian Agriculture Policy, Agri-tech, Green Farming



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE EFFECT OF IRRIGATION ON SYRAH (*VITIS VINIFERA* L.) JUICE COMPOSITION

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#### **ABSTRACT**

The present study studies the effect of four irrigation treatments applied during the pre-veraison stage on Syrah (*Vitis vinifera* L.) juice composition. The identification of the aroma compound in the fresh grape juice of the cited varieties has been done by the mean of the Gas Chromatography coupled the Mass Spectrometry. The Tunisian autochthonous varieties show large spectrums of free and bound fractions of the aroma grouped on C6 compounds, high alcohols, benzene compounds, terpenes, acids, norisoprenoids, lactones and aldehydes. In this work, it was been possible to identify high number of aroma components which have pleasant floral and fruity notes such as terpenes and norisoprenoids.

**Keywords:** *Vitis vinifera* L., Spectrometry, aroma compound





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SİMBİYOTİK SİNERJİ: KIYI MİMARİSİ TEORİSİNİ, KIRSAL ALANLARI VE ÇEVRESEL UYUMU KEŞFETMEK

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#### ÖZET

Bu araştırma, kıyı mimarisi teorileri, kırsal manzaralar ve çevresel denge arasındaki karmaşık etkileşimi araştırıyor. Hızlı kentleşmenin yaşandığı bir dönemde, inşa edilmiş kentsel alanların ve doğal çevrelerin bir arada bulunması büyük önem taşımaktadır. Bu çalışma, özellikle kırsal kıyı konumlarına odaklanarak, insan yerleşimleri ile doğal çevre arasında dengeli ve karşılıklı yarar sağlayan bir ilişkiyi kolaylaştıran mimari stratejileri araştırmayı amaçlamaktadır. Bu çalışma, vaka çalışmalarını ve teorik çerçeveleri kapsamlı bir şekilde inceleyerek, çevreyle etkili bir şekilde bütünleşen ve aynı anda topluluğun taleplerini karşılayan yeni tasarım stratejilerini belirlemeyi amaçlamaktadır. Bu araştırma, mimari müdahalelerin kırsal kıyı alanlarındaki doğal çevreyle nasıl etkili bir şekilde bütünleşebileceğini ve onu geliştirebileceğini anlamaya katkıda bulunmayı hedeflemektedir. Bunu mimarlık, çevre ve sosyo-kültürel dinamikler perspektiflerini birleştiren multidisipliner bir yaklaşımla başarmayı amaçlamaktadır. Bu çalışmanın bulguları, çevresel olarak sürdürülebilir ve kültürel açıdan dinamik peyzajların gelişimini teşvik ederek gelecekteki tasarım yaklaşımlarına rehberlik etme potansiyeline sahiptir. Çalışmanın nihai amacı, kıyı mimarisinin çevresel süreçlere saygı gösterdiği ve onları aktif olarak beslediği peyzajlar yaratmaktaki uygun yaklaşımları tespit etmektir. Bu yaklaşım, dirençli ve müreffeh kırsal toplulukların gelişmesine yol açmayı amaçlamaktadır.

**Anahtar Kelimeler:** Kıyı mimarisi teorisi, Kırsal alanlar, Çevresel uyum



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **SYMBIOTIC SYNERGY: EXPLORING WATERFRONT ARCHITECTURE THEORY, RURAL AREAS, AND ENVIRONMENTAL HARMONY**

#### **ABSTRACT**

This research explores the complex interplay between theories of waterfront architecture, rural landscapes, and equilibrium in the environment. The simultaneous presence of constructed urban areas and natural environments holds significant significance in a time characterized by swift urbanization. This project aims to investigate architectural strategies that facilitate a balanced and mutually beneficial relationship between human settlements and the natural environment, specifically focusing on rural waterfront locations. By thoroughly examining case studies and theoretical frameworks, this study aims to identify novel design strategies that effectively integrate with the environment and simultaneously meet the community's demands. This research contributes to understanding how architectural interventions may effectively integrate with and enhance the natural environment in rural waterfront areas. It achieves this through a multidisciplinary approach incorporating architecture, environment, and socio-cultural dynamics perspectives. The findings of this study have the potential to guide future design approaches, promoting the development of landscapes that are environmentally sustainable and culturally dynamic. The study's ultimate ambition is to create landscapes in which waterfront architecture demonstrates respect for environmental processes and actively nurtures them. This approach aims to result in the development of resilient and prosperous rural communities.

**Keywords:** Waterfront architecture theory, Rural areas, Environmental harmony



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### TARİHİ YAPILARIN MODERN AMAÇLARA DÖNÜŞTÜRÜLMESİ (ÖRNEK ÇALIŞMA: İNGİLTERE)

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#### ÖZET

Şehir, sürekli olarak yeni yapıların oluşumu ile genişleyen ve aynı zamanda değerli kültürel yapılarını koruyan dinamik bir varlıktır. Kentin gelişimi ve ilerlemesi, modern binaların inşasına tanık olunan günümüz de dahil olmak üzere çeşitli tarihi dönemlerin sonucudur. Son teknolojiye ile inşa edilen mimari tasarımlar gelecek nesillere miras olarak hizmet etmekte ve etmeye devam edecekler. Ancak tarihi yapıların güncel fiziksel, işlevsel ve ekonomik ihtiyaçlara uyacak şekilde yenilenmesi büyük önem taşımaktadır. Araştırmacılar, eski binaların mimari geçmişini korurken onları modern faaliyetler ve hizmetler için yeniden kullanmanın en iyi yollarını aramaktadırlar. Tarihi eserlere ilhak, koruma çalışmalarının en önemli konularından biridir. Yeni ve çağdaş mimari tarzların önemi, eski binaların tasarlanmasının değerini ve önemini göstermektedir. Eski binalar ile modern eklemeler arasındaki etkileşim, korumanın temel zorluklarından biridir. Çoğu zaman yeni eklemeler eski yapının tüketicilere nasıl görüldüğünü etkilemektedir. Sonuç olarak mevcut araştırma, uluslararası kabul görmüş ilkelere dayanan küresel yaklaşımlara ulaşmak amacıyla nitel araştırma yaklaşımı ve niceliksel araştırma olmak üzere iki yaklaşımla incelenmiştir. Bu çalışma, Birleşik Krallık'ta seçilmiş vakaların analizi yoluyla dönüşüm sürecindeki ortak temaları ve yaklaşımları incelemektedir. Koruma gerekliliklerini işlevsel ve estetik değişikliklerle dengelemek gibi geliştiricilerin, mimarların ve yerel otoritelerin karşılaştığı zorlukların tanımlanmasını araştırıyor. Daha sonra, tarihsel bağlamın tanımlanmasında etkili olan göstergelerin her birine değinilerek, yeni yapıların tasarımında dikkate alınması gereken faktörlerin bir diyagramı sunulmaktadır. Bu çalışmanın amacı, bu değişimlerin modern ihtiyaçları karşılarken mimari mirasın korunmasına nasıl destek olduğunu incelemektir. Aynı zamanda İngiltere'deki tarihi yapıları dönüştürmenin yaratıcı yollarına ilham vermeyi ve geçmişe ve bugüne saygılı sürdürülebilir kentsel kalkınmayı teşvik etmeyi amaçlıyor.

**Anahtar Kelimeler:** Tarihi binalar, Yenileme, Uyarlanabilir yeniden kullanım, Yeni Eklemeler, Sürdürülebilir Kentsel gelişim, İngiltere



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### TRANSFORMING HISTORIC BUILDINGS FOR MODERN PURPOSE (CASE STUDY: ENGLAND)

#### ABSTRACT

The city is a dynamic entity, continually expanding with new constructions while simultaneously preserving prized cultural landmarks. The development and progress of the city are the result of various historical eras, including the present time which witnessed the construction of modern buildings. Our cutting-edge architectural designs will serve as a legacy for future generations. However, it is crucial to renovate historical buildings to match current physical, functional, and economic needs. Researchers are looking for the best ways to preserve the architectural history of old buildings while reusing them for modern activities and services. Annexation to historical monuments is one of the most important issues in preservation efforts. The importance of new and contemporary architectural styles shows the value and importance of designing old buildings. The interaction between old buildings and modern additions is one of the primary challenges of conservation. More often than not, newer additions affect how the old structure appears to consumers. As a result, the current research has been investigated with two qualitative research approaches and quantitative research in order to achieve global approaches based on internationally accepted principles. Through the analysis of selected cases in the UK, this study examines common themes and approaches in the conversion process. It explores the identification of challenges facing developers, architects, and local authorities, such as balancing conservation requirements with functional and aesthetic changes. Afterward, referring to each of the influential indicators in the definition of the historical context, a diagram of the factors that should be considered in the design of new structures is presented. The purpose of this study is to examine how these changes support the preservation of architectural heritage while meeting modern needs. It also aims to inspire creative ways to transform historic structures in England and promote sustainable urban development that respects the past and the present.

**Keywords:** Historic buildings, Renovation, Adaptive reuse, New Additions, Sustainable Urban development, England





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### NATURE BASED URBAN STRUCTURE; TRANSFORMATION OF THE LEAF TO THE CITY

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#### ABSTRACT

Cities are multifunctional and complex living spaces built by human hands. At the same time, cities are expected to be compatible with nature, environmental conditions, natural resources, fauna and flora. Thus, cities live both as a part of the natural system and as a system that respects the environment, living things and natural resources. A city that consumes the least energy, uses the resources correctly and efficiently and is in harmony with nature is more effective in presenting the desired living conditions. With its billions of years of experience, Nature is an expert in energy efficiency and the correct and effective use of resources. It perfectly operates systems that complement each other and work in harmony within their own life cycle. Thus, there is a magnificent example in which human beings can find solutions for every issue and which contains endless information. Nature-inspired design or biomimicry is a science that enables human beings to learn and use the knowledge and experience of nature in the living space. Thus, with the transfer of knowledge, human beings can build their living space in harmony with nature, efficiently and effectively. This study is a follow-up to a previously published study. In this study, cities were produced from five suitable tree leaves (*Acer saccharinum*, *Juglans regia*, *Laurus nobilis*, *Quercus robur* ve *Platanus orientalis*), which were analyzed and selected in the previous study. Systems produced from leaves have been transformed into urban systems with today's urbanism rules and techniques. Thus, urban data and statistics regarding these cities became clear. In the last stage, cities were modeled and transformed into real city models.

**Keywords;** Biomimicry, leaf, city



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GELENEKSEL BELLAPAIS KÖYÜ'NDE TURİZMİN FİZİKSEL ETKİ DEĞERLENDİRMESİ

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#### ÖZET

Geleneksel kırsal bir yerleşime gelen turist kitleleri, bu yerin karakter ve görünüşünü değiştirebilmekte ve fiziksel hasara yol açabilmektedir. Bunun nedeni genellikle sağlam turizm yönetim sistemlerinin eksikliğidir. Turizm ekonomik fayda sağlarken geleneksel yerleşimlerin değerini ve ruhunu yok etmemelidir. Bu nedenle, bir destinasyondaki olası etkileri anlamak, taşıma kapasitesini, kabul edilebilir değişim seviyelerini ve güçlü yönetim stratejilerini belirlemek önemlidir. Bellapais köyü Kuzey Kıbrıs'ta, Girne ilçesinin 5 km doğu yönünde bulunan küçük bir dağ köyüdür. Köy somut ve somut olmayan değerleriyle ünlüdür. Önemli fiziksel çevresi ve mimari varlıkları arasında; 13. yüzyıldan kalma Bellapais Manastırı, geleneksel şapelleri, tarihi zeytinyağı ve un değirmeni, geleneksel ilkokul binası, iki geleneksel kahvehanesi, Kıbrıs evleri ve binalarının yeşil topoğrafya içindeki konumlanma özellikleri bulunmaktadır. Önemli sosyo-kültürel varlıklar arasında ise mahalle yaşantısı ve kahvehanede sosyalleşme biçimleri günümüzde de devam eden iki kavramdır. Bellapais köyü aynı zamanda pitoresk güzelliği ve birçok ünlü sanatçı ve yazar ile ve onların eserleriyle anılması ile de tanınır. Tarihi ve kültürel önemi nedeniyle köy çok sayıda ziyaretçi çekmektedir. Bir koruma alanı olmasına ve birçok tescilli yapısının bulunmasına rağmen, köyün geleneksel karakterini ve değerlerini korumak için sürdürülebilir gelişim, planlı bir kalkınma ve/veya koruma yönetimi planı bulunmamaktadır. Bu araştırma kapsamında, koruma, turizm ve miras yönetimi disiplinlerine ilişkin temel konular irdelenmektedir. Geleneksel köy karakterine yönelik başlıca tehditler; turizm kapasitesini artırmak için yapılan uygunsuz yeni yapılar ve geleneksel mimariye uygun olmayan yeni eklentiler, tarihi yapılara yönelik yanlış koruma uygulamaları, ziyaretçi ve turist otobüsleri için oluşturulmuş uygunsuz ve yetersiz otopark alanları, giriş ve çıkış için aynı yolu paylaşan yayaların ve araçların yaşadığı sıkıntılar, köyün merkezinde uygunsuz tabelaların varlığı olarak tanımlanmaktadır. Bu araştırma, köydeki fiziksel etkilere odaklanmakta ve turizm etki değerlendirmesi yapmakta ve güçlü, sürdürülebilir bir yönetim stratejisi oluşturmaya yardımcı olmak için Bellapais köyünün taşıma kapasitesini ve kabul edilebilir değişim düzeylerini tartışmaktadır.

**Anahtar Kelimeler:** Geleneksel köy, turizm, miras yönetimi, fiziksel etki değerlendirmesi, Bellapais köyü



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PHYSICAL IMPACT ASSESSMENT OF TOURISM IN TRADITIONAL BELLAPAIS VILLAGE

#### ABSTRACT

Masses of tourists to a traditional rural settlement can change the character and appearance, and cause physical damage. This is usually due to lack of robust tourism management systems. Tourism should not destroy the value and spirit of traditional places while bringing economic benefits. Therefore understanding possible impacts at a destination, identifying carrying capacity, acceptable levels of change and strong management strategies are important. Bellapais village is a small mountain village in North Cyprus, 5 km from the town of Kyrenia in its east direction. The village is famous for its tangible and intangible values. The significant physical environment and architectural assets include; the 13th Century Bellapais Abbey, the traditional chapels, the historic olive oil and flour mills, the traditional primary school building, the two traditional coffee shops, the traditional Cypriot houses and the siting of the buildings within the green topography. Among the important socio-cultural assets, the neighbourhood concept and the coffee shop gatherings are the two that are still continuing today. The village is also known for its picturesque beauty and its association with a number of famous artists and writers and their works. Due to its historical and cultural significance, the village attracts many visitors. Although the village is a conservation area with many listed buildings, there are no sustainable development, planned regeneration and/or conservation management plans to safeguard the traditional village character and its values. The research aims to investigate the key issues regarding to the disciplines of conservation, tourism and heritage management. The main physical threats to the traditional village character are defined as; inappropriate new constructions and inappropriate new extensions to traditional architecture to increase tourism capacity, wrong conservation applications for historic buildings, inappropriate and insufficient car parking for visitors and tourist buses, pedestrians and vehicles sharing the same road to enter and exit the village, inappropriate signage throughout the centre of the village. This research focuses on the physical impacts in the village and carries out tourism impact assessment and discusses carrying capacity, acceptable levels of change for the Bellapais village as a case study in order to help produce a strong and sustainable management strategy.

**Keywords:** Traditional village, tourism, heritage management, physical impact assessment, Bellapais village



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE EFFECT OF REFLECTIVE MORAL ATTENTIVENESS ON VOLUNTARY GREEN WORK BEHAVIOR OF EMPLOYEES

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#### ABSTRACT

Recently, companies regardless of their industry became more committed to protecting environment and practicing more green focused activities. In an environment like this, it is also important for employees to agree and conform to the green experiences of their companies. However the self-responsibilities regarding green work practices of employees also play an important role within the company policies. Reflective moral attentiveness is a relatively new concept in the literature which an individual continuously perceives and considers morality and moral elements in his or her work experience. According to the existing research the reflective moral attentiveness is found to be correlated with voluntary green work behaviors which are employee behaviors that support environmental sustainability within the company even though they are not under the control of an environmental green policy. The aim of the proposed study is to investigate whether reflective moral attentiveness has a significant impact on voluntary green work behavior of employees. The sample of the study will be university lecturers. The study will adopt a quantitative approach and data will be collected with the help of online questionnaire. The questionnaire will have three sections. First section includes demographic data, second part includes reflective moral attentiveness statements and the last part consists of statements about the voluntary green work behavior employees adapted from Garavan et. al. 2022. The findings from the study will contribute to the literature by measuring the level of reflective moral attentiveness and voluntary green work behavior as well as testing the anticipated relationship between two variables.

**Keywords:** Reflective moral attentiveness, Voluntary green work behavior, Environmental sustainability





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ASSESSING THE INTEGRATION OF ECOLOGICAL CONSCIOUS BUILDING DESIGN TECHNIQUES IN ARCHITECTURE PEDAGOGY

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#### ABSTRACT

As the global community struggles with pressing environmental challenges, the field of architecture finds itself at the forefront of sustainable innovation. The multidisciplinary nature of architecture education curriculums covers a wide range of environmental topics, yet, the tangible impact of these courses in the design process is not well explored. Accordingly, this study attempts to evaluate the effectiveness of an "Ecological Conscious Building Design" course in enhancing architectural design education and promoting ecological consciousness among future architecture practitioners. To this end, the Analytic Hierarchy Process (AHP) method is employed as a systematic framework for evaluating the course's impact on students' knowledge, abilities, and attitudes towards sustainable architectural practices. Through a comprehensive analysis of students' feedback, performance assessments, and course outcomes, this study attempts to explore the benefits and drawbacks of integrating ecological-conscious building design techniques into architectural education. The research also examines the alignment between the course curriculum and the Leadership in Energy and Environmental Design (LEED) certification system criteria, assessing whether the course adequately equips students to contribute to environmentally responsible architectural solutions. By exploring the nexus between architectural education and sustainable design, this research contributes valuable insights to both academia and the architecture industry. The findings offer guidance for refining pedagogical approaches, improving curriculum design, and fostering a new generation of architects committed to environmentally conscious practices. Ultimately, this study seeks to propel the field of architecture towards a more sustainable and ecologically responsible future.

**Keywords:** Ecological Conscious Building, Architecture Pedagogy, AHP, LEED, Education.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EKOELEŞTİRİ KURAMI BAĞLAMINDA ALEVÎ-BEKTÂŞÎ VELÂYETNÂMELERİ

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#### ÖZET

Bu çalışmanın amacı edebiyat ve çevre ilişkisini öne çıkaran ekoeleştiri yaklaşımı perspektifinden Alevî-Bektâşî velâyetnâmelerini değerlendirmektir. Ekoeleştiri, en genel tanımıyla “ekoloji prensiplerinin edebî metinlerde incelenmesi”dir. Edebiyat metinlerinin çevre duyarlılığına ve doğal unsurlara ilişkin sistemli bir şekilde ele alınması ekoeleştiri alanının ortaya çıkması ile sağlanmıştır. XII-XIII. yüzyılda Moğolların Orta Asya coğrafyasında uyguladığı baskı ve zorlamalar neticesinde Horasan’dan Anadolu’ya gelen Yesevî dervişleri sadece fiziken değil ruhen ve fikren de etkileşim gerçekleştirmişlerdir. Öğretileri etrafında teşekkül eden tekke ve dergâhlar hem pozitif hem de manevî ilimlerin yuvası olmalarının yanı sıra halkı aydınlatan, sığınılan bir liman olmuştur. Alevî-Bektâşî velâyetnâmeleriye “veli” olarak adlandırılan eren-dervişlerin yaşamlarını, yaşadıkları olağanüstü/mistik olayları, tariklerini yayma çabalarını ve bu uğurda karşılaştıkları olayları şifahi olarak kısmen manzum ve çoğu kez eski Türk inançları ile harmanlayarak mitolojik birtakım unsurların da karıştığı masalımsı, efsanevi ve menkıbe türünde ele alındığı eserlerdir. Bunlar, kısıtlı bilgi edinilebilen dönemlere dair ipuçları veren yardımcı kaynaklar olarak zikredilebilir. Bu bağlamda eserde yer alan çeşitli unsurlar karşılaştırmalı mitoloji, halk hayatı ve folkloru, etnografya, halk psikolojisi, sosyoloji, sanat, felsefe, tarih, kimlik, estetik düzene ilişkin farklı disiplinlere katkı sağlayabilecek düzeydedir. Doğa, en genel tanımıyla, ilahî irade vesilesiyle kâinatın, kaostan kozmoza geçişi sırasında, insan müdahalesi olmadan oluşan unsurların bütünü olarak tanımlanabilir. Toplumlar; doğanın nesnel varlığını kabul ettikten sonra doğada bulunan nesnelere anlamlandırmışlardır. Bunu da kendi varoluşlarını idame ettirebilmek için yapmışlardır. Zira bilmek egemen olmaktır. Gelenek açısından doğal kültürler başlı başına kutsala saygının tezahür ettiği unsurlardır. Çalışmamızda Yesevî dervişlerinden “Hacı Bektâş-ı Veli”nin anlatıldığı ve Türkiye Diyanet Vakfı tarafından basılan Hamiye Duran’ın transkripsiyonlu “*Velâyetnâme*” metni başta olmak üzere “Sultân Şücâ’e’-d-din”, “Abdâl Mûsâ”, “Koyun Baba” ve “Od’man Baba” velâyetnâmeleri incelenmiştir. Bu eserlerde ekoeleştiri kuramına yönelik su kaynakları, çevre düzeni, bitki örtüsünde oluşan tahribat, doğal ve kültürel mirasın korunmasına ilişkin tutumlar, ava ve avcılığa yönelik bakış, kirlilik kaynakları, yaşam döngüsüne ilişkin algı ve doğa-kültür dostluğunun yansımaları örnek pasajlardan hareketle analiz edilecektir. Bu çalışma sonucunda diğer canlılarla paylaştığımız doğal yaşam alanımızı koruma, ekolojik sistemi dengede tutmaya yönelik uygulamaların teknoloji / bilişim öncesi dönemde nasıl sağlandığına ilişkin bulgular elde edilecektir. Bu bulgulardan hareketle günümüz dünyasındaki bakış açısıyla kıyas yapabilmek imkânı elde edilecek, modern dünyanın çevre sorunlarına ilişkin çözüm önerileri gündeme taşınacaktır.

**Anahtar Kelimeler:** Alevî-Bektâşî Velâyetnâmeleri, Ekoeleştiri kuramı, edebiyat ve çevre, ekosistem



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ALEVÎ-BEKTÂŞÎ HAGIOGRAPHY TEXTS IN THE CONTEXT OF ECOCRITICAL THEORY

#### ABSTRACT

The aim of this study is to evaluate Alevî-Bektâşî velâyetnâmas from the perspective of ecocriticism, which emphasizes the relationship between literature and the environment. Ecocriticism, in its most general definition, is "the examination of ecological principles in literary texts". The emergence of the field of ecocriticism has led to the systematic examination of literary texts in relation to environmental sensitivity and natural elements. As a result of the oppression and coercion imposed by the Mongols in Central Asia in the XII-XIII century, the Yassawî dervishes who came to Anatolia from Khorasan interacted not only physically but also spiritually and intellectually. The lodges and dervish lodges that were formed around their teachings became a home of both positive and spiritual sciences, as well as a port of refuge that enlightened the people. Alevî-Bektâşî velâyetnâmas are works that deal with the lives of the virtuous dervishes called "velî", the extraordinary/mystical events they experienced, their efforts to spread their order and the events they encountered in this endeavor, partly in verse and often blended with ancient Turkish beliefs in the form of fairy tales, legends and legendary tales with some mythological elements. These can be mentioned as auxiliary sources that give clues about the periods when limited information can be obtained. In this context, various elements in the work can contribute to different disciplines related to comparative mythology, folk life and folklore, ethnography, folk psychology, sociology, art, philosophy, history, identity, aesthetic order. Nature, in its most general definition, can be defined as the totality of the elements formed without human intervention during the transition of the universe from chaos to cosmos through the divine will. After accepting the objective existence of nature, societies have made sense of the objects in nature. They did this in order to sustain their own existence. Because to know is to be sovereign. In terms of tradition, natural cults are elements in which respect for the sacred is manifested. In our study, "Sultân Şücâ'e'd-din", "Abdâl Mûsâ", "Koyun Baba" and "Od'man Baba" velâyetnâmes, especially the transcribed text of Hamiye Duran's "Velâyetnâme" published by the Turkish Religious Foundation, in which "Hacı Bektâş-ı Veli", one of the Yassawî dervishes, is narrated, are analyzed. In these works, water resources, environmental order, destruction of vegetation, attitudes towards the protection of natural and cultural heritage, hunting and hunting, sources of pollution, perception of the life cycle and reflections of nature-culture friendship will be analyzed based on sample passages. As a result of this study, findings will be obtained on how practices aimed at protecting our natural habitat that we share with other living beings and keeping the ecological system in balance were provided in the pre-technology / pre-information era. Based on these findings, it will be possible to make comparisons with the perspective of today's world, and solutions to the environmental problems of the modern world will be brought to the agenda.

**Keywords:** Alevi-Bektaşî Hagiography Texts, ecocriticism theory, literature and environment, ecosystem



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### FROM IBN KHALDUN'S ASSABIYAH TO SEN AND NUSSBAUM'S CAPABILITY THEORY: EXPLORING THE DYNAMICS OF SUSTAINABLE DEVELOPMENT

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#### ABSTRACT

Ibn Khaldun's theory recognizes the cyclical nature of civilizations and the role of assabiyah in their rise and decline. Sen's and Nussbaum's Capability theory aligns with this perspective by highlighting the importance of sustainable development that encompasses not only economic growth but also human well-being and agency. By nurturing assabiyah and enhancing capabilities, societies can work towards sustainable progress that benefits current and future generations. Sen's Capability theory emphasizes the importance of enhancing individual capabilities as a means to achieve well-being and lead a flourishing life. Assabiyah complements this by highlighting how social cohesion and solidarity can play a role in enabling individuals to realize their capabilities. A strong sense of community and shared purpose can create an environment where people have access to the resources and support needed to develop and utilize their capabilities to the fullest. Both theories are concerned with social justice and empowerment. The Capability theory seeks to enhance the capabilities of individuals, especially those who are disadvantaged, while Assabiyah promotes solidarity and cooperation to achieve common goals. By combining these ideas, we can emphasize that a society with a strong sense of assabiyah is better positioned to address social inequalities and empower marginalized individuals by collectively working towards the expansion of their capabilities. The intersections between Ibn Khaldun's theory of Assabiyah and Sen's and Nussbaum's Capability theory, particularly in relation to the concept of human agency, highlight the interplay between collective agency, social cohesion, institutional frameworks, social justice, and sustainable development. These intersections provide a comprehensive framework for understanding how societies can foster human agency and promote the well-being of their members through shared efforts and cooperative endeavors to create welfare for all.

**Keywords:** The Capability Approach, Sustainable Development, Human Agency





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PROSPECTS FOR ECOTOURISM IN GÜLNAR AND AYDINCIK (CILICIA): THE HISTORICAL DIMENSION

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#### ABSTRACT

Throughout history, the entire territory of Anatolia has possessed geographical and geopolitical importance. Some areas of Anatolia, though, have arguably been particularly significant, and one of these is the southern Anatolian region of Cilicia. Cilicia stretches from the Taurus Mountains in the north down to the Mediterranean in the south. This paper will discuss the prospects for ecotourism, and the need for ecotourism awareness, in the coastal region of Gülnar and Aydıncık, an area of the Central Taurus Mountain range between Silifke and Anamur. Today, Gülnar (in the highlands) and Aydıncık (by the coast) are districts within the province of Mersin. The inhabitants of these districts retain traces of their nomadic past, migrating upwards to the cooler plateau of Gülnar in the summer while spending the winter in Aydıncık. The historically-rooted relationship between these two districts is quite unique. Various threats posed by modern 'developments', however, make it essential to preserve the area's cultural and natural assets and convey their importance to new generations. These assets can and should also be deployed as objects for sustainable domestic and foreign tourism. Recently, the area around Gülnar and Aydıncık has become remarkably popular. The COVID-19 pandemic inspired a reappraisal of rural life and a renewed interest in small-scale commercial farming, evidenced by copious new orchards, especially of almond, olive and walnut trees. Meanwhile, the area has a low earthquake risk, making it a preferred target for new housing projects. The traditional lifestyle of Gülnar and Aydıncık is geared towards agriculture and animal husbandry. Nonetheless, to prevent the area from being covered with modern buildings, it is vital to preserve its historical and cultural legacy and raise awareness of the need for, and methods of, ecotourism.

**Keywords:** Ecotourism, Gülnar, Aydıncık, Cilicia, Historical legacy



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXAMINATION OF THE LIFE STUDIES CURRICULUM IN TERMS OF SUSTAINABLE ENVIRONMENTAL AWARENESS

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#### ABSTRACT

The rapid population growth, the creation of a consumer-based society, rapid industrialization, and global competition today pose numerous climate and environmental challenges. Recent years have seen an increasing number of sudden flood events, melting polar ice caps, and forest fires in various parts of the world, all of which significantly threaten human life and the natural ecosystem. To address this situation, many research studies and approaches are ongoing, but it is believed that fostering environmentally conscious citizenship may be the best solution. It is thought that such awareness can be instilled from childhood through regular education. In Türkiye, the "Hayat Bilgisi" (Life Studies) course in primary schools holds a fundamental position in fostering sustainable environmental consciousness. In this context, this study aims to examine the Life Studies curriculum in terms of its potential to cultivate sustainable environmental awareness. The study, conducted within the framework of document analysis, encompasses an examination of the Life Studies curriculum introduced in 2018. As a result of the examination, it was found that three out of the specific objectives and two out of the skills listed in the curriculum are directly related to sustainable environmental awareness. Regarding the acquisitions analyzed at the class level, it was determined that 8 acquisition in the 1st grade, 11 acquisition in the 2nd grade, and 8 acquisition in the 3rd grade directly target the development of sustainable awareness. Consequently, out of a total of 148 acquisitions, 27 are related to sustainable education, indicating that the curriculum considers the development of environmentally conscious citizens. This result is based on a descriptive analysis of the curriculum documents. However, a more comprehensive understanding of the extent to which sustainable environmental education is implemented can be achieved through an examination and observation of in-class instructional processes.

**Keywords:** Life Studies, Sustainability, Sustainable Environmental Awareness, Curriculum



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **ECOSYSTEM SERVICES and RESILIENCE: TWO KEY CONCEPTS COMPLEMENTING EACH OTHER**

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#### **ABSTRACT**

Our planet is fundamentally an organization composed of living and non-living entities. Within this hierarchical structure, there are natural systems that exhibit complex interactions between living organisms and their environments, where processes such as water and carbon cycles, energy transfer, and adaptation to ever-changing conditions take place. Ecosystems are the result of these dynamic natural systems, and considering the benefits they provide, the conservation, monitoring, and management of these systems are of utmost importance. For instance, forest ecosystems provide ecosystem services (ES) such as oxygen production, carbon storage, wood and wildlife hosting, which are closely related to the functioning of ecological systems and thus have a direct impact on urban areas as integral parts of the global ecosystem. They can also help reduce flood risks and make communities more resilient in terms of water management by enhancing rainwater absorption. As recent research indicates, human-altered ecosystems are under threat, and humanity is facing a variety of stress factors (such as climate change, soil erosion, habitat loss, etc.) like never before. As such, resilience has emerged as a concept reflecting the need for communities to be better prepared for stress factors. Consequently, this study focuses on conducting a review of the current literature on ecosystem services and resilience as a critical step in overcoming today's significant environmental and social challenges and aims to create resilience maps towards sustainability.

**Keywords:** Sustainability, Ecosystem, Ecosystem Services, Resilience



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DOCUMENTATION OF EDIBLE AND ORNAMENTAL CYPRIOT PLANTS IN LAPTA VILLAGE IN KYRENIA DISTRICT: A QUALITATIVE ANALYSIS

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#### ABSTRACT

Domestic vernacular architecture of Cyprus pays special attention to the concept of edible landscaping. Usually various fruits, vegetables and herbs in line with ornamental plants are cultivated within the Cypriot houses. The principal aim of this research is to conduct fieldworks and record native Cypriot plants both edible and ornamental which has been cultivated in residential buildings in Lapta village located in Kyrenia district, through qualitative analysis. Lapta, also known as Lapethos, is a coastal town in Cyprus known for its natural beauty and historical significance. Cyprus, with its Mediterranean climate, is home to a variety of ornamental and edible plants. During the fieldwork process, Cypriot residential buildings in Lapta village were visited with the aim of documenting the types of local edible plants and identifying the spaces where local vegetables, herbs, and decorative green elements are cultivated. This research demonstrates that various spaces in residential buildings such as gardens, doorways, windowsills, balconies, balustrades and rooftops are utilized for cultivating fruits, herbs, vegetables and ornamental plants. Interviews with local inhabitants were conducted with the aim of documenting the plant's type, cultivation process for each identified plant and the ways which local plants were consumed. Archival research was conducted in the National Archive of TRNC. Documents such as books and periodicals were searched, and plant types that were used to be cultivated by locals were identified. The results of the analysis demonstrate various ways of usage of the Cypriot native ornamental and edible plants, their cultural significance and related cultivation processes. This research also attempts to highlight the significance of edible and ornamental plants in the Cypriot residential landscape and to serve as a guide to contribute to the efforts of preservation of Cypriot cultural heritage.

**Keywords:** Qualitative analysis, Cypriot native plants, Cypriot culture, urban agriculture, edible and ornamental landscaping





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BELLAPAIS MONASTERY AND ITS SURROUNDINGS: A CASE STUDY IN CULTURAL TOURISM SUSTAINABILITY**

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#### **ABSTRACT**

This study offers a comprehensive examination of the dynamics surrounding the sustainability of cultural tourism, with a particular focus on Bellapais Monastery and its encompassing region in Cyprus. Bellapais Monastery, renowned for its medieval architecture and profound historical significance, has established itself as a captivating attraction, attracting both local residents and tourists alike. However, the sustainability of this celebrated tourist destination is entwined with multifaceted issues, encompassing the preservation of cultural and natural heritage, the bolstering of the local economy, and the management of tourism's far-reaching impacts. The main aim of the study is to explore the intricate nexus between socio-economic, environmental, and architectural dimensions in the context of sustainable tourism, using the Bellapais Monastery and its close surroundings in Cyprus as a case study. In this context, this case study investigates the historical and contemporary ramifications of cultural tourism on Bellapais Monastery and its environs, thereby providing a fundamental groundwork for the development of sustainable tourism practices within the realm of cultural heritage preservation. This study spans several key dimensions, including the historical, architectural and cultural significance of Bellapais Monastery, the multifaceted effects of tourism on Bellapais village and the immediate vicinity of the monastery (encompassing cultural, social, environmental, and economic dimensions), the obstacles and achievements encountered in the pursuit of sustainable tourism practices, the degree of community involvement in the management of cultural heritage tourism, and the influence of these tourism activities on the local economy. Ultimately, this case study serves as a valuable resource for scholars, local authorities, and tourism professionals seeking profound insights into the harmonious coexistence of significant cultural assets and architectural heritage such as Bellapais Monastery alongside tourism. Accordingly, its potential to inspire sustainable tourism practices in analogous tourist destinations renders it a model worthy of emulation that exemplifies the multifaceted interplay of socio-economic, environmental, and architectural dimensions.

**Keywords:** Bellapais, Monastery, Cultural Tourism, Heritage, Preservation



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### THE IMPACT OF CULTURE ON FOREIGN POLICY AND POLITICAL SCIENCE

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#### ABSTRACT

The concept of Culture was not used as an explanatory concept until the 1990s but became a noteworthy concept in both Political Science and International Relations disciplines with the Second World War. Although the significance of the culture has been recognized previously, throughout the Cold War period, realism and liberalism have become dominant in international politics. In contrast, culture from other fields of the social sciences has been a significant part of the analysis. However, it was only after the end of the Cold War that international Politics began to pay due attention to the concept of culture. Thus, in the 1990s, culture became a key concept in political science and international politics. The most important factor in this was that the "Rationalization" that emerged with the Enlightenment was insufficient to explain the events in internal politics and International Relations. This inadequacy makes it impossible to explain the events that occur in international politics using the approaches mentioned above. Therefore, in order to better understand the events and phenomena in both political science and foreign policy, it is necessary to understand the irrational phenomena that shape international politics. Only in this way, it is thought that they understand the seemingly meaningless outcomes of international politics. In this sense, the research topic of the study is "The Impact of Culture on the Formation of Foreign Policy Decisions.". In the study, the focus is first on the development and role of culture in the social science literature. Secondly, the relationship between culture and political science will be analyzed together with other topics such as minority rights, citizenship problems, and multiculturalism. In the following section, the relationship between International Relations, International Relations approaches (liberalism, realism, and constructionism), and culture is explained. In the last part, Foreign Policy and Culture are discussed.

**Keywords:** Culture, Political Science, Foreignpolicy, Rationality, Consturctionism



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GREYWATER USE IN LANDSCAPE ARCHITECTURE

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#### ABSTRACT

Water plays an essential role for living organisms, from its place in ecosystems to cellular metabolism. With increasing population and urbanization, the sustainability of water resources has become a critical issue. Wastewater generated from domestic sources, excluding toilet waste, is referred to as "greywater". Greywater can be treated through filtration, sedimentation, and biological treatment methods. Chemically and biologically evaluated, greywater contains organic matter, microorganisms, and sometimes chemicals. Treated greywater can be used for purposes such as garden irrigation, toilet flushing, and cleaning. When used for landscape irrigation, treated greywater can serve as an alternative water source. Safe recovery of greywater through appropriate treatment methods can contribute to the development of effective water-use strategies in landscape architecture. However, it is essential to maintain specific parameters for these practices to be effective and safe. Regular soil testing to monitor salt accumulation in the soil is crucial. Additionally, attention should be paid to ensuring proper drainage of the soil after irrigation with greywater. Many cities worldwide utilize treated wastewater for landscape irrigation as a means to efficiently use water resources, which helps preserve freshwater sources while reducing costs. This paper discusses the significance of greywater treatment, its applications in landscape architecture, benefits, risks, and examples from various countries. The study emphasizes the importance of water resources, explains greywater technologies, and how treated urban wastewater can be effectively used in landscape architecture. Furthermore, the advantages and risks of wastewater recycling, as well as the importance of water management, are highlighted with examples from around the world.

**Keywords:** Greywater, Landscape, Irrigation



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SOIL MOISTURE DIFFERENCES BETWEEN MICRO CATCHMENTS AND TERRACES

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## ABSTRACT

There is an urgent need for studies on developing alternative methods rather than traditional methods in plant cultivation, to mitigate the negative effects of global climate change. Water harvesting is one of the most important practices that can be used for ecosystem restoration/rehabilitation against water scarcity in arid and semi-arid areas. This study aimed to assess soil moisture variations in the root zone of Russian olive (*Elaeagnus angustifolia* L.) and narrow-leaved ash (*Fraxinus angustifolia* Vahl.) seedlings growing in V-shaped micro catchments and terraces in areas with severe water deficit during the growing period. The study was conducted on three different sites (i.e., blocks) in Yuntdağı, Ödemiş, and Karaburun in Izmir Regional Directorate of Forestry in the western Türkiye, where water deficit occurs at different rates during the growing period. For each species in each block, five different treatments including mycorrhiza (M), polymer (P), osmoprotectant (O), P+O, and the control (C-V, no application) were applied in the micro catchments. In addition, another control (C-A, no application) treatment was included for the traditional afforestation technique (terracing). During the first growing period (July, August, and September 2022), soil moisture in the root zone (30 cm) of the seedlings growing on the terraces and at the lower corner of the micro catchment was monitored using the TDR method. For Russian olive, the lowest soil moisture was measured in the terraces, while the highest soil moisture was measured in the C-V, M, O, and P+O micro catchment units. The latter group had two- and three-fold greater soil moisture in September and July-August term, respectively, when compared to the terrace treatment. For narrow-leaved ash, soil moisture averaged three-fold greater soil moisture for the micro catchment without any treatment, when compared to the terrace treatment.

**Keywords:** Soil moisture; Afforestation; *Elaeagnus angustifolia*; *Fraxinus angustifolia*; Rainwater harvesting

\*This study is funded by TUBITAK (The Scientific and Technological Research Council of Turkey) through Project no: 122O137 and titled “*Ecosystem Rehabilitation Against Climate Change with Effective Use of Water in V-Shaped Microcatchments / V-Şekilli Mikrohavzalarda Suyun Etkin Kullanımıyla İklim Değişikliğine Karşı Ekosistem Rehabilitasyonu*”.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### APPLYING BEDZED'S SUSTAINABLE COMMUNITY STRATEGIES IN YENIKENT: A CASE STUDY OF SUSTAINABLE DEVELOPMENT IN NORTH CYPRUS

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#### ABSTRACT

Sustainable community development has emerged as a crucial focus in urban planning, aiming to address various environmental, social, and economic challenges within cities. This research study undertakes a comparative analysis between BedZED, a prominent sustainable development in South London, and the OMG INTENSE Nicosia project in North Cyprus. The objective is to adapt the successful sustainable strategies employed in BedZED to enhance sustainability within the OMG INTENSE Nicosia project. The analysis encompasses four key sustainability aspects: social sustainability, water and power usage, material usage, and environmental impact. By examining these areas, we aim to identify similarities and differences between BedZED and the OMG INTENSE Nicosia project, allowing us to pinpoint opportunities for adaptation and improvement. Our findings indicate that BedZED's effective strategies can indeed be customized and applied to enhance sustainability in the OMG INTENSE Nicosia project. BedZED's emphasis on community engagement, mixed-use development, and the integration of green spaces can serve as valuable inspiration for enhancing social sustainability within the OMG INTENSE Nicosia project. Furthermore, BedZED's efficient water and energy systems can be tailored and implemented in the OMG INTENSE Nicosia project to improve sustainable practices related to water and power usage. Additionally, adopting BedZED's sustainable building practices and landscaping strategies can help minimize the environmental impact of the OMG INTENSE Nicosia project. The outcomes of this study contribute to the ongoing discourse surrounding sustainable community development and offer practical insights that can inform future urban planning efforts. Targeted at urban planners, policymakers, and researchers involved in sustainable community development, this research highlights the potential benefits of adapting successful strategies from BedZED to the unique context of the OMG INTENSE Nicosia project. By doing so, we aim to foster enhanced sustainability practices and contribute to the broader goal of sustainable urban development.

**Keywords:** BedZED, sustainable community, social sustainability, eco-friendly development, community engagement, North Cyprus



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BALANCING RURAL SERENITY AND URBAN DEVELOPMENT: ANALYZING THE IMPACT OF HIGH-RISE BUILDINGS ON RURAL RESIDENTIAL AREAS**

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#### **ABSTRACT**

As cities continue to grow and develop, they reshape many regions across the world. Urban-rural life has always held a sacred place for the people living within it. Rural allows people to have a life far away from the visual and auditory disturbances commonly associated with city life. The peacefulness and connection to nature offered by rural areas are cherished qualities, and their preservation is essential for the well-being of rural communities. Disturbances to this way of life can take various forms, and one of those forms is the intrusion of ill-fitted high-rise buildings. These structures may be a significant addition to a city if they are located in the right context and environment, but when they are built in a rural residential context this will raise many questions regarding their potential effects on the near residential buildings. The aim of this research is to provide a holistic understanding of the consequences of the existing added high-rise buildings in rural areas, and how they affect the fabric of the rural residential areas' sustainable development. Furthermore, this study will analyze the social, physical and psychological aspects of the urban-rural interface, exploring the perceptions and attitudes of rural residents toward the presence of high-rise buildings in their vicinity. The aim is to shed light on the multifaceted effects on the local community. Through surveys and interviews, we intend to uncover how these structures influence community identity, privacy, and overall well-being, recognizing the importance of local perspectives in shaping urban planning decisions. In conclusion, this study aspires to provide a holistic analysis of the impact of high-rise buildings on rural residential areas. It emphasizes the importance of preserving the unique qualities of rural life while accommodating urban development. Through a multidimensional approach.

**Keywords:** High-rise buildings, Residential environment, Rural areas, sustainable development



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXPLORING PERCEPTION OF RESIDENTS REGARDING THE OPEN GREEN SPACES IN GÜZELYURT, CYPRUS

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#### ABSTRACT

Globally, there is a significant demographic shift related to urbanization. Among the dangerous hazards of urbanization include environmental pollution, the urban heat island effect, and climate change. Urban green spaces such as parks, roof gardens, streams, woodlands can provide essential ecosystem services. Open green spaces can also assist urban residents' physical activity, as well as their psychological and general wellness. Urban landscapes are also significant for Cyprus as there is an on-going remarkable urbanization. Within this framework, this study looked into Güzelyurt's (Morphou) open and green spaces. This is the first study to look at how users feel about public open green spaces and how they perceive them in the Güzelyurt (Morphou) region of Cyprus. A questionnaire with 60 participants were conducted in order to understand respondents' suggestions about several aspects of existing open and green spaces in Güzelyurt, north Cyprus. After the introduction, the study continues with the methodology explaining research context, research design, measures and the sample. Then the findings are presented and a related discussion is made. Lastly conclusion is derived based on the findings. The results showed that majority respondents were unsatisfied with the city's urban open spaces. Our results indicate that local authorities should legalize the planning of open spaces and green areas within a long term perspective.

**Keywords:** Urbanization, open green space, questionnaire, Güzelyurt, Cyprus

\*Some parts of this study has been previously published as an article.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RESPONDING TO SDG 11, WOMEN'S USE OF PUBLIC SPACE: THE CASE OF İSMET PASHA STREET IN UŞAK, TURKEY

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#### ABSTRACT

This study investigates the relationship between architectural design, social dynamics, and cultural norms in shaping women's utilization of public space in İsmet Pasha Street, Uşak, Turkey. By explaining the layout, accessibility, and amenities of İsmet Pasha Street, this study seeks to highlight how design decisions can either facilitate or hinder women's active participation in the public sphere. The study examined the history of İsmet Pasha Street, which is the oldest street, the main commercial street, and a place for public socialization in Uşak. Focusing on the intersection of architecture with social and cultural factors, the paper aims to unveil the complex interplay between physical surroundings and women's engagement within the public realm. Analysis revealed the effects of architectural design on women's experiences in public spaces in terms of both social interactions and cultural norms. The investigation considered the impacts of walkability, safety, and inclusivity on women's willingness and ability to engage with the street's offerings. Moreover, the study examined the influence of Uşak specific cultural and social norms on women's lives in public spaces. It explored the historical context and prevailing societal attitudes towards women's mobility, visibility, and agency in public settings. The analysis also considered the role of gender-specific expectations, traditions, and practices in shaping women's comfort and freedom in navigating İsmet Pasha Street based on observation. Regarding the UN's Sustainable Development Goals, SDG 11 means to provide universal access to safe, inclusive, and accessible green and public spaces for women. Women's full and free participation in society is vital for their continued contributions to sustainability. Outcomes of the study of İsmet Pasha Street indicated that women's use of public space is not active enough even though they are main consumers in society because of design of the street. Mornings are perceived as safer and give women opportunities for socialization, but they cannot safely participate in social life on İsmet Pasha Street at night. Particularly, they did not feel safe at night in parts of the street where harassment was known to occur. Relatedly, their time for socialization and use of public spaces is limited by transportation because Uşak bus services end at 11pm and it is not culturally appropriate for women to use taxis, which would be the only other option. These gender-based inconsistencies do not contribute to the sustainability of Uşak but this paper offers some suggestions to help Uşak achieve SDG 11.

**Keywords:** Public space, women, Uşak, social norms, cultural norms, sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **META-MODERNISM IN ARCHITECTURE AND GENDER EQUALITY: A CRITICAL REVIEW OF WOMEN IN PUBLIC SPACE**

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#### **ABSTRACT**

Meta-modernism, a contemporary way of understanding architecture. In the literature, meta-modernism is expressed as including any practices and any ideas that challenge neither postmodernist nor modernist strategies. Studies demonstrate that societies have been influenced by social and art movements, while at least one study explains how certain movements and trends are related to different theories. For example, deprivation theory is exemplified in economic inequality, human rights violations, and gender inequality, which each reveal a lack of rights in society. These, in turn, affect the development, design, and use of public space. Therefore, this paper aims to determine the meaning of meta-modernism and gender equality by exploring how public spaces reflect changes in society regarding to SDG5. To reach these aims, the study also examines the impacts of meta-modernism in the field of architecture, especially regarding gender equality in architectural design. Gender equality (SDG5) is a major goal of the UN's Sustainable Development Goals that were established to achieve a more sustainable and equitable world by the year 2030. SDG5, in particular, works against gender inequality and discrimination in society. This paper investigates gender equality in architecture as design and the relevant design aims and solutions for gender equality in public spaces. While meta-modernism focuses on contemporary social norms, this study investigates the relationship between meta-modernism in architecture and women in public spaces.

**Keywords:** Meta-modernism, gender equality, society, social movements, public spaces





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE CRITICAL ROLE OF RESILIENCE FOR THE MANAGEMENT OF SOCIAL- ECOLOGICAL LANDSCAPES: AN EMPIRICAL EVIDENCE FROM LEFKE REGION OF TRNC

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#### ABSTRACT

Throughout history, man has shaped nature and nature has influenced the life of human societies. This dynamic interrelationship has led to the formation of *social-ecological landscapes* (SELs), which represent an interconnected system of humans and the environment with an adaptive capacity to uncertainties, disturbances, and changing conditions. The SELs are composed of ecological and social systems. Both systems are in harmony with each other within a coupled landscape system with a self-sustainable and self-organizational capacity. They represent distinctive landscape features with a high degree of biocultural diversity. Therefore, they provide multiple ecosystem services (e.g. climate regulation, food, cultural heritage, traditional knowledge, and practices) to human societies. Such landscapes have continuously evolved depending on their exposure capacity to disturbances, adaptive capacity, and resilience. Thus, resilience, the ability and/or capacity of SELs to cope with changing conditions and disturbances, is an important attribute of them. In this sense, the system either absorbs the effects of disturbances, resists, adapts, or becomes a new more stable system. Considering the vital role of SELs in human well-being and critical global issues, the resilience of SELs has been a major issue on the international agenda over the past decade to reconcile three fundamental goals: biodiversity conservation, food production and security, and sustainable community development – the primary goals of landscape planning. In this context, the resilience of SELs of Lefke Region located in TRNC was examined as a case study. The SELs of Lefke Region consist of a mosaic of ecosystems (e.g. Mediterranean maquis, agriculture, marine, and coast) that have evolved over centuries through interactions between nature and humans. However, this dynamic and coupled landscape system has been damaged by the effects of various driving forces (e.g. land-use change, drought, and intensive urbanization). For this reason, this study was important to address the current trends in the protection and management of SELs in the region. The methodology of the study included three stages: Identification of the place-based resilience assessment indicators through literature review; data collection using a multiple-choice questionnaire (on 1-5 points) and semi-structured interviews; and data analysis using several tests of the SPSS Statistical Program. From December 2015 to March 2016, a total of 106 residents from 12 villages in the region were surveyed. The results showed that the resilience of the ecological and social systems of the SELs was rated low with 2.87 and 2.53 points respectively. The resilience of the agricultural system was rated as medium with 3.44 points. The overall resilience of the SELs was estimated to be low at 2.94 points. The results indicate that the resilience of the SELs in Lefke Region is currently trending downward. Therefore, a range of planning approaches (e.g. integrated landscape planning), management interventions (e.g. adaptive comanagement), and policy instruments (e.g. European Landscape Convention and the protected landscape approach of IUCN) should be urgently employed to protect, enhance, and revitalize the co-produced landscape system and its resilience in the region.

**Keywords:** Resilience, Social-ecological landscape, resilience assessment indicators, Lefke Region



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE IMPORTANCE OF ENVIRONMENTAL GRAPHIC DESIGN FOR RURAL TOURISM

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#### ABSTRACT

Today, tourism is an important sector for the cultural and economic development of countries all over the world. Rural regions are trying to gain a place in this sector with their accumulated cultural history and natural beauty. However, the restoration, maintenance, and improvement of historical buildings and cultural elements may not be sufficient to attract tourists. Spatial communication and spatial experience are very important issues for newcomers to be able to wander around the country easily and to feel the cultural identity of traditional architecture. With the help of powerful communication between the urban texture and people, long-term bonds can be established and tourists will visit these local areas again and again. Architectural language is not sufficient for spatial communication in rural areas, graphic solutions need to be integrated into architectural design. Environmental graphic design (EGD) can improve the touristic values of rural areas and increase tourists' interest in these small villages under 3 main headings; navigation, identification, and interpretation. Environmental graphics enhance spatial communication and enhance spatial experience by intervening in the creative shaping of rural cultural spaces and transforming the cultural and historical appeal of rural heritage through the global graphic language. Firstly, this review paper identifies the key issues related to rural environment and tourism and then analyses the basic principles and skills of EGD, citing the best projects from all over the world. It presents a model that focuses on understanding how these graphics can contribute to cultural sustainability and the development of rural tourism. The study also aims to confirm this framework and show the future formation of cultural cities.

**Keywords:** environmental graphics, graphic design, spatial communication, rural tourism, visual communication



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A TWO-PRONGED APPROACH TO CLIMATE CHANGE AND CROP- LIVESTOCK PRODUCTION

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#### ABSTRACT

When analyzed in terms of greenhouse gas emissions contributing to climate change, agriculture, forestry, and land use collectively rank second, following industrial energy use at 25%. In 2018, global emissions from agriculture and related land use reached 9.3 billion tons of carbon dioxide equivalent (Gt CO<sub>2</sub>eq). Activities within agriculture, including fossil fuel consumption, feed production and processing, livestock rearing, ruminant enteric fermentation, fertilizer management, pesticide use, deforestation, and rice paddies, release greenhouse gases such as CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and H<sub>2</sub>S. Therefore, agricultural production is considered one of the major drivers of climate change. Intensive farming practices generate large amounts of animal waste, which can be challenging to manage. The disposal of animal waste onto agricultural lands often exceeds the soil's capacity to absorb it. Over-fertilization of soils with both chemical and animal manure leads to toxic runoff, including nitrogen, phosphorus, antibiotics, hormones, pesticides, and heavy metals. The transport of these pollutants to water sources and the release of gases like hydrogen sulfide, ammonia, methane, and nitrous oxide from fertilizers into the air exacerbate the negative environmental impacts. These factors, along with the intensification of agricultural land use, result in deforestation, increased erosion, decreased soil fertility, and a reduction in biodiversity. These ecological threats have cascading effects not only on weather patterns but also on animal and human health and agricultural productivity. The intertwined effects of these factors cannot be summarized simply as changing weather conditions. First and foremost, it directly affects ecology, and subsequently, it affects both animal and human health, as well as agricultural productivity. The decline in animal welfare and health, coupled with the increasing temperature stress, leads to consequences such as reduced feed consumption, reproductive disorders, immune system suppression, and decreased livestock production efficiency. Additionally, it leads to the emergence of antibiotic resistance in both animals and humans. It can also enhance the survival and reproduction probability of certain pathogen and vector varieties such as ticks and fleas. The plant and livestock sectors, which are fundamental components of our food production system, cyclically affect each other both in terms of causes and consequences of climate dynamics due to their intertwined nature with climate dynamics. Therefore, it should be considered within the framework of the One Health approach.

**Keywords:** climate change and livestock production, climate change and animal health, climate change and one health



**CHEMICAL COMPOSITION AND NUTRITIONAL VALUE OF *TARAXACUM OFFICINALE***

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**ABSTRACT**

**Background.** *Taraxacum officinale F. H. Wigg (TO)* is a plant with a high content of biologically active compounds with different functions: antioxidant, anti-hypertensive, anti-tumor, anti-atherogenic, anti-diabetic, anti-inflammatory, anti-oxidant and hepatoprotective effects. Due to their high nutrient content, *Taraxacum officinale* leaves (TOL) are often included as a salad ingredient, but *Taraxacum officinale* roots (TOR) are used as substitutes for coffee or tea. **Aim of the study:** Determination of the total polyphenols content (TPC) of TOL and TOR. **Material and methods:** Leaves and roots were harvested from a natural habitat of Republic of Moldova. Determination of TPC in TOL and TOR extracts (10, 20, 25, 40, 50 and 80% ethanol) was carried out using the Folin–Ciocalteu reagent. As a standard for TPC we used tannic acid. Phenols content was estimated using a standard curve obtained from various concentrations of tannic acid equivalent ( $\mu\text{g TAE}$ ) / mg dry weight (DW) of plant extract from TOL and TOR by next equation:  $y=3.9712x - 0.1725$ , where  $x$  is the absorbance measured at 765 nm using spectrophotometer *Synergy H1 Hybrid Multi-Mode Microplate Reader (BioTek Instruments, USA)* and  $y$  is TAE  $\mu\text{g}/\text{mg DW}$ . The coefficient of determination for TPC in TOL and TOR had a good linearity ( $R^2=0.9918$ ). **Results:** The content ( $M\pm SD$ , mg/mL) of TPC in TOL ethanolic extracts of 80%, 50% and 20%, was evaluated as 2.76, 8.35 and 5.82  $\mu\text{g}/\text{ml}$ , but in TOR respectively in ethanol of 10% –  $4\pm 0.19$ , 20% –  $4.36\pm 0.17$ , 25% –  $4.21\pm 0.15$ , 40% –  $4.75\pm 0.19$ , 50% –  $4.86\pm 0.2$  and 80% –  $5.69\pm 0.13$ . **Conclusions:** *Taraxacum officinale* is a promising source of TPC. The highest concentration of TPC was in ethanolic extracts of 50% and 20% in TOL and 80% in TOR. *Taraxacum officinale F. H. Wigg* can be used as a natural plant, cheap and widely available in Moldovan fields.

**Keywords:** *Taraxacum officinale* leaves and roots, polyphenols, anti-oxidants, spectrophotometric method.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXAMINING THE CONSERVATION-TOURISM RELATIONSHIP IN RURAL AREAS IN ANATOLIA WITH SWOT ANALYSIS

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#### ABSTRACT

Rural areas are settlements with dynamic characteristics with their unique social, cultural, economic and environmental data. All kinds of daily life, production and consumption activities carried out in these areas can directly affect the design of open and closed spaces. In this sense, a site-specific built environment is formed in every rural settlement; This environment is constantly transforming according to changing conditions and practices. It is possible to talk about the existence of many tangible and intangible cultural values in the Anatolian geography, where rural areas are concentrated, with the influence of the deep-rooted and rich historical and cultural accumulation. Architectural works, which are among the most tangible values, mostly appear as modest structures specific to these areas. However, life practices directly reflect on these structures and shape them accordingly. In addition, open spaces such as streets, squares, courtyards and gardens are organized according to daily life and production-consumption activities, like buildings. All these factors bring about the necessity of multi-faceted conservation of rural areas. Rural areas are important resources for the tourism industry. Therefore, tourism is becoming a primary tool in the conservation of rural areas. In this context, the aim of the study is to contribute to the conservation of rural areas in Anatolia and to draw attention to the importance of the conservation-tourism relationship in this sense. Within the scope of the study, various rural areas located in different parts of Anatolia were examined and evaluations were made in terms of tourism potential. The study method consists of on-site observations, literature reviews and SWOT analysis. As a result, it is aimed to evaluate the conservation-tourism interaction in rural areas in a multifaceted manner and to draw attention to the holistic conservation of these areas.

**Keywords:** Rural areas, Anatolia, conservation, tourism, Swot analysis

**Participation status:** Online





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DENGELİ VE SÜRDÜRÜLEBİLİR KALKINMADA TURİZM SEKTÖRÜ

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#### ÖZET

Kaynakları kalkınma amacıyla kullanamama, dengesiz kalkınma, sürdürülebilir kalkınmayı sağlayamama, kalkınmasını gerçekleştiremeyen gelişmemiş veya gelişmekte olan ülkelerin yaşadığı en önemli sorunlar arasında yer almaktadır. Türkiye, gelişmekte olan ülkeler arasında yer aldığından bölgelerarası dengesiz kalkınmanın olumsuz etkileriyle karşı karşıya kalmaktadır. Ekonomik, sosyal ve kültürel alanda kalkınma hedeflerini gerçekleştirmek isteyen ülkelerin, turizm sektörü gibi ekonomik katkısı yüksek sektörlerden yararlanması gerektiği düşünülmektedir. Sosyal, kültürel, tarihi, doğal arz verilerinin tanıtılması ve pazarlanması yoluyla turizm talebinin artırılması, döviz girişindeki artışla ekonomik gelişme sağlanması, istihdam olanaklarının yaratılması gibi olumlu katkılar turizm sektörünün, büyüme ve kalkınmada ortaya koyduğu en önemli katkılardandır. Bu çalışmada, turizm sektörünün, ülke ekonomisine, dengeli ve sürdürülebilir kalkınmaya, ödemeler dengesine ve istihdama olan pozitif etkisi üzerinde teorik olarak durulmaktadır. Bunun yanında çalışmada turizm sektörünün bölgesel kalkınmaya olumlu katkı sağlaması ve bölgelerarası dengesizliğin azaltılması amacıyla öneriler sunulmaktadır. Bu doğrultuda öncelikle bölgelerin sahip olduğu turizm arz envanteri çıkartılarak bölgelere yönelik etkin pazarlama faaliyetleri yapılmalı, destinasyon imajı geliştirilmeli, ulusal ve uluslararası turizm talebi çekilmelidir. Kalkınma planlarında turizm sektörü öncü sektör olarak değerlendirilmeli, turizm sektörüne yönelik yatırımların payı artırılmalı, turizm yatırımlarında gelişmemiş ve öncelikli bölgeler tespit edilmeli, turizm bölgelerinde turizm ile doğrudan veya dolaylı ilişkili sivil toplum kuruluşlarının sayısı ve etkinliği artırılmalı, birbirleriyle koordinasyonlu çalışan gönüllü derneklerin kurulması özendirilmelidir. Turizm arzına kaynaklık eden kültürel ve doğal değerler korunmalı, sit alanlarına gerekli özen gösterilmeli, turizm bilincini artırmaya yönelik her yaştan bireye bilgilendirme çalışmaları yapılmalıdır.

**Anahtar Kelimeler:** Kalkınma, Büyüme, Dengeli Kalkınma, Turizm.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### TOURISM SECTOR IN BALANCED AND SUSTAINABLE DEVELOPMENT

#### ABSTRACT

Failure to use resources for development, unbalanced development, inability to achieve sustainable development are among the most important problems experienced by undeveloped or developing countries that cannot achieve their development. Since Turkey is among the developing countries, it is faced with the negative effects of interregional unbalanced development. It is thought that countries that want to achieve their development goals in the economic, social and cultural fields should benefit from sectors with high economic contribution, such as the tourism sector. Positive contributions such as increasing tourism demand through the promotion and marketing of social, cultural, historical and natural supply data, providing economic development with the increase in foreign exchange inflow, creating employment opportunities are among the most important contributions of the tourism sector in growth and development. In this study, the positive effect of the tourism sector on the country's economy, balanced and sustainable development, balance of payments and employment is theoretically emphasized. In addition, in the study, suggestions are presented in order to make a positive contribution to the regional development of the tourism sector and to reduce the interregional imbalance. In this direction, first of all, the tourism supply inventory of the regions should be prepared, effective marketing activities should be carried out for the regions, the image of the destination should be developed, and national and international tourism demand should be attracted. The tourism sector should be considered as the leading sector in development plans, the share of investments in the tourism sector should be increased, undeveloped and priority regions in tourism investments should be determined, the number and effectiveness of non-governmental organizations directly or indirectly related to tourism in tourism regions should be increased, and voluntary associations working in coordination with each other should be encouraged. Cultural and natural values that are the source of tourism supply should be protected, due attention should be paid to protected areas, and information activities should be carried out for individuals of all ages to increase tourism awareness.

**Keywords:** Development, Growth, Balanced Development, Tourism



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SUSTAINING TRADITIONAL ARCHITECTURE IN CONTEMPORARY DESIGN OF INTERNATIONAL ARCHITECTS: CASES FROM RWANDA AND ZAMBIA

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#### **ABSTRACT**

Zambia and Rwanda, two African nations with distinct cultural backgrounds, exemplify the complex interplay between modernization and the preservation of traditional architecture. Zambia grapples with the challenge of harmonising traditional building practices with modern design trends as urbanisation accelerates with a few exceptions, while Rwanda has successfully integrated its rich architectural heritage with contemporary urban planning and sustainability. These contrasting journeys serve as compelling case studies, offering insights into how countries can navigate the evolving architectural landscape while safeguarding their unique cultural identities. As globalisation and modernization continue to transform architectural landscapes, there is an increasing emphasis on the preservation and vitality of traditional architectural practices within diverse cultural contexts. This abstract delves into the fascinating dynamics between international architects and the safeguarding of traditional architecture, all in the context of contemporary advancements, with a special focus on the nations of Rwanda and Zambia. In this paper it is examined how traditional architecture is sustained in contemporary design of international architects, utilising data collected from diverse architectural media sources, local sources and environmental studies, it adds to a deeper understanding of the challenges associated with the coexistence of traditional and modern architectural practices in a globalised environment by examining these situations from Rwanda (Women's Opportunity Centre) and Zambia (The Mwabwindo School). In order to maintain the preservation and promotion of traditional architectural heritage in the face of changing design trends, it emphasises the value of encouraging collaboration among international architects, local populations, and authorities.

**Keywords:** Sustainability, Traditional, Contemporary Design, Rwanda, Zambia.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BUILD BACK BETTER FOR A MORE RESILIENCE ENVIRONMENT INVESTIGATION**

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#### **ABSTRACT**

After each natural crisis like earthquake, it needs an environmental assessment to be collected, recorded, and analyzed. Knowing about environmental effects has been critical as a mainstream of the preliminary work after each earthquake. Environmental effects caused by the earthquakes on geomorphic, hydrological, archaeological, and structural features not only provide basic information to understand the earthquake type size, and intensity but also are matters for a resilience recovery. This information is practical both for ecological resilience and human wellbeing rebuiltment. Recovery of the Environment and ecosystem after extreme natural events such as earthquakes are related to Debris, Urban environment, Water bodies, Forest, and Biodiversity. This research attempts to prepare a review study from the past assessment researches over the post-disaster environmental assessment. As a result, this work provides a list of factors and sub-criteria that matter for environmental recovery and resilience after earthquakes by studying the appropriate projects and real experiences after a natural crisis such as earthquakes. This work also describes howe remote sensing images monitoring and evaluation of can be a practical method for the post-disaster restoration and reconstruction process. This review study may be a beneficial starting point for Turkey trying to recover from the damaged environment after the last earthquake occurred in 2023.

**Keywords:** Earthquake, Environmental assessment, Impact, Recovery, Resilience



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### TEKERLEKLİ SANDALYE KULLANICILARINA NAVİGASYON SİSTEMİ İLE ENGELSİZ ROTA OLUŞTURULMASI

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#### ÖZET

Engellilik, dünya nüfusunun önemli bir bölümünü etkilemektedir. Bu nedenle, toplumların bilinçlenmesi, eğitilmesi ve bireylerin topluma entegre edilmesi ve bu kapsamda engelli bireyleri etkileyen sorunları anlamak önemlidir. Son yıllarda ülkemizde üniversitelerin sayısında belirgin bir çoğalma olmuştur. Fakat üniversite kampüslerinde özellikle ortopedik engelli kullanıcılar bir takım sorunlarla karşılaşmaktadır. Ortopedik engelliler için standartlara uygun ve erişilebilir kampüsler tasarlamak, sürdürülebilirlik anlamında gerekliliği bilinen bir gerçektir. Bu çalışmada, ileride oluşturulacak GPS gibi akıllı ulaşım sistemlerinde kullanılacak, ortopedik engelli bireyler için güvenli ve erişilebilir rotaların öncelikli olarak nereler olması gerektiği ortaya konmuştur. Çalışmanın amacı ortopedik engellilerin hiçbir engele takılmadan istediği yere gidebilmesi için yollardaki uygun koşulların tespit edilmesi ve bu konuda gerekli düzenlemelerin yapılması gerekliliğini ortaya koymaktır. Bu doğrultuda İnönü Üniversitesi'nde öğrenim gören ortopedik engelliler ile anketler yapılmış ve anket sonuçlarına göre engelli yol standartlarında öncelikli olması gereken durumlar puanlanmıştır. Analitik Hiyerarşi Prosesi (AHP) den faydalanılarak, İnönü Üniversitesi kampüsünde seçilen alternatif yolların kriterler açısından değerlendirmesi yapılarak ortopedik engelliler için hangi yolun daha uygun olduğu ortaya koyulması amaçlanmıştır. Ayrıca seçilen alternatif yolların eğitim analizi ve alan analizleri yapılmış ve AHP bulgularıyla karşılaştırılmıştır. Bu çalışma; yeni engelsiz rotaların oluşmasında öneriler geliştirilmesine ve teşvikinin sağlanmasına, ortopedik engelliler için özgüvenlerinin artmasına ve eğitim rahatlığı sağlanmasına, erişilebilirlik konusunda hangi engellerin önemli olduğu ya da hangi konuların daha engel teşkil ettiğinin tespit edilmesine, en uygun erişilebilir yolun belirlenmesine yardımcı olmaktadır. Peyzaj tasarımlarının engelsiz olması gerektiği konusunda farkındalık oluşturmaktadır. Ayrıca bu örnek pilot çalışmanın tüm kentlerde uygulanması önerilmekte ve diğer engelli bireyler için de geliştirilebilir özellikte olduğu beklenmektedir.

**Anahtar Kelimeler:** Üniversite kampüsü, Analitik Hiyerarşi Prosesi, ortopedik engelli, evrensel tasarım, erişilebilirlik / ulaşılabilirlik, engellilik, alan analizi.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CREATING AN BARRIER-FREE ROUTE WITH THE NAVIGATION SYSTEM FOR WHEELCHAIR USERS

#### ABSTRACT

Disability affects a significant portion of the world's population. For this reason, it is important to raise awareness, educate and integrate individuals into society, and in this context, it is important to understand the problems that affect people with disabilities. In recent years, there has been a significant increase in the number of universities in our country. However, on university campuses, users with orthopedic disabilities face some problems. It is a well-known fact that designing accessible and compliant campuses for orthopedically disabled people is necessary in terms of sustainability. In this study, it has been revealed where safe and accessible routes should be primarily for individuals with orthopedic disabilities that can be used in smart transportation systems such as GPS to be created in the future. The aim of the study is to reveal the necessity of determining the suitable conditions on the roads and making the necessary arrangements in this regard so that the orthopedically disabled can go wherever they want without any obstacles. In this direction, surveys were conducted with the orthopedically disabled people studying at İnönü University and the situations that should be prioritized in the disabled road standards were scored according to the survey results. By making use of the Analytical Hierarchy Process (AHP), the alternative roads selected on the İnönü University campus were evaluated in terms of criteria, and it was aimed to reveal which road is more suitable for the orthopedically disabled. In addition, slope analysis and area analysis of the selected alternative roads were made and compared with the AHP findings. This work; It helps to develop suggestions and encourage the formation of new barrier-free routes, to increase self-confidence for orthopedically disabled people and to provide educational comfort, to determine which obstacles are important or which issues are more obstacles in terms of accessibility, and to determine the most appropriate accessible route. It creates awareness that landscape designs should be barrier-free. In addition, this sample pilot study is recommended to be implemented in all cities and it is expected that it can be developed for other disabled individuals.

**Keywords:** University campus, Analytical Hierarchy Process, orthopedic disability, universal design, accessibility / accessibility, disability, area analysis.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ZİHİNSEL ENGELLİ ÇOCUKLARA HORTİKÜLTÜR TERAPİSİ

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#### ÖZET

Bu çalışmanın amacı, İnönü Üniversitesi Özel Eğitim ve Rehabilitasyon Merkezi'nde eğitim alan zihinsel engelli olan çocuklara bireysel bahçe terapi tekniğinin uygulanması ve bu çocuklar üzerindeki yaşam kalitesi ve psikolojik iyileştirici etkilerinin araştırılması olmuştur. Bahçe terapinin engelli çocuklarda sosyal becerilerin ve yaşam kalitesi gelişimi üzerindeki etkileri ölçmek amacıyla çalışma merkezinde görev yapan öğretmenlere, uygulama öncesi ve sonrası için Sosyal Cevaplılık Ölçeği (SCÖ) ve Çocuklar İçin Yaşam Kalitesi Ölçeği (YKÖ) formların doldurularını istenmiştir. Sonuç olarak, YKÖ sonuçlarına göre danışanlarda daha çok duygularıyla ilgili ilerlemeler tespit edilmiştir. Bunlardan en çok üzüntülü, öfkeli hislerinin ve ileriye göre endişelerin azalımı, ve uyumakta zorlukların azalımı olmuştur. SCÖ'nin sonuçlarına göre en çok sosyal anlamda gelişmelerin olduğu açıklanmıştır. bunlar; grup aktivitelerine katılımın iyileşmesi, başkalarıyla hislerini paylaşabilir olması, yeni biriyle sosyal bir ilişkiye başlatan taraf olmaktan kaçınıldığının azalması ve başkalarıyla ilişkide kendine güveni var gibi görünür olması olmuştur. Danışanlar tarafından doldurulan gözlem formların ve SCÖ ve YKÖ sonuçlarına göre uygulama seanslarında daha az katılan veya engel durumu ağır olan danışanlarda, bahçe terapisi sonrası gelişmeleri az olarak tespit edilmiştir.

**Anahtar Kelimeler:** Bireysel bahçe terapisi, Engelli bireyler, Özel eğitim ve rehabilitasyon merkezi, Bahçe tasarımı, insan ve bitki etkileşimi



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### HORTICULTURAL THERAPY TO CHILDREN WITH MENTAL DISABILITY

#### ABSTRACT

The aim of this study was to apply the individual horticultural therapy technique to disabled children receiving education at İnönü University Special Education and Rehabilitation Center and to investigate the quality of life and psychological improvement effects on disabled children. In order to measure the effects of horticultural therapy on the development of social skills and quality of life in children with disabilities (as quantitative data), the teachers working at the study center were asked to fill in the Social Reciprocity Scale (SRS) and The Pediatric Quality of Life Inventory (PedsQL) forms before and after the procedure. As a result, The Pediatric Quality of Life Inventory (PedsQL) before and after individual garden therapy, more emotional improvements were detected in the clients. The most common of these was the reduction of feelings of sadness and anger, worries about the future, and of difficulties in sleeping. According to the Social Reciprocity Scale (SRS) before and after individual garden therapy, it was explained that most social developments occurred. these; participation in group activities improved, being able to share feelings with others, less avoidance of being the initiator of a social relationship with someone new, and appearing to have self-confidence in the relationship with others. According to the observation forms filled out by the clients and the results of SRS and PedsQL, it was determined that the patients who participated less in the practice sessions or who had a severe disability had less improvement after horticultural therapy.

**Keywords:** Individual horticulturel therapy, Disabled individuals, Special education and rehabilitation center, Garden design, Human and plant interaction



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EFFECT OF ENERGY CONSUMPTION AND GDP ON ENVIRONMENTAL QUALITY IN THE CONTEXT OF THE ENVIRONMENTAL KUZNETS CURVE HYPOTHESIS

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#### ABSTRACT

The interplay among energy consumption, Gross Domestic Product (GDP), and environmental quality, particularly in terms of carbon emissions, has garnered substantial scholarly attention, primarily within the framework of the Environmental Kuznets Curve (EKC) theory. As economies expand, they typically exhibit an augmented appetite for energy, which caters to diverse needs such as industrial operations, transportation, and residential demands. This heightened energy consumption tends to coincide with elevated levels of greenhouse gas emissions, air pollutants, and depletion of natural resources, thereby exerting an adverse influence on environmental quality, particularly in the early stages of economic growth. This investigation seeks to delve into the correlation between energy consumption, GDP, and CO<sub>2</sub> emissions within the paradigm of the EKC hypothesis, with a specific focus on the BRICS nations (Brazil, Russia, India, China, and South Africa) spanning the period from 1988 to 2022. To this end, the study employs the AutoRegressive Distributed Lag (ARDL) methodology. The findings elucidate that energy consumption contributes to an increase in CO<sub>2</sub> emissions, both in the short and long term, with GDP demonstrating statistical significance primarily in the long term. Notably, in the long term, GDP exhibits a positive impact, while the square of GDP ( $GDP^2$ ) exerts a negative influence, and the cube of GDP ( $GDP^3$ ) has a positive effect. These outcomes lend empirical support to the EKC hypothesis within BRICS nations that pursue sustained and long-term developmental trajectories. In light of these insights, policymakers in BRICS countries can consider transitioning to renewable energy sources as a viable strategy for curtailing carbon emissions, thereby fostering environmental sustainability.

**Keywords:** Energy, CO<sub>2</sub> Emission, Environmental Kuznets Curve, GDP, Sustainable Development



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DIRENÇLİLİK BAĞLAMINDA KÜLTÜREL MİRASIN DEĞERLENDİRİLMESİ: BAĞLIKÖY ÖRNEĞİ

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#### ÖZET

Kültürel miras, toplumun kültürel, geleneksel, çevresel değerlerini içerir. Ayrıca, insanların tarihsel geçmişi, bölgenin somut ve somut olmayan değerlerinin tümünü kapsar. Kültürel mirasın önemli unsurlarından biri olan konutlar kullanıcıların yaşam biçimlerinden ve sosyo-kültürel yapısından etkilenmiştir. Konutlar, somut olmayan değerlerin yanı sıra kültürel mirasın somut ve önemli mimari unsurlarıdır. Kentin hafızası, yaşam biçimlerinin, kültürün göstergesi olan konutlar kültürel mirasın sürdürülebilirliği ve yerleşim alanlarının gelecek nesillere aktarılması açısından önemlidir. Konutlar, kentin hafızasını ve içerisinde ait olduğu toplumun sosyal, kültürel ve sosyo ekonomik değerlerini yansıtırken, her geçen gün farklı tehditlere maruz kalmaktadır. Bu tehditler, zaman içinde büyüklük ve sıklıkları artan doğal afet olayları ile birlikte en az onun kadar şiddetli geriye dönülmez yıkımlara sebep olan insan kaynaklı tehditlerdir. Kentsel gelişim ve bilinçsiz yenileme politikaları kültürel miras yapılarının sürdürülebilirliğini etkileyen insan kaynaklı tehditlerden bazılarıdır. Bu çalışmanın amacı, kültürel mirasın önemli öğelerinden olan kerpiç konutların “Kültür, Kültürel Miras, Dirençlilik” kavramları çerçevesinde analiz etmektir. Çalışma kapsamında kültürel mirasımızı yansıtan Bağlıköy’de konumlanan kerpiç konutlar değerlendirmeye alınmıştır. Seçilen konutlar üzerinden belirlenen indikatörlere bağlı olarak analizler yapılmıştır. Sonuç olarak kavramsal çerçeveye bağlı olarak kültürel mirasımızın önemli öğelerinden olan kerpiç konutlar dirençlilik bağlamında tartışılmıştır.

**Anahtar Kelimeler:** Kültürel miras, Kültür, Dirençlilik, Kerpiç konut, Bağlıköy





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CULTURAL HERITAGE EVALUATION WITHIN THE CONTEXT OF RESILIENCE: BAĞLIKÖY CASE

#### ABSTRACT

Cultural heritage consists of the cultural, traditional, and environmental values of society. It also includes the historical past of the people and the tangible and intangible values of the region. Houses, which are one of the important elements of cultural heritage, have been affected by the lifestyles and socio-cultural formation of the users. Houses, which represent the city's memory, are an indicator of lifestyles and culture and are important for the sustainability of cultural heritage and the transfer of residential areas to future generations. While houses reflect the memory of the city and the social, cultural and socio-economic values of the society to which it belongs, it is exposed to different threats every day. These threats include natural disasters, which increase in magnitude and frequency over time, and are man-made threats that cause irreversible destruction at least as severe. Urban transformation and unconscious renovation policies are some of the man-made threats that affect the sustainability of cultural heritage buildings. This study aims to analyze adobe buildings, which are important elements of cultural heritage, within the framework of the concepts of "Culture, Cultural heritage, Resilience". Within the scope of the study, adobe houses located in Bağlıköy, which reflect our cultural heritage, were evaluated. Analyses were made on the selected houses depending on the indicators determined. As a result, depending on the conceptual framework, adobe houses, which are important elements of our cultural heritage, are discussed in the context of resilience.

**Keywords:** Cultural heritage, Culture, Resilience, Adobe housing, Bağlıköy



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CLIMATE VARIABLE RAINFALL FORECASTING USING ARIMA MODEL IN THE AGRA DISTRICT

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#### ABSTRACT

Climate change is a global phenomenon rooted in human activities. These activities have not only reshaped climate patterns but also left their impact on societies. Climate elements such as temperature, rainfall, and wind profoundly influence human habitats, yet the ability to withstand their potential adversities varies, contingent upon socio-economic factors. To tackle the challenges posed by climate change, forecasting climate variables emerges as a vital tool. However, it's a daunting task due to the inherent unpredictability of key parameters. This challenge is particularly acute in arid regions, where even minor shifts in climate can reverberate through economies and societies. To anticipate the trajectory of non-stationary, single time-series parameters, we harness the power of ARIMA (Auto-Regressive Integrated Moving Average) models—a linear framework comprising Autoregressive (AR), Integrated (I), and Moving Average (MA) components. Analysing 101 years of rainfall data from Uttar Pradesh's semi-arid Agra district, we unearth a conspicuous decline in rainfall trends, indicating suboptimal patterns for the region. Our study navigates the utilization of Python and R's auto-ARIMA function to unearth the optimal ARIMA model. By doing so, we equip ourselves with a tool capable of precise future predictions of precipitation patterns.

**Keywords:** ARIMA, rainfall forecast, climate change, Agra district



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN INVESTIGATION INTO THE PHYSICAL PARAMETERS AFFECTING THE EXERGY EFFICIENCY OF PVT AIR COLLECTORS

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#### ABSTRACT

In recent times PVT collectors have gained considerable importance due to their versatile use as electrical and thermal energy providers. The PVT collectors have practically zero carbon footprint as they totally operate on solar energy and remain in operation for a period of about 20-25 years. To ensure the optimal performance of such systems, the method of exergy analysis is employed to determine the various target areas where energy is being lost and suggest methods to overcome them. PVT collectors broadly use three kinds of coolants namely air, water or nanofluids to extract excess heat from the system. Air mass flow rate (MFR), type of glazing cover and different absorber configurations are a few of the many parameters on which the exergy efficiency of PVT air collector depends. In the given study, the effect of these parameters on the exergy efficiency of PVT air collectors has been discussed. It has been deduced that the performance of the system improved on increasing MFR, by adding glazing over the PV layer and by using various configurations in the absorber layer that increased the surface area of the absorber in contact with the coolant. The present study also suggests potential areas of research for improvement in the exergy efficiency of PVT air collectors.

**Keywords:** PVT air collectors, solar energy, exergy analysis, mass flow rate, absorber configurations.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **INFLUENCE OF SOCIAL MEDIA ON BANDITRY AMONG FARMING RURAL COMMUNITIES IN GIWA LOCAL GOVERNMENT AREA, KADUNA STATE**

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#### **ABSTRACT**

The study investigated influence of social media on banditry among farming rural communities in Kaduna North LGA, Kaduna State. One hundred (100) farmers were selected through multistage sampling and used for the study. The study specifically described the socioeconomic characteristics of rural communities, ascertained the activities of bandits and dimensions of use of social media, examined the perceived benefit of social media and identified the constraints to the use of social media. Data were analysed with Statistical Package for Social Science 20 version. The findings revealed that 38% of the farmers were 21-30 years, 62.0% were male, 35.2% had secondary education, 39.4% had visited adjoining communities once in a month 74.6% have 1ha of farmland. About 71.5% had favourable perception of use of social media that it is easy to use ( $M = 4.16$ ) against bandit activities. 39% used Facebook, Many (42.3%) used social for communication to friends. Stealing (100%) and (100%) destruction farms were the main activities of bandit. The results of Correlation analysis showed that at 0.05 there is positive and significant relationship between use of social media and activities such as rape ( $r = 0.027$ ), killing ( $r = 0.01$ ), destruction of farms ( $r = 0.000$ ) of bandit. It was recommended that for quick eradication of incidence of killing, rape and farm destruction by bandits, there is need for the rural farmers to make use of social media to track the activities of bandit.

**Keywords:** Influence, social media, bandit activities, farming rural communities.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PERCEIVED EFFECT OF SOIL EROSION ON ARABLE CROP PRODUCTION IN ABIA STATE, NIGERIA

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#### ABSTRACT

This study assessed the perceived effect of soil erosion on arable crop production in Abia State, Nigeria. A Multi-staged sampling procedure was adopted in the selection of one hundred and twenty arable crop farmers that participated in the study. Descriptive and Inferential statistics were used to analyze the data collected. Major findings revealed that Sand mining ( $\bar{x}=3.59$ ), Poor road construction ( $\bar{x}=3.58$ ), Crops that attract human traffic ( $\bar{x}=3.55$ ), Slope of the land ( $\bar{x}=3.52$ ), Quarrying of rocks ( $\bar{x}=3.35$ ), Excessive bush burning ( $\bar{x}=3.31$ ), High Population density ( $\bar{x}=3.24$ ), Rain water run off ( $\bar{x}=3.14$ ), Overgrazing ( $\bar{x}=2.84$ ) and Deforestation ( $\bar{x}=2.71$ ) were the perceived major causes of soil erosion on arable crop production. However, the perceived effect of soil erosion on arable crop production in the study area included Increase in pests infestation ( $\bar{x}=3.39$ ), Loss of fertile soils ( $\bar{x}=3.38$ ), High cost of farming ( $\bar{x}=3.07$ ), Reduction in crop yield ( $\bar{x}=3.27$ ), Increase in diseases attack ( $\bar{x}=3.26$ ) and Loss of crops ( $\bar{x}=3.22$ ). Furthermore, Cross strip (83.3%), strip cropping (80.8%), construction of diversion ditch (80.8%) and use of organic manure (80.8%) were among the various soil erosion management strategies practiced by arable crop farmers to curtail the perceived effects of soil erosion. The grand mean ( $\bar{x}= 3.27$ ) showed that the perceived effect of soil erosion on arable crop production was severe. The hypothesis result showed that there was a significant relationship between perceived effect of erosion on arable crop production and the various erosion management strategies practiced by the farmers in the study area. The study concluded that the perceived effect of soil erosion on arable crop production was severe and therefore recommended that farmers should be empowered by the Government to practice effective management practices to check the ravaging effect of soil erosion on arable crop production in the study area.

**Keywords:** Perceived Effect, arable crop production, soil erosion





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ENVIRONMENTAL MANAGEMENT TRAINEES' GREEN ENTREPRENEURIAL INTENTIONS, EVENTS AND FEARS IN NIGERIA

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#### **ABSTRACT**

Going green has created significant enthusiasm across society and green entrepreneurial intention is still at the evolving stage. The main objective of this study was to assess the green entrepreneurial intention, events and fear of environmental management trainees in Nigeria. A cross-sectional survey was conducted through a structured questionnaire among the environmental management trainees. A multi-staged sampling technique was used to select 240 respondents. The findings of the results revealed that a majority of the respondents (79.2 %) had a family size of less than or equal to 6 while the mean family size of the respondents is approximately 5 persons. A majority of the respondents (49.2 %) are between the ages of 21 to 25 years of age while the mean age of the respondents is approximately 22 years, received a student's monthly stipend (52.2 %) of between ₦ 10,000 and ₦ 20,000 while the mean students' monthly allowance was ₦ 16,017.70. The entrepreneurial intention (3.32), entrepreneurial event (3.13) and entrepreneurial fear (3.18) of the respondents were on average. The result of the study seeks to provide information to the stakeholders to explore opportunities for green entrepreneurial ventures among environmental management trainees. Colleges may offer adapted academic courses, or training programs to trigger the green business initiative among the students and this will be beneficial for the students in learning the essentials of green entrepreneurial intention, thus enhancing a better entrepreneurial experience and reducing entrepreneurial fright.

**Keywords:** environmental management, trainees, green entrepreneurial intentions, events, fears



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### REMOVAL OF BRILLIANT PINK B DYE FROM WATER FOR ENVIRONMENTAL REMEDIATION

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#### **ABSTRACT**

One of the synthetic organic dyes that is widely used in the textile, paper, leather, and several other industries is called Basic Violet 10 (BV10). In order to diminish or restrict the source of many illnesses, it is important to either remove it or reduce its concentration before releasing it into aquatic streams. Diverse physical and chemical techniques have been investigated to remove pollutants/dyes from wastewater; however, due to its high effectiveness and low cost, adsorption is one of the best methods currently in use. In this case, we used a plant-based biosorbent to remove BV10 from water and under ideal circumstances, BV10 adsorption reached over 86%. Biosorption occurs by pseudo-second-order kinetics, according to kinetic studies. The chosen biosorbent can therefore be used in its actual applications to remove BV10 from industrial effluents.

**Keywords:** synthetic organic dyes, BV10



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### REDOX MECHANISM OF FERROCENE DERIVATIVES

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#### ABSTRACT

The electron-exchange mechanism of two selected ferrocene derivatives namely acetylferrocene and ferrocenylethanol was studied and compared in mixed solvent system consisting of 20% dioxane in water. The reactions were studied at constant ionic strength and the order of reactions was determined corresponding to each reactant. Each ferrocene derivative was oxidized by Fe(III) based mixed ligand complex such as ferricyphen. Each reaction followed complex kinetics with parallel reactions pathway. The oxygen of acetylferrocene played a key role in the parallel reaction. The effect of several parameters including reactants concentration, pH, ionic strength, dielectric constant and temperature were revealed to propose the rate law for each reaction.

**Keywords:** electron-exchange mechanism, Fe(III)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### REMOVING BOTH INORGANIC AND ORGANIC AQUEOUS EFFLUENTS WITH AFFORDABLE BIO-ADSORBENTS

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### ABSTRACT

Protecting the environment, including surface waterways, is one of the pillars of sustainable development, which represents a major challenge for the future of mankind and our planet. It is important to point out that Algeria is making great efforts to protect the environment and reduce chemical and biological pollution, well aware of the environmental and economic stakes involved in the problem of liquid waste. In fact, chemical substances are constantly being released into the environment and can threaten the balance of aquatic ecosystems and human health. Consequently, to limit pollution, laws must be respected by setting standards for harmful substances discharged into water. This study's goal was to synthesize and construct biomaterials of the cationic and anionic types. These substances were utilized as adsorbents in waters that had been contaminated by various adsorbates that were probably prevalent in the environment. In order to describe the various materials, various approaches (IRTF, DRX, MEB, BET, and ATG/DTA) will be used. Studies on the adsorption by these substances will be conducted while



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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changing a number of variables, including pH, mass, concentration, and temperature. Removal of effluents in aqueous media, particularly the adsorption technique, which appears to be well suited to remove pollutants due to its shown efficacy as well as for financial reasons, using inexpensive adsorbents such agricultural and industrial wastes.

**Keywords:** Characterization; Different materials; Water treatment; Bio adsorbents; adsorption





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN EXAMINATION OF THE ENVIRONMENTAL CONDITIONS AND BIODIVERSITY AT THE FONTAINE OF GAZELLE DAM IN BISKRA

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#### ABSTRACT

The ecological knowledge of the artificial wetlands in particular the lakes of dam, of the development of their biological richness and their potentialities and their bio-ecological and socio-economic potentialities. Due to their biological diversity and crucial ecological roles that they play, these natural regions are extremely significant. Due to their significant capacity to provide proteins, they are also regarded as among the most productive environments, making them of tremendous economic importance. There are various wetlands in Algeria, notably the Biskra region, which features a number of sites that are significant both locally and regionally. Both national and global. These are either natural sites, which are typically represented by wadis, or artificial sites, such as dams like the one in the Fontaine of Gazelle study area, which, despite the diversity and richness of its natural resources, has received very little attention in terms of their knowledge and development. The dam that is the focus of our study is situated in



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

the Saharan bioclimatic stage, where ecological elements are susceptible to significant daily and seasonal changes. Ecological elements are subject to significant daily and seasonal variations. Characterization of the site's biotic and abiotic components has been made possible by the bio-ecology study of the biological resources undertaken from October 2019 to Mai 2020 on the 950ha Fontaine of Gazelle Dam artificial wetland. By examining and keeping track of a number of physical-chemical factors related to the soil, water, and the diversity of flora and fauna, it also enabled us to gain a general understanding of its significance. As a result, we identified the type of substrate, the physicochemical, bacterial, and biological quality of the water, as well as the presence of 33 plant species, 42 phytoplankton species, and 155 animal species, including 103 invertebrate species, 03 fish species, 04 amphibian species, 07 reptile species, 34 bird species, and 7 mammal species. This method allowed us to value the site's biological resources, assess their significance, and formulate management and conservation recommendations related to its socioeconomic status from the standpoint of long-term development.

**Keywords:** Ecological Diagnostic, Humid Zone, Barrage Fontaine of Gazelle, Biodiversity, Physical-Chemistry Soil Analysis, Water Quality, Biskra.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AIR POLLUTION IN INDONESIA

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#### ABSTRACT

The research on air pollution in Indonesia is highly relevant, as the problem of air pollution has become one of the most pressing environmental issues in the country. Air pollution has serious impacts on human health, the environment, and the economy. With a large population and rapid industrial growth, Indonesia faces major challenges in addressing air pollution. This study aims to identify major pollution sources, quantify air pollution levels in different regions, analyze health and environmental impacts, and evaluate government policies for addressing this issue. The research method involved analyzing air quality data and studying literature related to air pollution in Indonesia. The results showed that air pollution in Indonesia comes from various sources, including motor vehicles and industry. The impact involves an increase in respiratory diseases and environmental damage. The research objectives were to understand the main causes of air pollution, measure pollution levels in different regions, analyze health and environmental impacts, and evaluate existing policies. Policy recommendations include improved monitoring of industrial emissions, the promotion of sustainable transportation, and the use of renewable energy. Public awareness is also important in reducing air pollution. This research emphasizes the importance of addressing Indonesia's air pollution problem, which has serious impacts on health, the environment, and the economy. Continued collaborative efforts are needed to create a healthier and more sustainable future for future generations in Indonesia.

**Keywords:** Air Pollution, Indonesia, Health Impacts



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **CHEMICAL, PHYSICAL AND BIOLOGICAL ANALYSIS OF RIVER WATER AND SEDIMENT; SITNICA, IBRI, TREPÇA AND DRENICA - CORRELATION WITH EU STANDARDS - FOR SURFACE WATERS.**

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#### **ABSTRACT**

Hazardous waste in water and sediment is a big problem facing developing countries, including our country. The research has highlighted the concentration of heavy metals in the water and sediment of the rivers; Sitnica, Trepça, Ibri and Drenica. Chemical analyzes of water and sediment are essential to determine the level of trace elements in these ecosystems. The water and sediment concentration level were used to determine the Health Risk Index (HRI) for the exposed population. Trace elements were determined in water and sediment using the ICP-OES method. The samples were collected in September/ 2023, at eight different sampling points. Concentration (maximum value) for: Cr (0.079 mg/l), Zn (0.084 mg/l), Mn (0.097 mg/l) Fe (0.305 mg/l) Ni (0.107 mg/l) Pb (0.101 mg /l) and Cu (0.052 mg/l) in all sampling points, such as: (M1-M2, Sitnica river), (M3-M4, Trepça river), (M5-M6, Ibri river) and (M7- M8, Drenica river) and it turned out that most of the heavy metals were below the recommended US-EPA and WHO standards. But the concentration (maximum value) for: Fe>Ni and Pb, at all sample points were found to be above the recommended norms of US-EPA and WHO. All these chemical elements, (their concentration in water and sediment) originate from urban and industrial sources, around the researched areas. From the statistical analysis, a very significant positive relationship of Fe and Ni with Pb was found, originating mainly from the minerals and manufacturing industries around these rivers.

**Keywords:** Rivers, pollution, heavy metals, urban and industrial discharges.



**CHEMICAL ANALYSIS OF THE RIVER OF PRIZREN, THROUGH  
INSTRUMENTAL ANALYTICAL METHODS**

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**ABSTRACT**

This research will provide a more accurate picture of the Lumbardh River's water quality in the study region. Several physico-chemical parameters, such as; temperature, pH, EC, TDS, major ions ( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ ,  $\text{NO}_2^-$ ,  $\text{Cl}^-$ ,  $\text{NO}_3^-$ ) were determined. Heavy metals have been analyzed using inductively coupled plasma optical emission spectroscopy (ICP-OES). In the water sampling sites, the concentration of Fe as the most abundant element was: 0.897 to 0.485 mg/L, Zn varies from 0.513 to 0.392 mg/L, Ni from 0.174 to the highest of 0.235 mg/L, Mn 0.141-0.194 mg/L, Pb 0.142-0.254 mg/L, whereas As, Cd, Co, Al and Cr, were under limit detection in all of the water samples. Also, in the sediment ones the highest concentration element is Fe, followed by Zn, Mn, Ni and Pb. The highest concentration of Fe is in sample M3. The concentration varies from 0.985 mg/kg to the lowest of 0.698 mg/kg, Zn from 0.913 to 0.565 mg/kg, Mn from the highest of 0.413 to the lowest of 0.186 mg/kg, Ni 0.212 to 0.185 mg/kg, Pb 0.187 mg/kg to 0.143 mg/kg, followed by Cu, Cr and Al. Even in the soil samples, iron varies from; 0.652 mg/kg to the highest of 0.989 mg/kg, Zn starts from 0.589 to 0.798 mg/kg, Mn from 0.119 to 0.189 mg/kg, Ni 0.139 to 0.178 mg/kg and Pb 0.163 to 0.189. The concentration of Cr was observed in three soil samples from 0.033 to 0.064 mg/kg, whereas, Al is presented from 0.045 to 0.054 mg/kg followed by Cu from 0.049 to 0.098 mg/kg. The study shows that we are dealing with moderate pollution with these elements in the river, but to have a firm conclusion, it is advisable to examine more the zone of study.

**Keywords:** The Lumbardhi River, soil, sediment, water, pollution, ICP-OES technique.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CONVENTIONAL AND NON-CONVENTIONAL DISINFECTION APPROACHES TO PURIFYING DRINKING WATER

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#### ABSTRACT

The process of treating water involves getting rid of any biological, chemical, or physical impurities that could endanger the water supply for household and human usage. The greatest effects on least developed countries and rural populations are caused by the worldwide water shortage and need for clean water supplies, which has an impact on all aspects of human existence. For a sustainable lifestyle, it is imperative to improve water quality before distributing it to consumers. To avoid consuming polluted water sources that may result in health issues, water treatment can remove any potentially dangerous compounds from the water. The conventional methods discussed include chemical disinfection, such as ultraviolet irradiation and heat treatment. Boiling, chlorination, chloramine, bleaching powder, peroxyacetic acid, quaternary ammonium compounds and UV radiation are a few of the traditional methods used to disinfect water. Other techniques of disinfection that use chlorine include treating water with sodium hypochlorite solution and using solid calcium hypochlorite solution. Ozone generation, electrolyte water, cold plasma technology, high hydrostatic pressure, ultrasound, and microbial surfactants are a few of the unconventional techniques. The cold-plasma technology and microbial surfactant are known to be best treatment methods for disinfection of water.

**Keywords:** Disinfection, treatment methods, chlorination, ozonation, UV light, ultrasound, microbial.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### VISIBLE-LIGHT DRIVEN PHOTOCATALYTIC EFFECTIVENESS FOR SOLID-STATE SYNTHESIS OF $\text{Bi}_{24}\text{O}_{31}\text{Br}_{10}$ NANOPHOTOCATALYST TOWARDS COMPLETE DECOLORIZATION OF RHODAMINE B FROM WATER

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#### ABSTRACT

The development of oxide catalysts has become an emerging trend for effective photocatalysts to eliminate environmental pollution (Xing, 2019). In this context, bismuth-rich oxyhalides ( $\text{Bi}_x\text{O}_y\text{X}_z$ ) ( $X=\text{Cl}, \text{Br} \dots$ ) are widely considered as one of the promising photocatalysts due to their strong oxidizing ability, nontoxicity, low cost, and wide band gap (Sharma, 2023). Recently, they have been tested for their enhanced photocatalytic potential in pollutant degradation (Li, 2020), clean energy conversion, etc. In this work,  $\text{Bi}_{24}\text{O}_{31}\text{Br}_{10}$  photocatalyst was successfully prepared by a solid-state reaction method. Crystalline phases, optical absorption properties and morphologies were characterized by X-ray Diffraction (XRD), UV-visible Diffused Reflectance Spectra (DRS), Fourier Transform Infrared Spectroscopy (FT-IR) and Scanning Electron Microscope (SEM). Basing on optical characterizations,  $\text{Bi}_{24}\text{O}_{31}\text{Br}_{10}$  owns a band gap energy ( $E_g$ ) of 2.50 eV. Moreover, the photocatalytic activities of the as prepared catalysts were evaluated for the degradation of rhodamin B (RhB) dye under visible light using 250 W Xenon lamp. As a result, during 90 minutes of irradiation, the rate of degradation of RhB exceeds 98.9%. This work provides a



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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method to experimentally prepare  $\text{Bi}_{24}\text{O}_{31}\text{Br}_{10}$  and sheds a light on the significance of this bismuth-based semiconductor in photocatalysis application

**Keywords:** Photocatalysis;  $\text{Bi}_{24}\text{O}_{31}\text{Br}_{10}$ ; Solid-state reaction; RhB degradation



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ALLEVIATION OF PHYTOTOXICITY TO PEA PLANT IRRIGATED WITH WASTE WATER FROM PHARMACEUTICAL INDUSTRY BY USING *BACILLUS CEREUS* AS BIO-FERTILIZER

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#### ABSTRACT

The discharge of untreated waste water from industries to water bodies raised as serious environmental hazard at the global level. The situation is more intense in developing countries as industrial effluents contains large amount of heavy metals and mineral nutrients. In the present study, phytotoxicity alleviation effect of *Bacillus cereus* is evaluated. Pea (*Pisum sativum* L.) plant grown in two sets. One set irrigated with waste water from pharmaceutical industry with three different concentrations, while the other set with *Bacillus cereus* mixed with waste water. Whereas, irrigation with distilled water is kept as control. The results of field experiment showed that root length and lateral roots volume increased in the treatment set where *Bacillus cereus* was mixed with waste water compared to control. However, as the concentration of effluents increased, the effectiveness of *Bacillus cereus* was reduced. Though, under all stress levels plant growth response remained promising. Over all, in *Bacillus cereus* treated treatments, the content of active biological molecule i.e. chlorophyll A, chlorophyll B, total chlorophyll contents, carotenoids, proteins and carbohydrates sustained almost near to control with little decrease. These entire results conclude that *Bacillus cereus* may considerably reduce or detoxify the toxic effluents from waste water of pharmaceutical industry. This inference is supported by increase in biometric traits as well as contents of biologically active



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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molecules. Outcomes of this study revealed that *Bacillus cereus* could be used as bio-fertilizer in a sustainable and eco-friendly way to enhance the plant growth under industrial waste water stress condition.

**Keywords:** *Bacillus cereus*, Pharmaceutical industry waste water, Pea (*Pisum sativum* L.), Phytotoxicity, Effluents detoxification, Bio-fertilizer





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### WASTE PRODUCTION MAKES MONEY IN PEKALONGAN CITY

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#### ABSTRACT

This research intends to explain the study of waste management in the city of Pekalongan. Methods. The research uses qualitative research with a descriptive analytical approach. This research concludes that waste is the main concern in the city of Pekalongan. Research in Pekalongan regarding waste found that the waste in Pekalongan alone reached 140 tons per day. This was stated directly by Teguh Prabowo, Head of Cleanliness and Waste Management at the Pekalongan City Environmental Service. Even though it pollutes the environment, waste also has benefits as a source of organic fertilizer, a source of humus, a medium for growing mushrooms, and, if processed properly, can be made into useful objects worth money. TP PKK Pekalongan City, through the PAUD Mother Working Group and the Environmental Service (DLH), launched the program Turning Waste into Money (Oath of Juang), which was then developed further to support the completion of urban waste management. "We are trying to innovate so that we can sort inorganic waste and even process it with the aim of converting it into rupiah," he said. "This program will later be implemented in schools, village communities, and other communities within the school environment. Each school brings a minimum of 1 kilogram of waste to the IGTKI and Himpaudi meetings. After collecting a minimum of 50 kilograms, the waste bank will take it, count it, nominalize it, and then record it in the waste bank savings book. It's not just educational places that residents and villagers in Pekalongan City can also sell directly or manage their own organic kitchen waste into fertilizer and then sell it to DLH Pekalongan City. The formation of the fighting oath program, or turning waste into money, is aimed at reducing the level of waste growth in the city of Pekalongan.

**Keywords:** waste production, makes money, in pekalongan city



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### YAPAY RESİFLERİN ÜRETİMİ VE TASARIMINDA DİSİPLİNLERARASI İŞ BİRLİĞİNE SANATIN KATKISI

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#### ÖZET

Dünya genelinde balık ekolojisi sisteminde kullanılan yapay resifler ile ilgili yapılan çalışmalar incelendiğinde yapay resiflerin farklı şekillerde tasarlandığı ve çoğunlukla da beton malzemedan üretildiği görülmektedir. Beton malzemedan yapılan yapay resiflerin yine bu konuda yapılmış araştırmalarda başarı oranlarının yeterli olup olmadığı tartışılmaktadır. Betondan başka yapay resif üretiminde farklı türlerde resif oluşturma teknikleri ve malzemeleri de kullanılmaktadır. Taş, kaya parçaları, özellikle batırılan ve daha önce batmış gemi enkazları, uçaklar diğer tip taşıtlar, araç lastikleri, farklı biçimlerde plastik atıklar, ahşap ve çeşitli şekillerde metaller sayılabilir. Yapay resiflerin çok karmaşık tasarımları ve hangi malzemedan üretilmesi gerektiği tartışılan bir konu olduğu görülmüştür. Gelecekte daha verimli sonuçların elde edilmesi resiflerin yapımı ve tasarımının en uygun şekilde oluşturulması konusu bir sorun olarak ortaya çıkmaktadır. Balık ekolojisinin doğal ortamına zarar verecek özellikle plastik içerikli ve kısa ömürlü olması nedeniyle beton resiflerin yerine daha doğal ve daha dayanıklı türden yapıların tercih edilmesi ilk akla gelen çözümler arasındadır. Yapay resiflerin amaçları denizlerdeki olumsuz etkenlere karşı balık çeşitliliğini korumak ve artırmaktır. Bu amacın dışında disiplinler arası düşünüldüğünde yapay resiflerin ve doğal resiflerin dalış turizminde ilgi çekici noktalar olduğu da görülmektedir. Bu disiplinler arası etkileşim ortaklığında yapay resiflerin dünyanın farklı yerlerinde ayrıca sanatın konusu olduğu ve alternatif çözüm önerileri sunulduğu görülmüştür. Bu tür sanatsal çalışmalarda özellikle balıkların yaşam alanlarına katkıda bulunacak ve onların ihtiyacı olan yaşam alanlarına uygun tasarımların taş ve kaya gibi doğal malzemeler kullanılarak yapılabileceği düşüncesi gelişmiştir. Bu çalışma alternatif çözüm önerisi olarak sanatın farkındalık oluşturmadaki önemi ve taş, kaya gibi doğal malzemelerden balıklara yaşam alanı oluşturacak şekilde tasarlanmış ve biçimlendirilmiş heykellerin hem deniz faunasına hem de dalış turizmine katkısını araştırmayı amaçlamaktadır.

**Anahtar Kelimeler:** Yapay Resif, Sanat, Heykel, Dalış Turizmi



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE CONTRIBUTION OF ART TO INTERDISCIPLINARY COLLABORATION IN THE PRODUCTION AND DESIGN OF ARTIFICIAL REEFS

#### ABSTRACT

When the studies on artificial reefs used in fish ecology systems around the world are examined, it is seen that artificial reefs are designed in different ways and mostly made of concrete material. It is also discussed whether the success rates of artificial reefs made of concrete material are sufficient in the researches conducted on this subject. Apart from concrete, different types of reef building techniques and materials are also used in artificial reef production. Stone, rock fragments, especially sunken and previously sunk shipwrecks, aircraft, other types of vehicles, vehicle tyres, plastic wastes in different forms, wood and metals in various shapes can be counted. It has been observed that the very complex design of artificial reefs and the material from which they should be produced is a controversial issue. Obtaining more efficient results in the future, the construction and design of the reefs in the most appropriate way emerges as a problem. Preferring more natural and more durable structures instead of concrete reefs, which will damage the natural environment of fish ecology, especially due to their plastic content and short life span, is among the first solutions that come to mind. The purpose of artificial reefs is to protect and increase fish diversity against negative factors in the seas. Apart from this purpose, it is also seen that artificial reefs and natural reefs are points of interest in diving tourism when considered interdisciplinary. In this interdisciplinary interaction partnership, it has been observed that artificial reefs are also the subject of art in different parts of the world and alternative solutions are offered. In such artistic works, the idea has developed that designs that will contribute to the habitats of fish and suitable for the habitats they need can be made using natural materials such as stone and rock. This study aims to investigate the importance of art in raising awareness as an alternative solution proposal and the contribution of sculptures designed and shaped to create habitats for fish from natural materials such as stone and rock to both marine fauna and diving tourism.

**Keywords:** Artificial Reef, Art, Sculpture, Diving Tourism



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF LANDSCAPE CHARACTER AND TOURISM AND RECREATION POTENTIAL OF GÜMÜŞHANE TOMARA WATERFALL NATURE PARK

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#### ABSTRACT

Wetlands are ecosystems that hold great importance not only in ensuring ecological balance and preserving biological diversity but also in contributing significantly to the local and national economy. Considering the fact that major crises and conflicts in the 21st century will focus on water resources and wetlands, their significance becomes even more apparent. As the impacts of climate change on both humans and wildlife increase, the ability of wetlands to adapt to rapidly changing conditions emerges as an indispensable element. Studies indicate that the absolute preservation of wetlands for the future, conveying them to future generations in the healthiest way possible, and taking responsibility for this significant heritage are among our most crucial responsibilities. In this study, the Tomara Waterfall Nature Park, located within the boundaries of the Directorate of Nature Conservation and National Parks in the 12th Region, was chosen as the study area. In this context, literature research related to the study area was conducted, and subsequently, through a survey with users and assessments regarding the area's usage, recommendations were made to enhance the current usage towards a more qualitative state, prioritizing the preservation of the area's natural and ecological assets and increasing its usage potential.

**Keywords:** Landscape Planning, Tomara Waterfall Nature Park, Tourism ve Recreation



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXAMINING THE TOURISM AND RECREATION POTENTIAL OF ISTANBUL NEŞET SUYU NATURE PARK IN TERMS OF CONSERVATION AND USAGE PRINCIPLES

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#### ABSTRACT

The global increase in urban population and the growth of urban areas have led to a growing need for recreation in urban areas. However, unplanned and unregulated growth of cities causes damage to both their ecological assets and natural resources in the surrounding rural areas. Global climate change has already threatened the world and our natural resources, making the support, preservation, and transmission of ecosystems in urban and rural areas increasingly important every day. In the ranking of forest assets per capita, Istanbul is 78th out of 81 provinces in our country. Therefore, it is essential that forest assets and in-forest recreation areas in Istanbul are used in a more qualified and planned manner compared to other provinces. In this study, one of Istanbul's most important in-forest recreation areas, Neşet Suyu Nature Park, was observed and evaluated through field observations and a survey, considering its existing assets. Neşet Suyu Nature Park, one of the nine nature parks in Belgrad Forest located within the borders of Sarıyer district in Istanbul, is an important recreational area with visitor potential throughout the year, frequently chosen by people. In line with the evaluation results, recommendations have been made to increase the usage potential by prioritizing the preservation of the area's natural and ecological assets to enhance the current usage towards a more qualitative state.

**Keywords:** Landscape Planning, İstanbul, Neşet Suyu Nature Park, Tourism ve Recreation





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KIRSAL ALAN ve KENTLİ ZİHİN: SÜRDÜRÜLEBİLİR BİR GELİŞME MODELİ OLARAK EKOKÖYLERİN DÜŞÜNSEL İNŞASI

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#### ÖZET

Bu çalışma, büyük şehirlerden ekolojik köylere(ekoköyler) giden insanların, şehirde sorun olarak gördüklerini ekoköyde aşım aşamadıklarına ilişkin bir meraktan beslenir. Bu merak ve genel özellikleri üzerinden ekoköyleri alternatif bir sürdürülebilir gelişme modeli olarak ele almaya çalışır. Makalede ekoköyler bir sürdürülebilir gelişme modeli olarak sorgulanırken birbiriyle ilişkili üç sorunsal eşliğinde hareket edilmiştir. Bunlar ekoköyde çalışmanın niteliği, ekoköydeki ekonomik ve toplumsal ilişkiler ve ekolojik uygulamalardır. Bu sorunsallar etrafında şekillenen çalışma, nihayetinde ekoköyler hakkında düşünsel bir zemin oluşturmaya da olanak tanıyacaktır.

**Anahtar Kelimeler:** ekoköyler, sürdürülebilir gelişme



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **RURAL AREA AND URBAN MIND: INTELLECTUAL CONSTRUCTION OF ECOVILLAGES AS A SUSTAINABLE DEVELOPMENT MODEL**

#### **ABSTRACT**

This study feeds on a curiosity about whether people who go from big cities to ecological villages (ecovillages) can overcome what they see as a problem in the city in the ecovillage. Through this curiosity and general characteristics, it tries to consider ecovillages as an alternative sustainable development model. In the article, while questioning ecovillages as a sustainable development model, three interrelated problematics were acted upon. These are the nature of working in the ecovillage, the economic and social relations and ecological practices in the ecovillage. The study, which is shaped around these problematics, will ultimately enable to create an intellectual ground about ecovillages.

**Keywords:** ecovillages, sustainable development



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### YAŞAYAN KÜLTÜR MİRASINDA SÜRDÜREBİLİRLİK: TOPKAPI SARAYI BAHÇELERİ

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#### ÖZET

Tarihimizin yaşayan belgeleri olarak betimlenen ve sahip çıkılması gereken kültürel miraslarından biri de, tarihi bahçelerdir. Yaşayan tarihi mekânların zaman içerisinde maruz kaldığı tehlikelere karşı korunarak sürekliliğinin sağlanması, kendi kendine yetebilen, kentsel ekosistemin bir parçası olarak gelecek nesillere aktarılabilen sürdürülebilir bir sistemin geliştirilmesi oldukça önemlidir. Alınacak tedbirler ve özverili çalışmalarla çevreci, daha akılcı ve uzun ömürlü olması sağlanmalıdır. Günümüzde yüksek verimliliği hedefleyen sürdürülebilirlik çalışmaları ve çevresel koruma politikalarının önemi bir kat daha artmıştır. Bu bağlamda; geçmişten gelen miras arasında dengeli ve sürdürülebilir ilişkinin benimsenerek hem ekolojik, hem ekonomik hem de nesiller boyu sürekliliğinin sağlanmasında suyun akılcı kullanımını amaçlayan kurakçıl peyzaj çalışmaları ön plana çıkmaktadır. Çalışma alanı olarak İstanbul'un en önemli kültürel miraslarından biri olan Topkapı Sarayı Bahçeleri seçilmiştir. Zaman içerisinde bitkilerin yaşamını yitirmesi, yenilerinin eklenmesi ve yapılan yeniliklerle bahçeler değişime uğramıştır. Bu bağlamda çalışmada yapılan gözlemler ve yetkililerle bireysel görüşmeler yanında Osmanlı Dönemi'ndeki harita ve fotoğraflardan yararlanılarak alan için veriler toplanmış, kurakçıl peyzaj yaklaşımı çerçevesinde yorumlanmaya çalışılmıştır. Yanlış politikalar, hızlı nüfus artışı, kontrolsüz kentleşme, bilinçsiz ziyaretçiler, restorasyonlar gibi antropolojik sebepler ve küresel ısınma, iklim değişikliği gibi doğal sebeplerle tehdit altında olan İstanbul metropolünde; sahip olduğu tarihi kimliğiyle önemli bir yeşil alan olarak kalmış Topkapı Saray Bahçelerinin kurakçıl peyzaj ilkelerine uyumluluğu tartışılmıştır. Büyüyen kent içindeki yaşayan tarihi mirasın sürdürülebilirlik çerçevesinde gelecek nesillere aktarılabilmesi için yenilikçi çözümlerle enerji verimliliğinin artırılması için önerilerde bulunulmuştur.

**Anahtar Kelimeler:** Kurakçıl Peyzaj, Sürdürülebilirlik, Tarihi Bahçe, Tarihi Kentsel Peyzaj, Topkapı Sarayı



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SUSTAINABILITY IN LIVING CULTURAL HERITAGE: TOPKAPI PALACE GARDENS

#### ABSTRACT

One of the cultural treasures that requires preservation and serves as a living testament to our history are historical gardens. It is essential to ensure the endurance of living historical sites by safeguarding them from potential hazards throughout time. Furthermore, it is imperative to establish a self-sustainable system as a component of the urban ecosystem, with the intention of preserving it for future generations. With the implementation of specific measures and dedicated efforts, it is necessary to ensure that it is environmentally friendly, more rational and long-lasting. Today, the significance of sustainability initiatives and environmental conservation policies aimed at achieving maximum efficiency has further amplified. In this context, xeriscaping studies aiming at the rational use of water to ensure both ecological, economic and generational continuity by adopting a balanced and sustainable relationship between the heritage from the past come to the fore. The Topkapı Palace Gardens, one of the most important cultural heritages of Istanbul, was chosen as the study area. Over time, Gardens have been subject to change with the loss of plants, the addition of new ones, and with innovations. In this context, in addition to the observations made in the study and individual interviews with the authorities, data were collected for the area by utilizing maps and photographs from the Ottoman period, and it was tried to be interpreted within the framework of the xeriscape approach. Topkapı Palace Gardens has remained a crucial green area with its historical significance in the metropolis of Istanbul which has been facing threats from anthropogenic factors like misguided policies, rapid population growth, uncontrolled urbanization, careless visitors, and restoration activities, as well as natural challenges such as global warming and climate change. The article examines whether Topkapı Palace Gardens adheres to xeriscape principles. To preserve the growing city's living historical legacy for future generations in a framework of sustainability, suggestions have been put forth to enhance energy efficiency with innovative solutions.

**Keywords:** Sustainability, Historical Garden, Xeriscape, Topkapı Palace, Historical Urban Landscape



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A SITUATION ASSESSMENT STUDY FOR THE DEVELOPMENT OF STRATEGIES THAT SUPPORT PEDESTRIAN USE: BINGOL CAPAKCUR VALLEY, ESKISARAY STREET

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#### ABSTRACT

Pedestrianism is the most basic and sustainable form of transportation. Pedestrian priority transportation planning prepare the background for a livable environment by making a significant contribution to reducing pollution types, traffic density and costs, especially from motor vehicles. Çapakçur Valley, which divides Bingöl city center into two, is the most important natural corridor of the city. The valley, where rural life continues partially within the urban area today, is also one of the oldest residential areas in the city center. Therefore, Eski Saray Street, located in the valley, is one of the oldest streets in Bingöl. In addition to the residences where rural life somewhat continues on the streetside, there are various facilities such as wedding halls, amusement parks and Bingöl University Agricultural Production Center. It has significant potential for pedestrian priority use due to its natural, cultural and locational features. In order to increase this potential, a SWOT analysis was carried out with 8 expert participants to determine the current situation. As a result of the analysis, the strengths and weaknesses of the natural, cultural and locational features of the area; The opportunities and threats that the current construction, socio-demographic structure and the National Garden, that construction has started, have been revealed. In this study, it is aimed to evaluate the current situation by experts in order to determine the strategies to be put forward to protect and develop rural life in the middle of an urban area and to prevent and eliminate the negativities caused by motor vehicle pressure.

**Keywords:** SWOT Analysis, Pedestrian Priority Arrangement, Bingol, Capakcur Valley





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RURAL LANDSCAPES IN CINEMATIC NARRATIVES

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#### ABSTRACT

Like all visual and audio elements used in the art of cinema, landscapes are one of the narrative tools of films. Based on the identity and social memory of the geography where the film is shot, cinema provides information about the region to which the landscape used in the scene belongs, its characteristics, its period, in short, its culture. Landscape, rather than being a background for human activity, strengthens the visuality of films and influences the viewer's understanding of the storyline as the spatial reflections of the psychology of the characters. It is not only culture or social process; in fact some landscapes also harbour some emotional reactions when viewed purely as a scene. This leads to a strengthening of meaning in the scene, and in some cases to familiarity. Since rural landscapes are natural elements reflecting culture, they are frequently used in films with their natural beauty, calm atmosphere, and narrative power. From the wide panoramas in Westerns to the vast British countryside to Anatolian villages, the rural landscape plays a central role in the formation of cinematic space, giving meaning to events and depicting narratives in a specific spatial and historical context. The use of rural landscapes in cinema is not limited to creating the atmosphere of films. They also give clues about the origins, personalities, and inner worlds of the characters. The main purpose of this study is to show how the landscape bears traces on the physical and psychological selves and to determine the reflections of the psychological effects of rural space in the art of cinema through the sensuousness of the body. In the specific case of the film *Banshees of Inisherin*, that shot in rural landscapes, it will be read how the rural landscape relates to the art of cinema as a narrative tool.

**Keywords:** Rural landscapes, cinematic landscapes, visual, psychogeography



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### EVALUATION OF TRADITIONAL HOUSES IN THE CONTEXT OF SUSTAINABILITY; CASE OF LEFKE

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#### ABSTRACT

Sustainability is concentrated on meeting our current needs without compromising resources for future generations. The concept of sustainability is used in many different disciplines. The idea of sustainability in architecture involves; allowing people to live in a healthy, quality livable environment formation the quality of life, with improved environmental, social, and economic conditions. Based on this definition, sustainability in architecture includes the design and implementation of buildings where people can live in healthy, quality, and comfortable environments. Lefke region which is in Northern Cyprus, and hosted many civilizations throughout history. It is one of the most important settlements which preserved originality, urban texture, and traditional houses. Lefke City is experiencing a rapid transformation due to rapid population growth, migration, and economic reasons. Lefke City has unique traditional house samples that are affected by these developments. Some of these buildings are still used with their original function but some of them are abandoned. The study aims to evaluate traditional houses that conserve their original architectural character in terms of sustainability. Accordingly, the evaluation criteria of the houses in the context of sustainable architecture were determined. Traditional houses were analyzed according to the sustainable architectural criteria determined based on the literature review. As a result, Lefke traditional houses were evaluated and discussed in the context of sustainability.

**Keywords:** Sustainability, Traditional Houses, Lefke



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN UPDATED CHECKLIST OF MELOIDAE MYLABRINI (COLEOPTERA) AND HOST PLANTS IN A SAHARAN OASIS ECOSYSTEM IN ALGERIA

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#### ABSTRACT

The distribution of Mylabrini species in the oasis ecosystem is scarcely known, our study aimed to improve the knowledge of the beetle fauna in this very peculiar and severe habitat, represented by isolated spots in the desert. Tree large oases at the wilaya of Ouled Djellal (Oued El Assel, Oued Dj dai and Saad), northern Algeria were chosen for collecting insects. In each palm grove five pitfall traps were setup and visited every week. The content of each trap was stored in labelled vial and identified using binocular and confirmed by one of us. The updated checklist of the Coleoptera Meloidae from Algeria indicated the presence of 29 genera and 118 species belonging to the tribes Cerocomini, Epicautini, Lyttini (s.l.), Mylabrini, Meloini, Nemognathini. From the trap sampling we obtained 3 species; *Croscherichia litigiosa* (Chevrolat, 1840), *C. gilvipes* (Chevrolat, 1840), and *Mylabris impressa* Chevrolat, 1840. During our samplings, different spontaneous and weeds plants were identified from each palm groves. Among these, the most frequent plant species feed by blister beetles were flowers of *Silybium marianum* (Asteraceae), *Hedysarum carnosum* (Fabaceae), *Raphanus raphanistrum*, *Moricandia arvensis* (Brassicaceae) and *Aizoon hispanicum* (Aizoaceae) species. Even though the new records do not represent a significant range extension of the species, our collections will improve the knowledge also on their host plants in this ecosystem.

**Keywords:** Faunistics, oasis ecosystem, blister beetles, checklist.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BIOSORBENTS APPLICATIONS FOR ELIMINATION OF NITRITES FROM POLLUTED WATER

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#### **ABSTRACT**

In rural India the contamination of water by nitrite is profound. Cost-effective and safe water treatment methods are required to remove nitrite from water. A nitrite is regulated in drinking water quality primarily because excess amount can cause methemoglobinemia (also known as blue baby syndrome) disease. The fresh water contains 3% in the worldwide. Human and industrial activities produce and discharge wastes containing nitrite metal into the water resources making them polluted and threatening human health and ecosystem. Conventional methods for the removal of nitrite metal ions such as chemical precipitation and membrane filtration are more expensive when treating large amounts of water, inefficient at low concentrations of metal and generate large quantities of sludge and other toxic products that require careful disposal. Bio-sorption is eco-friendly and alternative methods for treatment of wastewater. These methods have advantages over conventional methods because it has a lower cost, easily available and reused. The present work studies the feasibility use of neem leaf, custard apple leaf, guava leaf, mango tree leaf, orange peel and banana peel as a biosorbents in removal of nitrite from contaminated water. The removal efficiency is 100% obtained from this work. The effects of different parameters like contact time, agitation speed, adsorbent dosage, pH and temperature are also studied. Also, the biomass can be modified by physical and chemical treatment before use. The process can be made economical by regenerating and reusing the bio-sorbent after removing the heavy metal.

**Keywords:** Water, Nitrite, Treatment, Biosorbents, Optimization, Heavy metals, Eco-friendly and Sludges



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ADSORPTION OF METHYLENE BLUE FROM TEXTILE INDUSTRIAL WASTEWATER USING BIO- MATERIALS FROM BARLEY BRAN PLANT

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#### ABSTRACT

The recovery and reuse of natural resources can lead to an important economy in the synthesis of materials. In order to prepare meso-structured materials, silica is an essential precursor. This study aims to find a new and less expensive source of silica to replace the one being used currently. It was mainly focused on the synthesis of organized mesoporous silica catalysts (OMS) by the sol-gel process. The bio-SBA-15 was synthesized using Algerian natural resources, such as barley bran and the extracted white powder was characterized by Fourier transform infrared spectroscopy (FTIR). This resulted in the presence of peaks as well as the XRF data proving the presence of silica in the extracted white powder with majority amounts, superior than 98.4%. Therefore, the prepared mesoporous samples were characterized by the different physicochemical methods (x-ray diffraction XRD, scanning electron microscopy SEM, N<sub>2</sub> physisorption, and transmission electron microscope TEM) in order to determine the structural and textural properties of the material. The type IV adsorption isotherm with hysteresis and X-ray diffraction results obtained for bio-SBA-15 show that the mesoporous material exhibited similar results to the material SBA-15 synthesized with the same method with a classic source of silica with a high surface specific area 635 m<sup>2</sup>/g and a pore volume diameter of 0.668 nm. Different parameters were studied to examine the adsorption performance, such as the effect of adsorbent material dosage, initial concentration dye of MB, and pH. Langmuir and Freundlich adsorption models which were recorded to define the equilibrium isotherms. The results show the good efficiency of Methylene Blue adsorption onto bio-SBA-15.

**Keywords:** barley bran, sol gel method, adsorption kinetics, isotherm, MB dyes, silica powder, bio-SBA-15.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PHENTHOATE TOXICITY EVALUATION IN ROOT MERISTEM OF *PISUM SATIVUM* L.

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#### ABSTRACT

Phenthoate is an organothiophosphate insecticide. Effect of phenthoate on the cytogenetic alterations in root tip cells of *Pisum sativum* L., a multiuse crop was investigated in this study. *Pisum sativum* L. seeds were exposed to different concentrations of phenthoate (0.1, 0.2, 0.3, 0.4, and 0.5%) and were germinated at 24°C for 72 hours and cytogenetic alterations were assessed. Analysis of mitotic index revealed that phenthoate has cytotoxic attributes, and cell proliferation kinetics frequencies showed alterations in the kinetics of the mitotic process. Phenthoate treatment of 0.1% to 0.5% resulted in an increase in the metaphases, and a reduction in prophases, anaphases, and telophases ratio, dose dependently. The findings of the study reveal that, phenthoate reduced the percentage of seed germination, mitotic index, radicle length and increased chromosomal abnormalities dose dependently. Root tip cells of *Pisum sativum* L. seeds treated with phenthoate showed an increased occurrence of single and double bridges, fragments, stickiness, laggard, and vagrants.

**Keywords:** phenthoate, seed germination, radicle length, Mitotic Index, genotoxicity, cell proliferation kinetics, *Pisum sativum* L.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### REPLACEMENT OF FISH MEAL WITH CANOLA MEAL SUPPLEMENTED WITH CITRIC ACID TO CHECK THE IMPACT ON PROXIMATE COMPOSITION AND GROWTH PARAMETERS OF *CIRRHINUS MIRGALA* FINGERLING

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#### ABSTRACT

Fishmeal being a limited and costly feed ingredient is continuously substituted with locally available plant protein sources. However, the occurrence of anti-nutritional factors in plant meal suppresses its potential to be fully replaced. Therefore, in this study, we aimed to check the synergistic effects of dietary additives such as citric acid on growth performance in *Cirrhinus mrigala* fingerlings. Canola meal was used as a test ingredient to replace fishmeal at graded levels such as; 0%, 1%, 2%, 3%, 4% and 5%. These six diets were further supplemented by varying levels of citric acid to formulate total six test diets named as T1, T2, T3, T4, T5, T6. Each treatment contained three replicates having 15 fingerlings in each tank; following 3×3 factorial arrangement. Chromic oxide (1%) was also added in these diets as an inert marker. Maximum weight gain% of *C. mrigala* (212%) and the best values of FCR (1.18), respectively,



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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were recorded when fish fed on diet T<sub>4</sub> (canola meal replacement level supplemented with 3% citric acid) compared to fish fed control diet T<sub>1</sub> (without citric acid supplementation). Similarly, body composition values such as protein (17%), Ash (2.44%), and moisture (74%) were also noted for same diet. Improved values of body composition was also recorded when fish were fed on diet T<sub>4</sub>. In conclusion, canola meal replacement by fishmeal supplemented with citric acid at the levels of 3%, respectively proved beneficial in maximizing the growth performance and body composition *C. mrigala*.

**Keywords:** Fishmeal, canola meal, growth, body composition.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KNOWLEDGE OF FARMERS ON PESTICIDE SAFETY PRACTICES IN NSUKKA LOCAL GOVERNMENT AREA, ENUGU STATE, NIGERIA

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#### ABSTRACT

The study assessed knowledge of farmers on pesticide safety practices in Nsukka local government area, Enugu State, Nigeria. Multistage sampling procedure was used to select four town communities, eight villages, and eighty farmers for the study. Data was collected using structured interview schedule, analyzed with SPSS and presented in percentage and mean score. Result revealed that majority (90%) of the respondents applies pesticides in the morning and 80% use knapsack sprayer for pesticide application. Also, findings indicated that the perceived health effects of the pesticides on farmers were: skin damage ( $\bar{x} = 2.79$ ), irritation on the skin ( $\bar{x} = 2.78$ ) and eye irritation ( $\bar{x} = 2.71$ ). Furthermore, finding showed that majority (90%) of the respondent had high knowledge of pesticide safety practices. Moreover, result indicated that constraints faced by the farmers in adhering to pesticides safety precaution were: lack of money to buy material ( $\bar{x} = 3.44$ ), high cost purchasing personal protective equipment ( $\bar{x} = 3.36$ ) among others. Finally, result revealed that possible strategies that can be employed to improve farmers' safety practices on pesticide use were: free provision of protective materials ( $\bar{x} = 3.49$ ), subsidization of price of protective equipments ( $\bar{x} = 3.48$ ) among others. The study concluded that farmers had good knowledge of pesticides safety application practices on their farm but poverty hindered them from getting necessary protective materials. Thus, government should provide the farmers with personal protective equipments or subsidize prices of the protective materials to enable the farmers procure and use them while applying pesticides.

**Keywords:** Pesticide, safety practices, irritation, protective equipment



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RECENT ADVANCES INTERCROPPING APPROCHES FOR *STRESS TOLERANCE* IN PLANTS FOR *SUSTAINABLE AGRICULTURE*

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#### ABSTRACT

Intercropping may be a means to address some of the major problems associated with modern farming, including biotic and abiotic stresses. Intercropping (IC) could address challenges to Mediterranean agriculture imposed by climate change. IC as a farming practice that can efficiently contribute to diversification of cropping systems and a more sustainable management of natural resources (e.g. soil, water) to mitigate deleterious effects of climate change. Climate change can strongly increase drought and salt stress by changing rainfall patterns, and increasing evaporation, which reduces water availability and affect water quality especially in the arid and semi-arid regions. Intercropping can be a method to improve diversity in agricultural ecosystem. Cropping of several plant species together reduces negative effects of a monoculture and thus is commonly employed in ecological agricultural systems. Tomato–maize intercropping is promoted within semi-arid regions as an adaptation strategy to water scarcity and drought for low-input systems. This confirms the suitability of the common practice among farmers who use the low planting density under water scarce conditions and salt stress. Here we evaluated drought and salinity tolerance of tomato cultivars co-cultivated with maize or grown in monoculture by analyzing growth, physiological and biochemical parameters. Our results show that maize-tomato intercropping provides opportunities to produce the same food on less land under drought and salinity conditions.

**Keywords:** Intercropping, drought, salinity, tomato, maize, climate change.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PARAMETER OPTIMIZATION OF CATIONIC DYE ADSORPTION ON NATURAL KAOLINITE CLAY BASED ON CENTRAL COMPOSITE DESIGN, DESIRABILITY FUNCTION, AND ARTIFICIAL NEURAL NETWORK

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#### ABSTRACT

The presence of synthetic dyes in water causes serious environmental issues due to the poor water quality, toxicity to the environment and human carcinogenic effects. Adsorption has evolved into an affordable and practical technology for the purification of colored effluent. Clay minerals offer an intriguing substitute for eliminating colorants from colored aqueous solutions. Because they are affordable, simple to extract and handle, and non-toxic. In the present study applies a systematic procedure for the parameter optimization of Cationic dye Adsorption by Muscovite-Kaolinite clay. The adsorbent was characterized by X-ray Diffraction (XRD), pH value at the zero-charge point (PZC), Fourier Transform Infrared Spectroscopy (FTIR), X-ray fluorescence (FX), and Scanning Electron Microscopy coupled with an Energy Dispersive X-rays Spectroscopy elemental compositions analyzer (SEM- EDXS). The principal minerals found in the studied clay are muscovite, kaolinite, and quartz. Possible parameters experimental conditions such as adsorbent's dose, time, adsorbate concentrations, pH, and temperature has been investigated, in order to understand the adsorption behavior of the dye molecules onto Kaolinite clay. The central composite design of response surface methodology (CCD-RSM) was used for adsorption modeling and optimization. Variance analysis, response surfaces, iso response curves, and desirability function show that the model is a good predictor, and the



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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optimal parameters for maximum response are estimated as 25.9 mg of adsorbent dose, 51 mg/mL of initial concentration, 25°C of temperature, pH 7.99, and a contact time of 31.48 min. An artificial neural network (ANN) training set was also created using the exact same architecture. The optimized ANN model with 3 neurons in the hidden layer shows a strong positive correlation between experimental and predicted values. The CCD-RSM and ANN (3) models were available with correlation coefficients of 0.9719 and 0.9859, respectively. Further, ANN(3) is the best predictive model, according to the error analysis.

**Keywords:** kaolinite, adsorption, optimization, CCD-RSM, ANN.



**ANTI-INFERTILITY POTENTIALS OF HEXANE EXTRACTS AND FRACTIONS  
OF *SESAMUM INDICUM* SEEDS ON CYCLOPHOSPHAMIDE-INDUCED  
SPERMATOTOXICITY IN MALE WISTAR ALBINO RATS.**

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**ABSTRACT**

This study was aimed to evaluate the anti-infertility potentials of *Sesame indicum* seed (SIS) extract and fractions in cyclophosphamide-induced spermatotoxicity in male wistar albino rats. Forty eight (48) albino rats were shared into eight groups of six animals each. Group 1 was the control group. Spermatotoxicity was induced in group 2-8 with 15mg/kg of cyclophosphamide twice a week for 28 days. Group 2 was the untreated group while group 3 received 56 mg/kg addyzoa (standard drug), groups 4-6 received 100,200 and 400mg/kg of SIS extract, respectively and groups 7-8 received 200mg/kg of hexane-acetone and methanol fractions, respectively. Groups 3-8 were administered extract, fractions and addyzoa concomitantly with the cyclophosphamide. Phytochemicals, antioxidant enzyme activities, sperm parameters and hormonal profile were evaluated. Phenols and flavonoids were found in highest composite in the extract compared to the fractions. There were significant decreases ( $p<0.05$ ) in the follicle stimulating hormone (FSH), leutinizing hormone (LH), testosterone concentrations in group 2 when compared with that of the control group. However, treatment with hexane extract, and addyzoa significantly increased ( $p<0.05$ ) FSH, LH and testosterone concentrations while the fractions only increased the FSH and LH concentrations significantly. Significant decreases ( $p<0.05$ ) observed in sperm count, motility and viability in untreated group (group 2) were significantly increased ( $p<0.05$ ) in groups treated with crude extract, fractions and addyzoa. Total sperm abnormality (TSA) significantly increased and percentage normal sperm (PNS) significantly decreased in group 2 relative to the control group. However, the concentration of TSA significantly decreased ( $p<0.05$ ) and PNS significantly ( $p<0.05$ ) increased in groups treated with crude extracts, different fractions of sesame seeds and addyzoa. Compared to the untreated group, rats administered with SIS extract significantly increased ( $p<0.05$ ) superoxide dismutase, catalase activities and SIS fractions significantly increased ( $p<0.05$ ) reduced glutathione concentration. The histology of the testes for untreated group showed reduced



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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seminiferous tubule density (STD) and mature spermatid density (MSD) while the extract and fractions attenuated the effect by increasing the STD and MSD but not as control group which showed intact seminiferous tubules and interstitium with orderly germ cell maturation. Hence, *Sesamum indicum* seeds possess fertility potentials by reducing the reproductive toxicity of the albino rats caused by cyclophosphamide intoxication. However, Hexane extract showed a better ameliorative effect.

**Keywords:** Male infertility, *Sesamum indicum* seeds, Sperm parameters, Hormonal profile, Cyclophosphamide



**ENHANCED PERFORMANCE OF ADIPONECTIN – LINKED FLAVONOIDS  
ANTI-OBESITY DRUG TARGET: AN *IN-SILICO* DISCOVERY**

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**ABSTRACT**

Adiponectin's role in obesity management is well reported to be associated with its antioxidant and anti-inflammatory function, via improvement of glucose and lipid metabolism, for healthy energy expenditure. This study investigated the effects of flavonoids on the enhanced function of adiponectin protein as anti-obesity factor, through molecular docking. HPLC analysis was used to isolate quercetin, p. coumarin, epigallocatechin, caffeic acid, sinapic acid, naphthoresorcinol and gallic acid flavonoids in ethylacetate flavonoid rich fraction of honey (EAFH) and methanol flavonoid rich fraction of lime juice (MFLJ); and AutoDock Vina software was used for the molecular docking of these ligands and the standard drugs (Atorvastatin and Orlistat). Results reveal that the respective binding affinities of atorvastatin and orlistat (-7.9 Kcal/mol and -7.4 Kcal/mol) to the target protein, adiponectin were stronger than those of gallic acid (-6.0 Kcal/mol), naphthoresorcinol (-6.1 Kcal/mol), sinapic acid (-6.1 Kcal/mol), caffeic acid (-6.4 Kcal/mol), but weaker than those of quercetin (-8.4 Kcal/mol) and p. coumarin (-8.0 Kcal/mol); while epigallocatechin had the same binding affinity (-7.4 Kcal/mol) with orlistat (standard drug), atorvastatin was stronger (-7.9 Kcal/mol) than epigallocatechin. The binding affinity ( $\Delta G$ ) value for quercetin (-8.4 Kcal/mol), p. coumarin (-8.0 Kcal/mol) and epigallocatechin ligands portrayed their proficiency as anti-obesity phytotherapy, with latent potential to enhance adiponectin protein function in lipid and glucose metabolism. Moreso, the participating amino acid catalytic subunit, involved in the interaction and generation of hydrogen bond between the adiponectin protein and ligands are; His 382, His 241, and Tyr 252, which are pivotal for adiponectin performance. It may be concluded that the higher ( $\Delta G$ ) value of quercetin, p. coumarin and epigallocatechin suggest their potential as anti-





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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obesity drug target on adiponectin to exert their antioxidant, glucose and lipid metabolic effects on this protein and thus could improve its function in healthy energy expenditure.

**Keywords:** Adiponectin, Anti-obesity, Atorvastatin, Epigallocatechin, Flavonoids, Ligands, Orlistat, P. coumarin, Quercetin



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **ANALYSIS OF THE SOIL COMPOSITION OF THE SUBSTANCE AND IMPROVEMENT OF ITS QUALITY USING NEW DATA PROCESSING APPROACHES**

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#### **ABSTRACT**

Today, the rapid development of rural industry opens up new ways for researchers to increase yields, the quality of seed products and the opportunity to defeat such a global problem of humanity as hunger. To solve this problem, scientists are taking various steps related to increasing its fertility, the withdrawal of new plant varieties to improve the welfare of the population. Chemical analysis of the soil can show the main disadvantages faced by agriculture in a particular area of our globe. Undoubtedly, clay soil adversely affects the growth of agricultural products, hinders its development. The same effect is exerted by excessive moisture, which is observed in swampy, tropical areas, as well as in regions with frequent rains and showers. Which way can we go? On the one hand, it is possible to dilute fertile soil containing chernozem with clay, thereby ensuring an average yield level in several territories at the same time. On the other hand, you can try to synthesize the required composition of the substance in accordance with some reference sample, evaluate its composition and the components that need to be added. In addition, there are situations in which soil with the same composition of matter in two different areas yields different yields. Detailed noise spectroscopy of the substance composition can help to analyze such phenomena.

**Keywords:** agriculture, data processing, industrial production.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CONFIRMATION OF SANCTUARY PROTOCOL IN VANET UTILIZING SCYTHER

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#### ABSTRACT

In recent years, several researchers have researched the Vehicular Ad Hoc Networks Fidd (VANETs) VANET is a subgroup of mobile ad-hoc networks (MANETS) VANET refers to a group of nodes (e conveyances) These nodes communicate with each other as well as road-side units cite this) for ascertaining safety on roads and giving a better driving experience. In VANETs messages are communicated between the nodes utilizing wireless mediums Security is consequently a paramount aspect of Vehicular Ad-hoc Networks Data and messages need to be conveyed securely among the conveyances. In this paper several security issues in VANET have been discussed, types of attacks and assailers in VANET have been relegated and additionally we have discussed some recent solutions to the above challenges in security of VANET along with their advantages and disadvantages (17) In the cessation we have proposed a solution for Authentication of Conveyances in VANET afore entering any region or network Our proposed model uses Digital Signature and Unique Id for sanctioning conveyances and then assigns a key for communication across the region Withal we have discussed advantages and disadvantages of the proposed model and the assailments which are proposed to be covered by our model. We have withal endeavored to implement this method utilizing the Scyther Implement. Our protocol covers all the assailments we have claimed in this project and the same has been verified by Scyther Implement At last but not the least we have concluded this dissertation by discussing the outcomes of the project.

**Keywords:** VANET, Network, Ad-Hoc, MANET, Nodes.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A DISASTER TWEET MANAGER DOING PREDICTION USING MACHINE LEARNING TECHNOLOGY

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#### **ABSTRACT**

In today's world convivial media has become an integral part of life. Twitter is an American micro-blogging and convivial networking portal which provides the users a platform to post news, data and celebrations. Twitter has become an essential mode of communication medium during the occurrence of an emergency or disaster. The pervasiveness of astute phones and tablets enable people to pronounce and apprise others of the occurrence of an emergency they are experiencing in genuine-time. This information regarding disasters propagated over the convivial media can preserve thousands of life by alerting others so that they can take evasive action. Thanks to computer technology, texts uploaded on convivial media may be relegated predicated on the emotional expressions they contain, making it simple to utilize them to expound and forecast occurrences. Natural language processing (NLP) implements are capable of carrying out this estimation process. In this paper, we utilized several preprocessing strategies, the TF-IDF (Term Frequency-Inverse Document Frequency) feature extraction method, and relegation models to evaluate tweets containing disaster-cognate terms. According to their fl scores, train precision, and test precision, we compared sundry relegation algorithms (SVC, MultinomialNB, LogisticR, XGBClassifier, RandomForest, DecisionTreeClassifier, and KNeighborsClassifier)

**Keyword:** Python, Tweet, Disaster, Machine Learning, Prediction.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A NOVEL PROCEDURE FOR IMAGE ENCRYPTION

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#### **ABSTRACT**

This report provides an overview of image encryption techniques and their applications. The report fixates on the consequentiality of image encryption in securing sensitive data in sundry industries, including medical imaging, defence, and finance. The report discusses sundry image encryption algorithms, including symmetric key encryption, asymmetric key encryption, and chaos-predicated encryption. The performance of these algorithms is compared predicated on their encryption efficiency, security, and resistance to attacks. The report withal highlights the inhibitions of image encryption techniques, including the computational intricacy of some algorithms and the susceptibility to attacks. The report concludes that image encryption is a crucial component of data security and that perpetual research and development are indispensable to ameliorate the efficacy and robustness of image encryption methods. This report discusses the utilization of chaos maps for image encryption. Chaos maps have been proven to be efficacious in engendering a sequence of pseudorandom numbers, which can be habituated to encrypt an image. The encryption process involves the utilization of an initial key and a chaotic map to engender a series of keys, which are then used to scramble the image pixels. The report discusses several chaos-predicated encryption techniques, including Logistic Map, Henon Map, and Lorenz Map, and compares their performance in terms of encryption efficiency, security, and resistance against attacks. The results designate that chaos-predicated encryption is a promising technique for securing image data and can be utilized in sundry applications, such as secure communication and data storage. However, the report additionally highlights the desideratum for further research to amend the robustness and reliability of chaos-predicated encryption methods.

**Keyword:** Image, Encryption, Key, Security, Date.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A GENUINE-TIME TRAFFIC SURVEILLANCE IDENTIFICATION UTILIZING YOLO A STATE OF THE ART ALGORITHM

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#### ABSTRACT

The objective of this paper is to develop a genuine-time traffic detection system utilizing state-of-the-art YOLO (You Only Look Once) models, including YOLO v7, v4, and v5. The proposed system aims to ameliorate the safety of drivers, passengers, and pedestrians by detecting and identifying conveyances and other objects in the vicinity of a moving conveyance. The system leverages deep learning techniques to detect and track objects in authentic-time, providing timely and precise information to drivers and other stakeholders. The proposed system comprises several components, including data acquisition, data preprocessing, object detection, and post-processing. The data acquisition component involves accumulating data from sundry sensors, such as cameras and LIDAR sensors, mounted on the moving conveyance. The data preprocessing component involves processing the raw data to abstract noise, distortions, and other artifacts that may obstruct object detection. The object detection component involves applying the state-of-the-art YOLO models, including YOLO 17, 4, and 5, to detect and track objects in authentic-time. Determinately, the post-processing component involves analyzing the results of object detection to make decisions, such as braking or warning the driver about potential hazards. The YOLO models utilized in this project are state-of-the-art deep neural network architectures that are highly precise and efficient. They are designed to detect objects of different sizes, shapes, and colors with high precision and can process images in genuine-time. The models have been trained on immensely colossal datasets of traffic images and videos. making them felicitous for detecting objects in traffic environments. The proposed system has been tested on sundry traffic scenarios, including urban and highway environments, and has demonstrated high precision and genuine-time performance. The system has withal been evaluated on sundry metrics, including precision, recall, and F1 score, to assess its performance. The results show that the proposed system outperforms other state-of-the-art traffic detection systems, achieving higher precision and authentic-time performance. In conclusion, the proposed system presents a novel approach to genuine-time traffic detection utilizing state-of-the-art YOLO models. The system leverages deep learning techniques to detect and track objects in genuine-time, providing timely and precise information to drivers and other stakeholders. The system has been evaluated on sundry metrics and has demonstrated



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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high precision and authentic-time performance. The proposed system has potential applications in ameliorating the safety of drivers, passengers, and pedestrians, and truncating the number of accidents on roads.

**Keywords:** ML, YOLO, Detection, Data, Object.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DESIGN, DEVELOPMENT & EVALUATION OF TERBINAFINE LOADED NANOEMULGEL FOR THE TREATMENT OF DERMATOPHYTOSIS

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#### ABSTRACT

The aim is to develop and optimize nanoemulgel for the treatment of dermatophytosis. Terbinafine loaded oil in water nanoemulsion (TH-NE) was fabricated using Aqueous microtitration method with olive acid (oil phase), Span 80 (surfactant), and propylene glycol (co-surfactant). Pseudo-phase ternary diagrams and thermodynamic studies revealed the stability of TH-NE. TH-NE was optimized by Box-Behnken Design (BBD) and recorded a particle size of  $28.07\text{nm} \pm 0.5$ , PDI  $0.1922 \pm 0.1$  and zeta potential  $-41.87\text{ mV} \pm 1$ . Furthermore, TH-NE was incorporated into 1.5% Carbopol and nanoemulgel (TH-NEG) was formed. TH-NEG was subjected to texture analysis which showed firmness (168.00g), consistency (229.81g.s), cohesiveness (-83.36g), work of cohesion (-107.02g.s). In vitro drug release for TH-NEG and TH-NE showed an initial burst effect followed by sustained release of 88% and 74% respectively for 48 h when compared with the marketed formulation (66%). Similarly, ex-vivo release studies showed that TH-NEG and TH-NE have sustained release of 86% and 71% respectively when compared with marketed formulation (67%). Further, TH-NE and TH-NEG followed Higuchi kinetic model in which drug is released via diffusin from the matrix. Moreover, TH-NEG and TH-NE showed  $30\mu\text{m}$  and  $25\mu\text{m}$  penetration into the epidermal layer respectively as seen in Confocal microscopy. Hence, TH-NEG proved to be potential carrier of TH for dermatophytosis treatment.

**Keywords:** TH-NEG, TH-NE



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **THE POSSIBLE PATHWAY OF WATER-BORNE SPECIES INVASION IN MALAYSIA: WHERE DANGER OVERTHROWS BEAUTY**

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#### **ABSTRACT**

Biologist and philosopher Herbert Spencer, once said on social Darwinism, "survival of the fittest", but this term is not only implacable on "Invasion" but also, dangerous for the endangered native species. The state of the art water-borne invasive species in Malaysia is scrutinized and assembled in this research work to assess the different pathways of water-borne species invasion in Malaysia. The data were collected from different sources including, published literatures, which are cross checked and validated with Global Invasive Species Database, CABI, IUCN Invasive Species Specialist Group, IUCN Red List, Malaysian government websites and WoRMS database. There are 59 water-borne invasive species available in Malaysia (where 10 native species are invasive to the other regions) and classified into plants, fishes, algae, amphibians, mollusks, reptiles, microorganisms, crustaceans, seastar, coral, and sponge; among them 47 are freshwater species and 12 species are from marine habitat. The four invasion stages are proposed for the Malaysian invasive species, for instance arrival, establishment, localized and widespread. This review found a major number of the species are already established and since a long time, they have been spreading around the country's local habitat. It is also revealed that most species are introduced in Malaysia due to the intentional, purpose of aquaculture and aquarium trade from the different regions especially



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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the South American Continent; where some of the species came accidentally, through international maritime trade using 13 commercial seaports around the country. The local dispersion of these invaders, occurred in many ways, including, local transport, natural dispersal, agriculture, and aquaculture. The long-run consequence of different invasions and invasive species is performing irreparable damage such as, impact on local habitat, niche, and ecosystem; competition with local species, hybridization and the transmission of disease. The most alarming phenomenon occurring right now; some illegal ornamental species importations from around the globe towards Malaysia, without concerning the invasion possibilities. That might lead to the permanent collapse of the food chain, ecosystems, and ecological balance. Which demands urgent investigation into different aspects of ecosystem degradation including their extensive taxonomy, ecological and economic impact.

**Keywords:** Biological invasion, international route of invasion, local dispersal, biodiversity, Sundaland





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A MESHLESS METHOD FOR THE SOLUTIONS OF VARIABLE ORDER FRACTIONAL PARTIAL DIFFERENTIAL EQUATIONS VIA RADIAL BASES FUNCTIONS

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#### **ABSTRACT**

In this thesis, a hybrid numerical scheme which comprises of radial basis functions (RBFs) and finite difference is proposed for the numerical solutions of local and global variable order time fractional partial differential equations (VOTFPDEs). In local case the fractional part is transformed to integer form and then approximated by forward finite difference, while in global case the temporal part is approximated with a well-known  $L_1$  formula and space derivatives are approximated by RBFs. The propose method is collocation based which convert local and global VOTFPDEs into the system of algebraic equations. In first chapter some basic definitions are reported. In second chapter the proposed method is used to solve global VOTFPDEs, while in chapter three the methodology is extended to local VOTFPDEs. To tackle the nonlinear term the Quasi Linearization technique is used. To check the consistency and efficiency of the proposed scheme error norms  $L_2$  and  $L_1$  are computed. From tabulated and graphical results it is observed that the proposed method works well for local and global VOTFPDEs.

**Keywords:** VOTFPDEs, radial basis functions



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MOLECULAR APPROACHES FOR DETECTION OF ANTIBIOTIC RESIDUES IN DAIRY MILK

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#### ABSTRACT

Healthy productive population along with adequate nutrition are increasingly recognized as an important prerequisite for social development. Humans have a long tradition of consuming milk produced by dairy animals. Pakistan is endowed with diverse livestock genetic resources. In Pakistan, main dairy animals are buffalo and cattle and producing mass supply of milk (95%) in the market. Dairy sector is facing great challenge of infectious disease, among them the mastitis is primarily important. *Staphylococcus aureus* (*S.aureus*) is a contagious pathogen bacterium that is involved in the onset of bovine mastitis. It has a zoonotic implication in term of causing infection in both human and animals. The emergence of most commonly used antibiotic resistant strains of *S.aureus* is a great challenge for pharmaceutical sector, as it contribute significantly in the economic losses particularly in dairy sector due to cost of treatment. The current study was conducted to determine the prevalence of detection of genetic determinants in *S.aureus* and their antibiotic resistance profile. In the present study total of 250 samples were screened for the detection of antibiotic resistance determinants in *S. aureus* recovered from bovine species affected from mastitis and farm personals. For detection of antibiotics residues in the milk specific primers were designed. Specific primer based PCR was performed for detection of targeted determinates against tetracycline and methicillin. Bioinformatics analysis using POP Gen was done to figure out frequency of resistance determinants in our local strains of this contagious pathogen. The results showed the high frequency of all four genetic determinants in our studied bacterial population. These are commonly used antibiotics and these findings have prompting concern with rational use of these therapeutics.

**Keywords:** Milk, Dairy animals, antibiotics, bovine



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **IRON DEFICIENCY ANAEMIA IN PREGNANCY: REEXAMINING THE NATURE AND MAGNITUDE OF THIS PUBLIC HEALTH CONCERN**

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#### **ABSTRACT**

Iron deficiency anemia (IDA) is the most common nutritional deficiency worldwide with immense public health consequences. Iron deficiency anaemia is a condition in which the number of red blood cells and consequently their oxygen-carrying capacity is insufficient to meet the body's physiologic needs. Pregnant women are recognized as one of the groups most vulnerable to iron deficiency anaemia because of increased iron requirements during pregnancy. Approximately 800 mg of iron are required in pregnancy, which is far higher than the "230 mg of iron that non-pregnant women need. Iron supplies oxygen and nutrients to the foetus, supports placental functions and manufactures red blood cells and is an important micro-nutrient for the development of the foetal brain and cognitive abilities of the new born. Maternal iron deficiency and particularly iron deficiency anaemia has been associated with detrimental effects on maternal and infant function. Maternal iron deficiency is associated with increased risk for cesarean delivery, transfusion, perinatal bleeding, preeclampsia, placental abruption, poor maternal thyroid status, poor wound healing, cardiac failure, and even death. Adverse perinatal outcomes include intrauterine growth retardation, prematurity, low birth weight, all with significant mortality risks. Post-partum cognitive impairment and behavioral difficulties are also reported. Notably, more human studies are essential to generate the best evidence to advance strategies to reduce the incidence of iron deficiency during pregnancy to improve maternal, neonatal and infant health.

**Keywords:** Iron deficiency anemia, pregnancy, iron deficiency



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ANTICIPATING RISK MAPPING FOR LAND MOVEMENTS IN MOROCCO'S MIDDLE RIF REGION

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#### ABSTRACT

The Middle Rif region stands out for its unique geographical features. Characterized by pronounced coastal dips resulting from its mountainous morphology, it also exhibits a less-than-ideal lithological composition, primarily composed of flysch and schist, which presents challenges in terms of geotechnical suitability. Furthermore, it experiences substantial annual rainfall, approximately 640 mm per year, owing to its Mediterranean climate. Additionally, the region is marked by significant seismic activity due to its location along the boundary of the African tectonic plate, which converges with the Eurasian plate (Europe-Asia) in what is classified as zone 5 according to RPS 2000 version 2011. These four key factors—lithology, rainfall, seismicity, and topography—contribute to the Middle Rif's susceptibility to landslides, necessitating substantial public funding for mitigation efforts. These land movements hinder the region's development, including the expansion of settlements, the expansion of the road network, and the enhancement of the electricity and water supply infrastructure. To foster the development of this region, it becomes imperative to identify and delineate the most vulnerable areas prone to landslides. This article focuses on the creation of Landslide Risk maps, a novel endeavor in this context. These maps will serve as a foundational resource for planning future infrastructure projects in the EL HOCEIMA-JEBHA region. The development of these maps demands an in-depth examination of the various parameters mentioned earlier: lithology, pluviometric patterns, seismic activity, and topography, all of which will be expounded upon in subsequent sections.

**Keywords:** Slope instability, risk map, geotechnical design, Middle Rif Morocco



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE SIGNIFICANCE OF DIGITAL MARKETING AND MACHINE LEARNING IN SHAPING ECOTOURISM BEHAVIOR

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#### ABSTRACT

The development of technical progress contributes to the digitalization of society and the activation of advanced technologies use. In the conditions of globalization, innovative approaches are quickly spread among many countries of the world and are used by companies in the creation of products. Consumers quickly reorient themselves to innovative products, especially younger age groups. However, in modern conditions, there is an orientation towards solving ecological problems and protecting the surrounding environment in all regions of the world. A significant number of users forms a stable demand for ecological goods and services, which are characterized by innovation and the absence of negative impact on nature. Among modern trends, it is advisable to pay attention to ecotourism, which attracts the attention of customers in different age groups. Awareness of responsibility for the environment and the desire to spend vacations in ecologically clean conditions leads to the purchase of appropriate tourist trips. The presented type of tourist products is characterized by a constant growth in demand, which encourages companies to implement complex marketing strategies in the digital environment in order to establish communications on a long-term basis. Travel companies interact with ecotourists thanks to the use of modern digital marketing tools. Increasing the efficiency of interaction between companies and ecotourists is possible thanks to the integrated use of digital marketing and machine learning. The integration of modern big data processing algorithms into marketing in a digital environment allows for identifying new directions for stimulating demand for ecotourism products. Among innovative technologies for creating content for eco-tourists, it is advisable to pay attention to Dall-E 3 and ChatGPT.

**Keywords:** digital marketing, communications, content, machine learning, ecotourism





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DEVELOPMENT OF PINEAPPLE JAM INCORPORATED WITH CHIA SEED AND HONEY

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#### ABSTRACT

The research aimed to discover the potential of chia seeds in the jam industry. In this study, pineapple jam was used as the base jam and honey was added instead of sugar. The trial assessed different concentrations of chia seeds (2%, 3%, and 4%) alongside honey, and a control jam with no chia seeds or honey. The outcomes show noteworthy changes in the composition, texture, color, antioxidant properties, and sensory characteristics of the jam based on chia seed content. Increased protein (6.58%), fiber (1.63%), and vitamin C content (13.4 mg/100g), as well as improved antioxidant activity (88.5%), were generally observed with higher chia seed concentrations (4%). Texture analysis revealed increased firmness and stickiness with chia enrichment. Viscosity increased, and color profiles varied with chia seed addition. Sensory evaluation showed moderately positive ratings (7) across qualities for both control and chia-enriched jam. However, among the three samples, sample containing 3% chia seed was much closer to the control jam on the basis of texture, color and flavor. The sample also has higher acceptability to the consumer than the other two samples containing 2% and 4% chia seeds. Overall, this investigation brings attention to the potential advantages of incorporating chia seeds and honey into pineapple jam, providing insights into its nutritional and sensory implications and further study is necessary for research on jam enriched with chia seeds.

**Keywords:** Honey, sugar, protein



**EXPERIMENTAL STUDY ON BORIDED AISI H13 STEEL**

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**ABSTRACT**

In this study, boride layers were formed on AISI H13 steel using a solid boriding process. This involved the use of a powder mixture consisting of 90%  $B_4C$  and 10%  $NaBF_4$ , followed by subjecting the steel to treatment for durations ranging from 2 to 6 h at 900, 950, and 1000°C. When examining the microstructures, it was observed that the interface between the boride layer and the transition zone displayed less pronounced tooth-like features. XRD analysis indicated the presence of a dual-phase boride layer composed of FeB and  $Fe_2B$ , as well as chromium and vanadium borides as precipitates within this layer. The kinetics of boron diffusion into AISI H13 steel was investigated using the classical parabolic growth law. The calculated boron activation energy across the entire boride layer (FeB +  $Fe_2B$ ) was found to be 236.34 kJ mol<sup>-1</sup>. Additionally, this energy value was compared to the literature data.

**Keywords:** Boriding, iron borides, Kinetics, Diffusion, Activation energy



**ANTIOXIDANT EFFECT OF ETHANOL FRACTION OF *TERMINALIA IVORENSIS*  
ROOTS ON CROTON OIL INDUCED HAEMORRHOID IN ALBINO RATS.**

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**ABSTRACT**

Haemorrhoid or pile is one of the most common inflammatory diseases located in the lower parts of rectum which are characterized by alteration and swelling in the veins of the anal canal including blood vessels, supporting tissues, muscles and elastic fiber. Enzymes that are involved in the degradation of supporting tissues in the anal cushions include matrix metalloproteinase (MMP) and a zinc-dependent proteinase. Herein, investigating the phytochemical constituents of ethanol fraction of the roots of *Terminalia ivorensis* (EFRTI), and its effect on recto-anal coefficient and proinflammatory cytokines of croton oil induced haemorrhoid in rats, so as to create scientific basis for the use of the plant roots in traditional medicine for the treatment of haemorrhoid. A total of forty-eight (48) healthy adult Wistar albino rats were divided into six groups of eight rats each. Group 1 received normal saline (normal control), group 2 positive control (induced but not treated), group 3, received 500 mg/kg of daflon (standard control) while group 4, 5 and 6 received 250, 500 and 1000 mg/kg of the EFRTI respectively. Animals in the respective groups were treated for 5 days administered orally. Effect of EFRTI on body weight and recto- anal coefficient of rats induced with haemorrhoids showed that EFRTI caused a significant increase in the mean body weight of the treated groups with a corresponding reduction of rectal anal weight and recto-anal coefficient when compared with positive control. However, the Levels of cytokines, TNF- $\alpha$ , and IL-6 of rats in positive control were significantly higher than the values obtained for rats in the treated groups. Hence, treatment with standard and EFRTI in the studies led to a significantly lower the Levels of cytokines, TNF- $\alpha$ , and IL-6 in comparison with the Positive control group. In conclusion, the result demonstrates that the extract has possessed anti-haemorrhoidal property.

**Keywords:** phytochemical constituent, recto-anal coefficient and proinflammatory cytokines



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MOLECULAR IDENTIFICATION AND CHARACTERIZATION OF BOVINE EPHEMERAL FEVER (BEF) VIRUS IN BOVINES

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#### **ABSTRACT**

Bovine ephemeral fever (BEF) is a disease that effects cattle and water buffalos, the causative agent of which is Bovine ephemeral fever virus. BEF is an arthropod born viral disease mainly occurring in summer season prevalent throughout Africa, Asia and some parts of Middle East and Australia resulting in great economical loss. Agriculture contemplates the lifeline of Pakistan. The total share of which constitutes around 19.5% in the overall GDP whereas livestock alone has its share more than 58% in agriculture, talking of which cattle and buffalos are integral part of livestock. 30 samples were collected under aseptic condition. Further, RNA (BEF) virus was isolated using Trizol method and transcribed into complementary DNA. The molecular based detection of G-gene was performed through Nested PCR for more specificity and sensitivity with outer and inner primer sets in two successive rounds of PCR. The amplicon size of 350bp band and 300bp was visualized. Later the samples were sent for sequencing and were to be subjected to bioinformatics tools give us the phylogenetic analysis and completing the characterization of the virus circulating in the region of study.

**Keywords:** Bovine ephemeral fever, PCR, RNA



**INDUCED CHEMICAL MUTATION IN CROCOSMIA CROCOSMIIFLORA**

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**ABSTRACT**

Genetic variability as a result of induced mutations by various mutagens (chemical or physical) has contributed to plant breeding efforts. In this study ethyl methane sulfonate (EMS) were used as a chemical mutagen. EMS is characterized by causing the highest frequency of genetic changes and lowest frequency of aberrations in plant. The obtained changes can include flower colour and shape, plant habit or tolerance to stress factors. The plant material were seeds of *Crocoshmia* obtained from a collection of Horticulture Department of West Pomeranian University of Technology Szczecin, Poland. *Crocoshmia crocosiiflora* cultivar Lucifer is a perennial with red flowers. Seeds were soaked in chemical mutagen solution at 0 (as a control), 2.0 and 5.0 mM concentration in combination with a buffer of 0.025 mM orthophosphoric acid solution at pH4. The soaking time was 1h. Observations of phenotypic changes were made on the obtained seedlings. The ISSR-PCR technique was used to assess genetic changes by isolating DNA from seedlings differing from the control. Seeds treated with 5.0 mM EMS showed a 17% higher germination efficiency compared to the 2.0 mM concentration, but a 38% lower germination efficiency compared to the control (100%). Most (39%) of the observed phenotypic changes were obtained after the application of 5.0 mM concentration of EMS. These changes were related to chlorophyll discoloration on the leaves. After the application of 2.0 mM EMS, one plant with a bright red flower colour was obtained compared to the control (red). In addition, plants treated with 5.0 mM EMS were 14% higher than the control (31.66 cm). In the ISSR-PCR amplification reaction, 22% of genotype-specific products were observed, suggesting that the phenotypic changes obtained may have a genetic background.

**Keywords:** EMS, mutagenesis, DNA, ISSR-PCR, variability





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### OPTIMIZATION OF CULTURE CONDITIONS FOR PRODUCTION OF LIPASE FROM *ASPERGILLUS* SP.

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#### ABSTRACT

Lipases, (triacylglycerol acylhydrolases, E.C. 3.1.1.3) are serine hydrolyases that catalyze both the synthesis and hydrolysis of long-chain triacylglycerols. They catalyze the hydrolysis of triacylglycerols at oil-water interface to release glycerol and free fatty acids. In contrast to esterases, lipases are activated only when adsorbed to an oil-water interface and do not hydrolyze dissolved substrates in the bulk fluid. The present study adopts the experimental method. Lipase producing *Aspergillus* was isolated from soil collected from a refuse dump site within Awka metropolis, Anambra state. Standard microbiology and biochemical and techniques were used for confirmation of the fungal strain as *Aspergillus*. Yellow colouration after two days of incubation confirmed the ability of the organism to produce the enzyme in the presence of p-NPP. Submerged fermentation (SMF) system was used for the enzyme production. Carbon sources including: glucose and sugarcane baggase were optimized, sugarcane baggase was found suitable for the protein production with highest lipase activity (121.71  $\mu\text{mol}/\text{min}$ ). Among the nitrogen sources optimized, peptone was found optimal for lipase production with activity of 119.34  $\mu\text{mol}/\text{min}$ . pH 6.0 was found the best for the enzyme production. Effect of incubation period on the enzyme production showed the 5<sup>th</sup> day of the seven days fermentation as the peak day for lipase production from *Aspergillus*. The results from this study have shown that *Aspergillus* isolated from refuse dump contaminated soil has the potential for lipase production in a commercial scale for both industrial and clinical applications.

**Keywords:** Lipase, optimization, p-NPP, *Aspergillus*, SMF



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SUNFLOWER OILSEEDS IMPORTANCE AND APPLICATIONS

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#### **ABSTRACT**

Sunflower (*Helianthus annuus* L.) is a major oilseed crop widely grown for medicine and food. Sunflower seeds have 60-65% lipids, 16 to 18 mineral elements and 30-33% protein contents. Sunflower seed oil contains fatty acids majorly 19-20% oleic acid and 60-65% linoleic acid. These fatty acids help to reduce cholesterol levels in the bloodstream and consequently reducing the risk of heart diseases. The physical properties like length, width and thickness of sunflower seeds and kernels varies at different moisture content levels. The hull of the sunflower seeds is primarily composed of cellulose, lignin, and pentosans. Sunflower seeds are rich in many nutrients including proteins, dietary fibers, antioxidants, vitamins, unsaturated fatty acids, minerals and vitamins; therefore, these have applications for food industries and pharmaceutical companies.

**Keywords:** Sunflower Seeds, Oil Composition, Bioactive Compounds, Food Industry, Public Health



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ROOIBOS TEA IS ONE OF THE NEW TYPES OF FOOD PRODUCTS

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#### **ABSTRACT**

Healthy nutrition is the key to active longevity, increasing the body's resistance to adverse environmental influences. Tea is one of the most important food products for a person's daily life. A new type of tea has appeared on the consumer market of Ukraine. It is rooibos tea. As you know, one of the first places in the world in terms of tea consumption is occupied by Turkey. Therefore, tea is one of the international beverages. Tea is a tonic drink that charges a person with cheerfulness, energy and a good mood. This beverage normalizes metabolism, promotes the digestion of fats, and it has an antioxidant effect. First of all, rooibos is an aromatic and tasty drink with a rich red color, a great alternative to traditional tea or coffee. Rooibos tea leaves contain more than 17 amino acids, more than 20 macro- and microelements, about 100 aromatic compounds, more than 30 polyphenols, pigments, alkaloids, organic acids, vitamins. The leaves contain little caffeine and accumulate a low amount of tannins. Tea exhibits antioxidant, anti-inflammatory, cardioprotective and antidiabetic effects. The use of rooibos normalizes the work of the digestive system, increases the elasticity of the walls of blood vessels, and lowers blood pressure. Consumption of rooibos tea improves the functionality of the entire body, is a natural source of energy and can be the basis of many functional product recipes.

**Keywords:** Healthy nutrition, energy, good mood



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **MODERN-AGRI TECHNOLOGY USAGE AND CHALLENGES AMONG YOUNG AGROPRENEUR IN KEDAH, MALAYSIA.**

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#### **ABSTRACT**

The usage of agricultural mechanisation technologies in the agriculture industry has been encouraged by the quick growth of technology. The efficiency of mechanised technology is crucial to raising farmer output and management skills. Consequently, the objectives of this study is to investigate the usage of modern-agri technology tool among young agropreneur, investigate challenges faced by young agropreneur in agricultural sector. In this qualitative research, few interviews conducted with 12 young agropreneur in Gurun, Kedah, Malaysia. The finding of this study show not all the young agropreneur use modern-agri technology tools in agricultural field. The finding also found that challenges faced by young agropreneur in agricultural which including climate changes, cost operation, lack of skills and knowledge, higher cost of technology and failed failure (caused by pest insects). However, many alternatives ways have been taken by young agropreneur to face all this challenges. Government should actively give an effort to give more incentive for young agropreneur or adoption of mechanization technology to help achieving the goal of domestic rice supply.

**Keywords:** Agricultural, technology, young agropreneur, modern-agri, technology usage



**STUDY OF THE EFFECTS OF OCCUPATIONAL EXPOSURE TO VOLATILE ORGANIC COMPOUNDS (VOCs) CONTENT OF AUTOMOBILE SPRAY PAINT IN ALBINO RATS**

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**ABSTRACT**

Occupational exposure to Volatile organic compounds (VOCs) could be one of the leading causes of health disorder among exposed workers. This study investigated the effects of volatile organic compounds (VOCs) content in automobile spray paint in albino rats. A total number of 30 Wistar albino rats comprising both males and females were used for this study. The experimental rats were randomly divided into 5 groups (n=6 for each group) and exposed to different inhalation concentrations of 0 (for the control), 25, 50, 75, and 100 ppm of paint-solution respectively. The animals were exposed to these inhalants (paint-solution) for 8 weeks and 15 minutes daily using an inhalation exposure chamber. A digital air quality machine was used to determine the concentration of each chamber and the paint components were quantified using gas chromatography and biochemical analysis done with the aid of automated machines. There were significant ( $p < 0.05$ ) differences in the result of weekly weight observations, total blood counts, and antioxidant levels from this study. The results of AST (**Aspartate Transaminase**), ALP (**Alkaline Phosphatase**), and ALT (**Aspartate Transaminase**) showed significant ( $p < 0.05$ ) differences in relation to the exposure concentration when compared with the control. The results of TB (total bilirubin) and urea showed many statistical differences in the group exposed to 100, 75, 50 and 25 ppm respectively when compared to the control. This work has demonstrated that the effects of these organic compounds are dependent on the level of exposure.

**Keywords:** Immunology, Liver markers, VOC, Albino rats, Antioxidants.

**ASSESSING DISEASE PREVALENCE AND ANTIBIOTIC USAGE IN POND  
AQUACULTURE: A PUBLIC HEALTH CONCERN IN NARSINGDI,  
BANGLADESH**

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**ABSTRACT**

Commercial aquaculture practices, characterized by high inputs and increased stocking densities, often lead to environmental degradation and frequent disease outbreaks among cultured species. The inappropriate use of aquaculture pharmaceuticals, particularly antibiotics for fish disease control, can contribute to the emergence of antibiotic resistance. Recognizing these critical issues, this study was conducted to assess the status of disease prevalence, the utilization of aquaculture drugs and antibiotics for fish health management, and potential human health concerns in the Narsingdi district of Bangladesh. To gather data, a set of survey tools was employed. According to the respondents, the study area documented nine different fish diseases and 140 aquaculture drugs from various agrovet companies. Approximately 30 different antibiotics, 18 growth promoters, and four enzymes were administered for purposes such as disease treatment, growth enhancement, digestion improvement, and water quality management. This investigation revealed several challenges associated with the use of these drugs, including farmers' limited knowledge regarding their proper use, recommended dosages, application techniques, withdrawal periods, and the potential risks to human health resulting from their irresponsible application. Nevertheless, further research is needed to comprehensively understand the impact of these products on the aquatic environment, fish health, and human health for the betterment of society.



Figure 1. Disease burden and different pharmaceuticals are used for a variety of purposes in the aquaculture setup

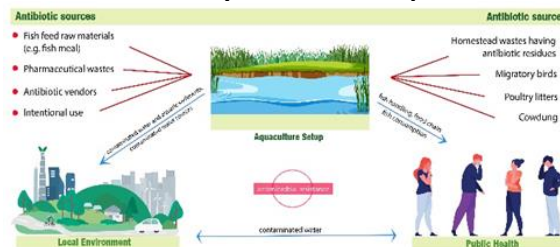


Figure 2. Exposure pathways of antibiotics through aquaculture setup where various sources input the antibiotics into the setup and, afterward, affect the public health

**Keywords:** antibiotic resistance, health management, potential human health





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATING THE ENVIRONMENTAL IMPACT OF A DRINKING WATER PRODUCTION PLANT USING THE LIFE CYCLE ASSESSMENT APPROACH

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#### **ABSTRACT**

Recent decades have witnessed a significant rise in the global demand for clean water, aligning with population and industrial growth. To meet this escalating need, various water treatment facilities and processes have undergone continuous development and refinement, aimed at producing the necessary volume of purified water. However, this pursuit involves energy consumption, chemical usage, and the generation of substantial sludge quantities, all of which contribute to a notable environmental footprint. The principal objective of this study was to assess and analyze the potential environmental impact of the Al Hoceima water treatment plant. This assessment was carried out by applying the life cycle assessment (LCA) methodology, which evaluates environmental effects comprehensively. The functional unit chosen for this evaluation was 1 m<sup>3</sup> of drinking water produced by the plant. Additionally, the inventory data were meticulously examined using the Eco invent v.3.01 database and subsequently modeled and processed using the Open LCA software. The outcomes of the analysis highlighted that the sludge component is the most significant contributor to the environmental impact of water production, accounting for 49% of the total impact. As part of our study's conclusion, efforts were directed towards sludge recycling and the establishment of a recycling system within the treatment plant. Moving forward, employing the same methodology, we intend to assess the plant's environmental effects post-recycling, allowing for a direct comparison of the outcomes.

**Keywords:** Drinking water; Environmental impact; Assessment life cycle.



**CLASSIFICATION OF SECOND ORDER ORDINARY DIFFERENTIAL  
EQUATIONS USING LAMBDA SYMMETRIES**

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**ABSTRACT**

This research investigates the application of differential equations (DEs) in modeling dynamic phenomena across scientific domains. Nonlinear DEs, common in natural processes, pose significant challenges, but Lie symmetries offer effective solutions by transcending order, linearity, and homogeneity constraints. Identifying symmetries simplifies both partial and ordinary DEs, streamlining problem-solving. The study also delves into  $\lambda$ -symmetries, which extend Lie symmetries and provide new avenues for tackling nonlinear ODEs and PDEs. It conducts a comparative analysis of Lie and  $\lambda$ -symmetries, focusing on categorizing second-order linear and nonlinear ODEs through symmetry identification. By solving equations using both approaches, the research enhances our understanding of the interplay between Lie and  $\lambda$ -symmetries in solving complex differential equations.

**Keywords:** Lie symmetries; Lambda Symmetries; Nonlinear Dynamics; Classification.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EMERGENC OF POLYGLOT ENTRAINMENT IN THE HODGKIN-HUXLEY MODEL

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#### **ABSTRACT**

In nonlinear dynamics, a pivotal focus is the study of entrainment, and the Arnold tongue is used to study entrainment in different types of nonlinear systems. In this study, we investigate entrainment phenomena in the Hodgkin-Huxley (HH) model near the Hopf bifurcation. We explore both monoglot and polyglot entrainment in the original HH model and its reduced three-dimensional version. Our findings reveal that the HH model exhibits polyglot entrainment near the first Hopf point and monoglot entrainment when the fixed point is located far away from the Hopf point. We also examine different parameter regions using sinusoidal forcing and observe that multiple 1:1 entrainment does not occur in the 3D HH model. This research offers insights into the dynamics of nonlinear systems and provides a foundation for future investigations in this area.

**Keywords:** Hodgkin-Huxley, nonlinear dynamics



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SOME THREATENED ENDEMIC SPECIES IN ANKARA AND STUDIES ON THEIR PROTECTION

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#### ABSTRACT

According to our current knowledge, there are approximately 2355 plant taxa in Ankara, including their subspecies and varieties. This means that you can see one fifth of Türkiye's flora in Ankara. About 400 of its contents are endemic, that is, they are common. About 90 of the endemic species are endangered species. It is especially important to protect living creatures from recording their living environments. Unfortunately, we have difficulty in preventing the machine from destroying delicate products. Since 2013, conservation efforts have been continuing with the support of the General Directorate of Nature Conservation and National Parks. Until today, 14 species have been introduced in their living environments: local people are suitable for being informed on this subject through on-site training activities. As a result, 7 species of very urgent species were surrounded by wire fences and 6 species conservation action plans were completed. Protection and monitoring efforts continue. In this declaration; the studies carried out for selected endangered endemic species and those that may disappear in a short time if precautions are not taken will be explained. The reason why nature protection is cut off after conservation decisions are taken (Natural Site, Nature Park, National Park, SEPA, etc.) is mostly due to cut off rent and conflicting political decisions. Making conservation plans, Nature Parks, National Parks, etc. Strategies for reconsidering the "Ecological Planning" strategies of the "1/100 000 Scale Environmental Plan" in Ankara performance will be summarized, emphasizing the need to expand the protection status and prepare "Long Term Development Plans". Endemic species have a special position and value among Ankara's assets. It will be emphasized that at least 33 endemic flowers grow and are consumed only in Ankara and their number is decreasing day by day.

**Keywords:** Ankara, Ecological Planning, Endemic Species, Nature Conservation, National Park.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN ARCHITECTURAL CRITICISM ON CONTEMPORARY HOUSING IN NORTH CYPRUS- NICOSIA BY INVESTIGATING PROJECTION TYPOLOGY

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#### ABSTRACT

Projections are important facade elements which were widely used in the Ottoman period houses and created an identity for Cyprus streets. Projections are located generally on the first floor above the ground. These cantilevered design elements with 3 enclosed sides reside as projections towards the street. In the influence of Islamic culture, they originally function as a private space which introduces visibility to the street from interior space. Nowadays, projections still appear on the facade of contemporary houses, authors investigate the reason behind this, and question that either projection has become part of architectural vocabulary for Cypriot architects or there is an architectural demand for projections from their clients. Also, authors investigate functions of projections on the contemporary house designs; Do they still carry the original function? Are there any interpretations? Or are they ornamental elements which decorate facades? Authors would like to emphasize that this study does not aim to understand the projections typology on Ottoman's period houses. Within this context, in the light of above questions, the aim of this study is to compare and discuss the projection component use in architecture today. Architectural criticism on projection usage is the outcome of the study which identifies that they are used apart from an architectural space understanding today.

**Keywords:** Projection, housing, architectural criticism, Ottoman period, Cyprus-Yenikent.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INVESTIGATION OF WORSHIP BUILDINGS IN TURKEY IN THE CONTEXT OF CULTURAL HERITAGE: THE CASE OF İSTANBUL AND İZNIK

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#### ABSTRACT

Historically known as Nicea, Iznik is a city with a rich historical and cultural heritage in Turkey. This city has hosted various kingdoms and empires since prehistoric times. The city has been home to different religious communities, including Muslims and Christians, for centuries, and its buildings of worship, such as mosques and churches, have cultural and spiritual significance. However, despite having similar qualities, these buildings do not receive the same value as the buildings included in the World Heritage List. However, sustainable cultural heritage management requires the protection, sustainable use and transfer of cultural heritage to future generations. In this study, in order to contribute to sustainable cultural heritage management, firstly, the concept of cultural heritage and the role of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the protection and preservation of cultural heritage were examined and the buildings on the World Heritage List in Turkey were identified. In addition, Iznik Hagia Sophia Mosque and the Church of Koimesis, which are among the most important cultural heritage buildings in Iznik, were selected to be examined. The cultural and architectural characteristics, plan types and current conditions of these selected worship structures were examined. Then, they were compared with the Hagia Sophia Mosque and Hagia Irene Church in Istanbul, which are on the World Heritage List and have the same architectural features as these buildings. The findings of the comparative analysis of these buildings in terms of their architectural and cultural significance show that they have the same degree of importance in terms of cultural heritage. This result highlights the need for further efforts to preserve and recognize the worship buildings in Iznik and the importance of considering heritage sites beyond those already designated as UNESCO World Heritage Sites to ensure sustainable cultural heritage management.

**Keywords:** sustainability, culture, heritage, iznik, worship buildings





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A NEW MODEL PROPOSAL IN RURAL DEVELOPMENT: MUDURNU VIRTUAL MUSEUM PROJECT

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#### ABSTRACT

Rural development is a concept that aims to improve the quality of life of societies living in regions where industrial activities are not developed, agriculture is a predominant form of livelihood, population density is low, and traditional production and lifestyles continue. The Mudurnu Virtual Museum project was created to support the sustainability of rural development in the Mudurnu district of Bolu Province, Türkiye. The overall aim of the project is to ensure the visibility of local, natural and cultural values that provide input to tourism, to develop social and economic development dynamics in disadvantaged areas of the region, to create the technological infrastructure that enables integration with the digital world, to create areas with high-level experience and with access to high welfare conditions and to increase the tourism potential of the region by transmitting the values of these areas to future generations. The activities included in the Mudurnu Virtual Museum Project are designed to implement international rural development policies through cultural tourism and strengthen the rural tourism infrastructure through social, cultural and economic dynamics. The project will contribute to the rural development dynamics of the district with a multi-stakeholder governance approach. It will provide employment, especially for the young population in the district, and young people who receive education in Bolu province and in the district in cooperation with the university will play an important role in creating added value for the economy by protecting Mudurnu and the historical fabric in Mudurnu. With the proposed tourism routes and the integration of the virtual museum with these routes, there will be an



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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increase in the visibility of Mudurnu, in the number of visitors and average length of stay, and in the income level of Mudurnu tradesmen and tourism enterprises. With the trainings to be realised within the scope of the project, Mudurnu will be a district with a higher capacity for socio-cultural infrastructure to develop and provide input to the economy.

**Keywords:** Sustainability, Rural Development, Tourism, Virtual Museum, Mudurnu



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KAMU SANATININ KAMU ALANLARINA DAHİL EDİLMESİNİN FAYDALARININ DEĞERLENDİRİLMESİ

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#### ÖZET

Kamusal sanat, estetiğin ötesine uzanan çok sayıda fayda sağlayarak toplulukları geliştirmeye yönelik güçlü bir araç olarak ortaya çıkmıştır. Kamusal sanat, kamusal alanda çeşitli işlevleri yerine getirerek bir bölgenin kültür ve kimliğinin oluşması, değişmesi ve yeniden üretilmesi sürecinde önemli bir rol oynamış ve oynamaktadır. Bu araştırmanın amacı kamusal sanatın toplumun kültürel, sosyal, çevresel, ekonomik ve psikolojik yönleri üzerindeki etkisini ve rolünü araştırmaktır. Bu çalışmada ihtiyaç duyulan veriler saha ve kütüphane yöntemleri kullanılarak analiz edilmiş ve toplanmıştır. Kapsamlı araştırma ve vaka çalışmalarına dayanan bu makale, kamusal sanatın kültürel çeşitliliği zenginleştirme, mirası koruma ve kültürel alışverişi teşvik etmedeki rolünü vurgulamaktadır. Kamusal sanat enstalasyonlarının nasıl bir yer ve kimlik duygusu yarattığını, toplulukları benzersiz ve unutulmaz kıldığını araştırıyor. Ayrıca bu makale, kamusal sanatın psikolojik ve duygusal etkisini de ele alarak; stresi azaltma, yaratıcılığa ilham verme ve sosyal etkileşimi teşvik etme yeteneğini tartışmaktadır. Ayrıca Turist çekme, turizmi teşvik etme ve yerel kültürel ve yaratıcı endüstrileri desteklemedeki rolü de dahil olmak üzere kamusal sanatın ekonomik faydaları da araştırılıyor. Ayrıca, ihmal edilen kentsel alanlarda gururu, aidiyeti ve sosyal uyumu teşvik ettiği için kamusal sanat girişimlerinde topluluk katılımının çok önemli olduğunu vurguluyor. Bu makale, çeşitli kaynaklardan elde edilen bulguları sentezleyerek, bir toplulukta kamusal sanatın çok yönlü faydalarına kapsamlı bir genel bakış sunmaktadır. Yaşam kalitesini artırmada, kültürel zenginliği teşvik etmede ve canlı ve kapsayıcı topluluklar yaratmada kamusal sanatın dönüştürücü gücünü ortaya koyuyor. Ayrıca fiziksel, sosyal veya kültürel alanlardaki kamusal alanlar ve topluluk diyalogu da dahil olmak üzere kamusal alandaki çeşitli işlevler; eğitim ve zevk; sanatın takdir edilmesi ve yaratılmasına katılıma ilham vermek; Toplumun sorunlarını çözmek; fiziksel altyapının ve çevrenin iyileştirilmesi; Mekanların sınırlandırılması, kutlanması ve dönüştürülmesi de kentte yaşamın ve sürdürülebilirliğin yaratılmasında kamusal sanatın çok öne çıktığını gösteriyor. Kentin yaşanabilirliğinin ve sürdürülebilirliğinin yaratılmasında kamusal sanat öncüdür. Kamusal sanatın dönüştürücü gücü, yaşam kalitesinin iyileştirilmesinde, kültürel zenginliğin artırılmasında, dinamik ve kapsayıcı toplumlar yaratılmasında yatmaktadır.

**Anahtar Kelimeler:** Kamusal Sanat, Kamusal Alan, Kentsel Mekan, Topluluk, Kültür ve Kimlik.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN ASSESSMENT OF THE BENEFITS OF INCORPORATING PUBLIC ART INTO PUBLIC SPACES

#### ABSTRACT

Public art has emerged as a powerful tool for enhancing communities by providing numerous benefits that extend beyond aesthetics. Public art performs various functions in the public domain and plays an important role in the process of formation, change, and reproduction of the culture and identity of a region. The purpose of this research is to investigate the influence and role of public art on the cultural, social, economic, and psychological aspects of society. The data required in this study have been analyzed and collected through field and library methods. Based on extensive research and case studies, this article highlights the role of public art in enriching cultural diversity, preserving heritage, and fostering cultural exchange. It investigates how public art installations create a sense of place and identity, making communities unique and memorable. Furthermore, the article delves into the psychological and emotional impact of public art, discussing its ability to reduce stress, inspire creativity, and promote social interaction. The economic benefits of public art are also explored, including its role in attracting tourists, stimulating tourism, and supporting local cultural and creative industries. Also, it emphasizes community involvement is crucial in public art initiatives as it fosters pride, belonging, and social cohesion in neglected urban areas. By synthesizing the findings from various sources, this article provides a comprehensive overview of the multifaceted benefits of public art in a community. It demonstrates the transformative power of public art in enhancing the quality of life, fostering cultural enrichment, and creating vibrant and inclusive communities. In addition, public spaces in the physical, social, or cultural domains show that public art is very prominent in creating the livability and sustainability of the city. And the transformative power of public art in improving the quality of life, increasing cultural enrichment, and creating dynamic and inclusive communities.

**Keywords:** Public Art, Public Space, Urban Space, Community, Culture and Identity.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF SPATIAL PLANNING POLICIES AND PRACTICES IN RURAL SETTLEMENTS FROM PAST TO PRESENT OF TÜRKIYE

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#### ABSTRACT

Studies on rural areas in Türkiye go back to the founding period of the Republic. The idea of eliminating the differences between urban and rural areas and modernizing rural areas by providing services that cannot be provided in these areas has gained ground. The large number of rural areas in our country and their geographical dispersion have made the service and investment in these areas difficult and left us face-to-face with many problems. We can say that these problems are rapidly increasing day by day in the migration seen in rural areas, villages becoming idle settlements with increasing migration, and the decrease in the products produced in agriculture and animal husbandry. These observed problems necessitated the creation, development, and implementation of strategic plans for rural areas. In this study, examining and evaluating the policies and practices that are spatial planned to be followed in the future for rural areas are considered to be important and examined in four sections. In the first part, the village models followed for village settlements in the 60s are included, in the second part, development policies for rural areas with the support of international organizations in the 80s, and in the third part, rural development projects developed during the European Union membership processes in the 2000s are included. In the last section, studies on village design guides that support spatial development while preserving local values are examined. Finally, in this study, the development and implementation studies followed in rural areas in our country after the 60s were revealed and evaluated.

**Keywords:** Rural area, Rural development policies, Village design guides, Türkiye



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DOĞADA KENDİLİĞİNDEN YETİŞEN TIBBİ VE AROMATİK BİTKİLERİN SÜRDÜRÜLEBİLİRLİĞİNDE ÇEVRESEL SORUNLAR: SULTANMURAT YÖRESİ YAYLALARI

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#### ÖZET

Turizmin doğal, sosyal ve kültürel kaynaklarda bozucu etkileri açısından literatürde büyük bir zenginlik olduğu ileri sürülebilir. Turizmin özellikle doğal kaynaklar üzerindeki bozucu etkileri araştırmacıların son yıllarda en çok inceledikleri konuların başında gelmektedir. Bununla birlikte turizmin doğal ve kültürel kaynakları koruma gibi bir işlevinin olduğunu ileri süren çalışmalarda bulunmaktadır. Bu çalışma turizmin doğal kaynakları koruma potansiyelinin olduğunu ileri sürmektedir. Çalışmanın hareket noktası, Trabzon'un Sultanmurat yöresindeki yaylalarda doğada kendiliğinden yetişen tıbbi ve aromatik bitkilerin son dönemlerde yerel halk ve ziyaretçiler tarafından aşırı sömürsünün yarattığı kaygılardır. Araştırma sahasında kendiliğinden yetişen tıbbi ve aromatik bitkiler geleneksel olarak yerel halk tarafından gıda olarak tüketilmek veya halk hekimliği amacıyla kullanmak üzere toplanmaktadır. Kuşkusuz bu tür toplayıcılık faaliyetlerinin de doğal çevrede bozucu etkileri olmakla birlikte sürdürülebilir bir boyutta olduğu ileri sürülebilir. Ancak son dönemlerde, özellikle dünya genelinde artan bitkisel ilaç kullanımına paralel olarak, belirtilen amaçlar dışında bazı şahıs ve firmaların yerel halka bu bitkileri toplattıkları tespit edilmiştir. Bu tür toplayıcılık faaliyetlerinin yerel halkın geleneksel toplayıcılık faaliyetlerine eklenmesiyle, çevre üzerindeki bozucu etkilerin, özellikle dağlık alanlardaki zorlu doğa koşulları da dikkate alındığında, geri dönüştürülemez tahribatlara yol açacağı düşünülmektedir. Bu çalışma Trabzon'un Sultanmurat yöresindeki yaylalarda doğada kendiliğinden yetişen tıbbi ve aromatik bitkilerin turistik kullanımla sürdürülebilirliğinin sağlanabileceğini ortaya koymayı amaçlamaktadır. Çalışma, yöredeki turistik ürün çeşitlendirme çabalarına katkı sağlayabileceği gibi aynı zamanda yöre için de turistik çekicilik unsurlarının sürdürülebilirliğini destekleyebilir. Diğer yandan yaylaların zorlanan taşıma kapasitelerine, dikkat çekebilir. Çalışmada Trabzon'un Sultanmurat yöresindeki yaylalarda doğada kendiliğinden yetişen tıbbi ve aromatik bitkilerin yerel halkın mihmandarlığında turistler tarafından toplanarak ekonomiye kazandırılması ve bu toplama faaliyetinin eko turizm yaklaşımıyla planlanması yöre halkına, işletmelere, yerel yönetimlere ve diğer paydaşlara önerilmektedir.

**Anahtar Kelimeler:** Tıbbi ve aromatik bitkiler, Sürdürülebilirlik, Trabzon - Sultanmurat yaylası.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ENVIRONMENTAL PROBLEMS IN THE SUSTAINABILITY OF MEDICINAL AND AROMATIC PLANTS GROWING SPONTANEOUSLY IN NATURE: SULTANMURAT REGION PLATEAUS

#### ABSTRACT

It can be argued that there is a great wealth of literature in terms of the damaging effects of tourism on natural, social and cultural resources. The damaging effects of tourism, especially on natural resources, are among the most studied topics by researchers in recent years. However, there are studies suggesting that tourism has a function such as protecting natural and cultural resources. This study suggests that tourism has the potential to protect natural resources. The starting point of the study is the concerns created by the recent excessive exploitation of medicinal and aromatic plants that grow naturally in the plateaus in the Sultanmurat region of Trabzon by local people and visitors. Medicinal and aromatic plants growing naturally in the research area are traditionally collected by local people to be consumed as food or used for folk medicine purposes. Undoubtedly, although such gathering activities have detrimental effects on the natural environment, it can be claimed that they are sustainable. However, in recent times, especially in parallel with the increasing use of herbal medicine around the world, it has been determined that some individuals and companies are making local people collect these plants for purposes other than those specified. It is thought that the addition of such gathering activities to the traditional gathering activities of local people will cause irreversible damage, especially when the harsh natural conditions in mountainous areas are taken into account. This study aims to demonstrate that the sustainability of medicinal and aromatic plants that grow naturally in the plateaus of Trabzon's Sultanmurat region can be ensured through touristic use. The study can contribute to the touristic product diversification efforts in the region, as well as support the sustainability of tourist attraction elements for the region. On the other hand, it may draw attention to the strained carrying capacity of the plateaus. In the study, it is recommended to local people, businesses, local governments and other stakeholders that medicinal and aromatic plants that grow naturally in the plateaus in the Sultanmurat region of Trabzon are collected by tourists under the guidance of local people and brought into the economy, and that this collection activity is planned with an eco-tourism approach.

**Keywords:** Medicinal and aromatic plants, Sustainability, Trabzon - Sultanmurat plateau.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### COĞRAFİ BİLGİ SİSTEMLERİ TEMELLİ ÇOK YÖNLÜ KARAR ANALİZİ İLE 'CEVİZ AĞACI'NIN UYGUN YETİŞME ORTAMLARI VE EKOLOJİK PLANLAMA

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#### ABSTRACT

'Coğrafi Bilgi Sistemleri' uygulamaları içinde 'Çok Yönlü Karar Analizleri' yöntemi ; tarım ve ağaçlandırma projelerinde '**Bitkiler İçin Uygun Yer Analizi**' çalışmalarında kullanılabilir. Bu bağlamda; bitkiler için de '**Çok Yönlü Karar Analizleri**' uygulayarak ; yetiştirme koşullarına göre '**Uygun Yer Analizi**' çalışmalarının yapılması son derece önemli ve mutlak gereklidir. Dolayısıyla; Peyzaj Planlama Ana Bilim Dalı çalışmalarında '**Çok Yönlü Karar Analizleri İle Ekolojik Tabanlı Sorgular Yapılması**' konuları 'Peyzaj Mimarlığı' meslek disiplini çalışma alanı içerisinde olup tüm planlama karar aşamalarında; '**BITKİLER İÇİN UYGUN YER ANALİZİ**', CBS sorgulamaları ile birlikte mutlak çalışılması gerekli olan çalışma konuları kapsamındadır. Çalışma alanı ; İstanbul İli, Anadolu Yakası, Çekmeköy İlçesi, Şile Karayolu'nun Kuzey Bölgesi'nde 9128 ha. olarak belirlenmiştir. İlçede, bölgede ve tüm ilde de yapılabilecek bu çalışma; doğal ve kültürel veriler ile Coğrafi Bilgi Sistemleri ArcMap kullanılarak belli bir bölgede çalışılmıştır. Çalışma ile Ceviz ağacının Çekmeköy İlçesi'nde uygun yer analizi yapılarak; tarım ve ağaçlandırma projeleri için kılavuz teşkil etmesi hedeflenmiştir. Araştırmada; Materyal olarak; Prof. Dr. İbrahim ATAY, Prof. Dr. Burhan AYTUĞ, Prof. Dr. Suat ÜRGENÇ, Prof. Dr. Faik YALTIRIK çalışma grubunun 'Kent içi Ağaçlandırmalarında Kullanılacak Ağaç, Ağaçcık ve Sarılgı Bitki Türlerinin Seçim Kılavuzu'( İ.Ü. Orman Fakültesi, 1987 ) kullanılmıştır. Araştırma metodu olarak ise; CBS Programlarından, ArcGIS / ArcMAP 10.8.1 versiyonu ile veriler CBS ortamına dönüştürülerek; bitkilerin yetiştirme ortamlarına ve çok yönlü karar analizlerine göre semboller ile uygun yer analizi yapılmış ve bitkinin yetiştirme ortamları; CBS veri tabanlı ve analiz çalışmalarına dayalı olarak karar verilmiştir. Örnek çalışma alanı doğal ve kültürel Vektörel verileri Raster ve aynı koordinat sistemine dönüştürülerek analiz yapılmıştır. En az 10 faktörlü yapılması gereken çok yönlü karar analizi; bitkilerin doğal ve kültürel faktörlerle en uygun yerin tespiti konusunda bilimsel bir sonuç çıkarmaktadır. Örnek çalışma; Çekmeköy İlçesi'nin Şile karayolunun kuzeyinde 'Ceviz' ağacının uygun yetiştirme ortamlarına göre Coğrafi Bilgi Sistemleri'nin 'Çok yönlü Karar Analizleri' içeren yöntemleri ile tarım ve ağaçlandırma projeleri' çalışmalarında kullanılması amacıyla bir yöntem içermektedir. Bu yöntem ile üst ölçekte karar verilip; ' Ceviz' ağacından verim , kalite , rekolte olarak en iyi şekilde sonuç



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

alınması sağlanacaktır. Ayrıca 'Ekolojik Tabanlı Sorgu' uygulayarak; 'Bitkiler İçin Uygun Yer Tespiti' yapan 'Peyzaj Mimarlığı' çalışma alanında 'Coğrafi Bilgi Sistemleri'nin önemi vurgulanmaktadır.

**Keywords:** CBS, ArcGIS / ArcMAP 10.8.1, Çok Yönlü Karar Analizi, Ekolojik Planlama, Bitki; Ceviz



**SUITABLE GROWING ENVIRONMENT AND ECOLOGICAL PLANNING OF THE  
'WALNUT TREE' WITH GEOGRAPHICAL INFORMATION SYSTEMS BASED  
MULTI-DIRECTION DECISION ANALYSIS**

**ABSTRACT**

'Multi-Faceted Decision Analysis' method within 'Geographic Information Systems' applications; It can be used in 'Suitable Place Analysis for Plants' studies in agriculture and afforestation projects. In this context; By applying 'Multi-Faceted Decision Analysis' for plants; It is extremely important and absolutely necessary to carry out 'Suitable Site Analysis' studies according to growing conditions. Therefore; In the studies of the Department of Landscape Planning, the subjects of 'Conducting Ecologically Based Queries with Multifaceted Decision Analyzes' are within the field of study of the 'Landscape Architecture' professional discipline and in all planning decision stages; 'SUITABLE PLACE ANALYSIS FOR PLANTS' is within the scope of the study subjects that must be studied together with GIS inquiries. Working area ; 9128 ha in Istanbul Province, Anatolian Side, Çekmeköy District, Northern Region of Şile Highway. was determined as . This study can be carried out in the district, region and the whole province; Natural and cultural data were studied in a certain region using Geographic Information Systems ArcMap. With the study, by analyzing the suitable location of the walnut tree in Çekmeköy District; It is aimed to serve as a guide for agriculture and afforestation projects. In the research; As material; Prof. Dr. İbrahim ATAY, Prof. Dr. Burhan AYTUĞ, Prof. Dr. Suat ÜRGENÇ, Prof. Dr. Faik YALTIRIK's working group's 'Guide for Selection of Trees, Shrubs and Bearing Plant Species to be Used in Urban Afforestation' (I.U. Faculty of Forestry, 1987) was used. As for the research method; From GIS Programs, data is converted to GIS environment with ArcGIS / ArcMAP 10.8.1 version; Appropriate location analysis was made with symbols according to the growing environments of the plants and multifaceted decision analysis, and the growing environments of the plant were; The decision was made based on GIS data-based and analysis studies. The natural and cultural vector data of the sample study area were analyzed by converting them into Raster and the same coordinate system. Multifaceted decision analysis that must be made with at least 10 factors; It draws a scientific conclusion on determining the most suitable place for plants based on natural and cultural factors. Case study; It includes a method for the use of Geographic Information Systems' methods including 'Multi-faceted Decision Analysis' in agricultural and afforestation projects' studies, according to the suitable growing environments of the 'Walnut' tree in the north of the Şile highway in Çekmeköy District. With this method, decisions are made on a higher scale; The best results will be achieved in terms of yield, quality and yield from the 'walnut' tree. Additionally, by applying 'Ecologically Based Query'; The importance of 'Geographic Information Systems' is emphasized in the field of 'Landscape Architecture', which is 'Identifying Suitable Places for Plants'.

**Keywords:** GIS, ArcGIS / ArcMAP 10.8.1, Multifaceted Decision Analysis, Ecological Planning, Plant; Walnut



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BİNALARIN GÜNEŞ ENERJİSİ KAZANCININ BULANIK MANTIK YÖNTEMİ İLE MODELENMESİ

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#### ÖZET

Son yıllarda enerji kaynaklarının hızla tükenmesi nedeniyle artan enerji ihtiyacı tasarımcıları enerji etkin bina tasarımına yöneltmiştir. Enerji etkin bina tasarımı yapılabilmesi için yenilenebilir enerji kaynaklarının verimli kullanılması önemli bir yere sahiptir. Yenilenebilir enerji kaynaklarının başında güneş enerjisi gelmektedir. Binaların güneş enerjisinde doğru ve etkili bir biçimde faydalanması enerji etkin bina tasarımının en temel gerekliliğidir. Binalarda güneş enerjisi kazancını etkileyen temel tasarım parametreleri arasında binaların yönlendirilmesi ve bina cephelerinin pencere/duvar oranı yer almaktadır. Bu bağlamda mevsimlere göre binaların tasarım aşamasında yönlendirme, pencere/duvar oranı gibi tasarım parametrelerine göre güneş enerjisi kazancının araştırılması ve tasarımlara girdi olması bakımından çalışılması gereken bir konudur. Teknolojinin hızla gelişmesi ile yaygınlaşan yapay zeka yöntemleri ile oluşturulan modeller kullanılarak hızlı ve kolay sonuçlar elde edilebilmektedir. Bu yöntemler enerji etkin bina tasarımı için de araç olarak kullanılabilir çözümler sunabilmektedir. Bu çalışmada bir yapay zeka yöntemi olan bulanık mantık yöntemi ile binaların Güneş enerjisi kazancını tahmin etmek için kullanılabilir bir model geliştirilmiştir. Geliştirilen bulanık mantık modelinde sistemin girdi parametreleri yönlendirme, pencere/duvar oranı ve mevsim olarak belirlenmiştir. Güneş enerjisi kazancı ise bulanık mantık sisteminin çıktı parametresi olarak tanımlanmıştır. Çalışmada 120 tane hesaplanmış olan güneş enerjisi kazancı değeri kullanılarak model kurgulanmıştır. Bu değerlerin bir kısmı modelin eğitilmesinde, değerlerin geri kalanı modeli test etmek için kullanılmıştır. Güneş enerjisi kazancı değerleri ile bulanık mantık modelinde tahmin edilen değerler R2 yöntemi ile karşılaştırılmıştır. Çalışmada genel olarak bir yapay zeka yöntemi olan bulanık mantık yöntemi ile model oluşturma ve test etme basamakları anlatılmıştır. Bu çalışma mimarlık ve tasarım ile ilgili konularda yapay zeka yöntemlerinin kullanımına yol göstermesi ve bu yöntemlerin tasarım aşamasında kullanılarak optimum çözümler üretilmesi için aracı olması açısından önem taşımaktadır.

**Anahtar Kelimeler:** Binalarda güneş enerjisi kazancı, Bulanık mantık, Mimarlık ve Yapay Zeka, Mimarlık ve Makine Öğrenimi.



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**MODELING THE SOLAR ENERGY GAIN OF BUILDINGS WITH FUZZY LOGIC  
METHOD**

**ABSTRACT**

In recent years, the increasing energy need due to the rapid depletion of energy resources has led designers to energy efficient building design. Efficient use of renewable energy resources has an important place in order to design energy efficient buildings. Solar energy is one of the leading renewable energy sources. Correct and effective use of solar energy by buildings is the most basic requirement of energy efficient building design. Design parameters affecting solar energy gain in buildings include the orientation of buildings and the window/wall ratio of building facades. In this context, during the design phase of buildings, solar energy gain according to design parameters such as orientation and window/wall ratio should be investigated and studied as an input to the designs. Quick and easy results can be obtained by using models created with artificial intelligence methods, which have become widespread with the rapid development of technology. These methods can also provide solutions that can be used as tools for energy efficient building design. In this study, a model that can be used to estimate the solar energy gain of buildings was developed using the fuzzy logic method, which is an artificial intelligence method. In the study, the model was constructed using 120 calculated solar energy gain values. Some of these values were used to train the model, and the rest of the values were used to test the model. Solar energy gain values and the values predicted by the fuzzy logic model were compared with the R2 method. In the study, the steps of creating and testing models using the fuzzy logic method are generally explained. This study is important in terms of guiding the use of artificial intelligence methods in issues related to architecture and design and being a tool for producing optimum solutions by using these methods at the design stage.

**Keywords:** Solar energy gain in buildings, Fuzzy logic, Architecture and Artificial Intelligence, Architecture and Machine Learning.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### LOSS OF IDENTITY IN THE INTERACTION OF RURAL TOURISM AND TRADITIONAL HOUSING

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#### ABSTRACT

As urbanization standardizes our daily lives and the city treats people and nature carelessly, people's interest in nature and rural areas has increased. With the needs created by the increasing demand due to increasing tourism activities, local people have started to look for alternative solutions. Thus, people rearranged their homes accordingly, using them for new or additional functions to serve tourists. As a result, traditional houses, which are a means of cultural expression in the region in which they are located, have also changed over time. Traditional houses are shaped by the cultural, social, climatic and many other characteristics of the region in which they are located and they form an identity over time. However, incorrect interventions damage the original texture and cause the traditional environment to lose its original identity over time. Starting from this point, the study aims to draw attention to the importance of sustainable use of traditional houses by revealing the identity losses that occur in traditional houses due to tourism movements. For this purpose, first of all, literature research was conducted on the concepts of rural tourism, traditional housing, and identity, and hallmark elements in traditional houses were discussed under three headings: façade, interior and courtyard. Then, the identity losses that occur in traditional houses are examined through the aforementioned elements and explained with examples. As a result of the study, the importance of not damaging the identity elements of the buildings during refunctioning and restoration works in traditional houses has been revealed in terms of sustainable preservation.

**Keywords:** Traditional housing, rural tourism, identity



**ADAPTATION STRATEGIES TO HERDERS' FARM INTRUSION OF FEMALE-HEADED HOUSEHOLDS' IN ENUGU-EZIKE AGRICULTURAL ZONE IN ENUGU STATE, NIGERIA**

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**ABSTRACT**

The study accessed the adaptation strategies to herders' farm-intrusion of female headed households in Enugu-Ezike Agricultural zone, Enugu state, Nigeria. Specifically, the study described the socio-economic characteristics of the respondents, ascertained the causes of herders' farm-intrusion, effects of herders' farm-intrusion on agricultural production of female headed households, adaptation strategies of female headed households to herders' farm-intrusion and challenges to the adaptation strategies of female headed households to herders' farm-intrusion. A sample of 60 female headed households were purposively selected using snowball sampling technique for the purpose of the study. A structured interview schedule was used to collect data. Frequency, percentage, mean and standard deviation were used in the analysis of data. Results showed that the mean age of the respondents were 60.5 years. Majority of the respondents were widows. The mean number of years spent in school of the respondents was 8 years. The mean years of farming experience was 36.77 years. The mean household size of the respondents was 6 persons. The mean farm size of the respondents was 3.82 hectares. The average annual income of the respondents was found to be ₦152, 666. 67. The finding shows that the majority of the respondents (48.3%) had no access to credits. Also, only 6 of the respondents had extension visits. The finding also shows that majority (60.0%) of the respondents used family labour while the majority (83.3%) of the respondents belonged to religious group. Also, majority (61.7%) sourced their land from husband inheritance. The various causes of herders' farm-intrusion were lack of political will for government to arrest and punish the offenders adequately (95.0%), increased competition for land between farmers and herders (86.7%), urban development (86.7%), among others. The study revealed that the effects of herders' intrusion were destruction of crops (100.0%), fear of going to farm (98.3%), food insecurity (98.3%), among others. The respondents indicated that the major female headed households' adaptation strategies to herders' farm intrusion were use of community vigilante (M=4.7), diversifying crop production with animal production (M=4.7), community based natural resources management (M=4.0) taking up alternative occupation (M=3.9), among others. The study also shows that the major challenges to adaptation strategies to herders' intrusion of the respondents were lack of cooperation from herders (M=4.6), language barrier in communicating with herders (M=4.6), no compensation for damaged crops and properties (M=4.5), among others. The study recommended that efforts should be made to ensure that the rural female household heads are well enlightened and encouraged through extension service delivery to diversify income sources, explore alternative income-generating activities like small-scale businesses or crafts to reduce reliance on farming.

**Keywords:** adaptation strategies, female headed households, herders intrusion



**BIOFUELS PRODUCTION IN A CONTINUOUS SYSTEM FROM WASTE  
BIOMASS VALORIZATION**

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**ABSTRACT**

Nowadays, although the disposal of untreated agro-industrial wastes in the environment has been proven environmentally harmful and dangerous to both human and natural health ecosystems, these types of wastes are a significant and attractive carbon source for the biofuels production. Hydrogen is a clean alternative to methane, also known as natural gas. It is the most abundant chemical element, estimated to contribute 75% of the mass of the universe and is a versatile energy carrier, which can help to tackle various critical energy challenges. Hydrogen can be produced from almost all energy resources, though today's use of hydrogen in oil refining and chemical production is mostly covered by hydrogen from fossil fuels, with significant associated CO<sub>2</sub> emissions. In the present work, a continuous process was developed for the production of advanced biobased hydrogen enriched methane, from crude glycerol in a two-stage reactor system. In the first step, biohydrogen production was studied, using attached mixed acidogenic consortia in an up-flow column bioreactor. The effluent of the hydrogenic reactor was fed to a methanogenic continuous stirred reactor (CSTR) in which the effect of organic loading on the methane yield was studied.

**Keywords:** Biotechnology, waste, valorization, biofuel, methane, hydrogen, fuel cell



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ADAPTATION STRATEGIES TO HERDERS' FARM INTRUSION OF FEMALE-HEADED HOUSEHOLDS' IN NSUKKA AGRICULTURAL ZONE IN ENUGU STATE, NIGERIA

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#### ABSTRACT

The study assessed adaptation strategies to herders' farm intrusion of female-headed households' in Nsukka Agricultural zone in Enugu state, Nigeria. Specifically, the study was designed to describe the socio economic characteristics of the respondent, ascertain the perceived causes of herders' farm intrusion, determine the effects of herders' intrusion in female-headed household agricultural production, ascertain female headed household adaption strategies to herders' intrusion, and identify the challenges to the adaptation strategies of female-headed to herders' intrusion. A structured interview schedule was used to collect data from a sample of 60 respondents, frequency, percentage, standard deviation, means score and descriptive statistics were used to analyze the data collected. Result show that all (100.0%) of the respondents indicated that desertification of the Sahel and Northern Region and movement of herders and their cattle southwards is the perceived major cause of herders' farm intrusion in the study area. Similarly, 98.3%, 98.3% and 95.0% also indicated that herd size, lack of political will of government to arrest and punish the offenders adequately and herders inability to control cattle are other major perceived causes of herders farm intrusion respectively. All (100.0%) the respondents indicates that destruction of crops, soil degradation, decrease in output and income of crop, hostilities between herders and farmers, loss of produce in storage, reduced human mobility, poverty, reduction in farming activities and food insecurity were the major effects of herders' farm intrusion. Similarly, the major adaptation strategies to herders' farm intrusion as indicated by the respondents were: taking up alternative occupation ( $\bar{x}=4.2$ ), purchasing food on credit ( $\bar{x}=4.1$ ), migration ( $\bar{x}=3.9$ ), diversifying crop production with animal production ( $\bar{x}=3.8$ ), taking loans from friends and families ( $\bar{x}=3.5$ ) and community based natural resource management agricultural resources ( $\bar{x}=3.4$ ). However, the challenges to the adaptation strategies of female-headed households to herders' intrusion were: limited market access after destruction ( $\bar{x}=4.2$ ), limited land availability due to loss of land during conflict ( $\bar{x}=4.2$ ), no legal sanctions of defaulters ( $\bar{x}=4.1$ ), poor government policies and regulations ( $\bar{x}=4.0$ ) and lack of financial capability to startup business ( $\bar{x}=4.1$ ). The study recommended that adequate provision of funds and credit facilities in addition to collaboration of herders and local authorities to develop sustainable resource management plans (rotational grazing, protected corridors etc) will help to improve the adaptation strategies of female-headed households to headers' farm intrusion. Also, government should arrest and punish the offenders adequately while agricultural extension agents should reach out to these women for capacity building and advisory services.

**Keywords:** adaptation strategies, female headed households, herders intrusion



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### FIXED POINTS OF SET-VALUED MAPPINGS IN MENGER PROBABILISTIC METRIC SPACES ENDOWED WITH AN AMORPHOUS BINARY RELATION

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#### ABSTRACT

In this paper, we prove the existence of fixed point results for set-valued mappings in Menger probabilistic metric spaces equipped with an amorphous binary relation and a Hadzic-type  $t$ -norm. For the usability of such findings we present a Kelisky-Rivlin type result for a class of Bernstein type special operators introduced by Deo et. al. [Appl. Math. Comput. 201, (2008), 604-612 ] on the space  $C([0, n/n+1])$ . In this way, these investigations extend, modify and generalize some prominent recent fixed point results of the existing literature.

**Keywords:** Fixed point; set-valued mapping; Bernstein operator.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BACTERIAL ENDOPHYTES: A NATURAL DEFENCE AGAINST COLLAR ROT PATHOGEN *SCLEROTIUM ROLFSII* IN BRINJAL

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#### ABSTRACT

Collar rot, caused by the pathogen *Sclerotium rolfsii*, represents a significant threat to brinjal (*Solanum melongena*) production, leading to considerable yield losses. Conventional control measures, often reliant on synthetic fungicides, have raised environmental and health concerns. In response to these challenges, this research investigates the potential of bacterial endophytes as a natural defence against *Sclerotium rolfsii* in brinjal crops. Isolation and characterization of bacterial endophytes from healthy brinjal plants revealed a diverse pool of potential antagonists. Several microbial antagonists, such as *Pseudomonas fluorescens*, *Agrobacterium radiobacter*, *Bacillus* species, *Trichoderma virens*, *Burkholderia cepacia*, *Saccharomyces* species, and *Gliocadium* species, have been identified for their antagonistic activities against fungal plant pathogens. In vitro assays demonstrated the antagonistic activity of selected endophytes against *Sclerotium rolfsii*, including inhibiting mycelial growth and producing antifungal metabolites. Greenhouse and field trials were conducted to assess the efficacy of these endophytes in suppressing collar rot. The results revealed a significant reduction in disease incidence and severity and increased brinjal yield. Furthermore, molecular and biochemical analyses elucidated the mechanisms underlying biocontrol, including competition for nutrients and induction of systemic resistance in brinjal plants. This study emphasizes the potential of bacterial endophytes as a sustainable and eco-friendly approach for collar rot management in brinjal cultivation. The findings promise to reduce reliance on synthetic fungicides, promote plant health, and enhance agricultural sustainability. This research contributes to the growing body of knowledge on biological control strategies for plant diseases and underscores the importance of harnessing natural defence mechanisms for crop protection.

**Keywords:** *Solanum melongena*, *Sclerotium rolfsii*





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXTENSION NEEDS OF FARMERS IN THE SUSTAINABLE PRODUCTION OF FUTURE SMART FOODS IN NSUKKA AGRICULTURAL ZONE, ENUGU STATE.

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#### ABSTRACT

The study assessed the extension needs of farmers in the sustainable production of future smart foods in Nsukka Agricultural Zone, Enugu State. Structured interview schedule was used for data collection. A total number of 60 future smart food farmers were selected using purposive sampling technique. Data collected were analyzed using percentages, mean scores, and standard deviation. The findings show that the mean age of the farmers was 47 years. The majority (76.7%) of the farmers were female while 53.3% of the farmers were married. The average number of years spent in school was 9.6 years. The mean years of farming experience was 18.8 while the average household size was about 7 persons. The mean farm size of 5 hectares. However, only 6.7% of the respondents has been visited by agricultural extension agent. The majority (58.3%) of the farmers generate less than or equal to ₦70,000 annually with a mean annual income of ₦75,483.33. The future smart food mostly cultivated by the farmers were: pumpkin, cocoyam, amaranthus, winged bean, bush mango and spinach among others. The major challenges encountered by farmers in the production of future smart food were: unavailability of land for production ( $\bar{x}=2.25$ ) and poor consumer education and awareness ( $\bar{x}=2.78$ ) among other challenges. The major areas of extension needs of farmers were basically on access to low interest credits and affordable sources of seeds among. The study therefore recommended that agricultural extension agents should collaborate with farmers to access low interest credits and also purchase seeds at affordable rates, so as to enhance production of future smart foods.

**Keywords:** future smart food, extension needs, sustainable production



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### ECOLOGY AND RESTORATION OF NATURAL HERITAGE IN RURAL AREAS: A PATH TOWARDS SUSTAINABLE DEVELOPMENT

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#### **ABSTRACT**

Rural areas hold invaluable natural heritage and ecosystems that are essential for both local communities and global biodiversity. This abstract explores the intricate relationship between rural ecology, the restoration of natural heritage, and the promotion of sustainable development. In today's rapidly changing world, rural areas face numerous challenges, including habitat degradation, loss of biodiversity, and unsustainable resource use. However, they also offer a unique opportunity for conservation and sustainable growth. Firstly, rural ecosystems are hubs of biological diversity, providing habitat for countless species and contributing to ecosystem services such as water purification and carbon sequestration. Protecting and restoring these ecosystems is not only an ethical imperative but also vital for maintaining ecological balance and resilience. Secondly, the restoration of natural heritage in rural areas aligns with the principles of sustainable development. This involves a holistic approach that integrates environmental, social, and economic considerations. Sustainable land management practices, reforestation efforts, and the promotion of organic agriculture can enhance rural livelihoods while safeguarding natural resources for future generations. Furthermore, rural communities play a central role in conservation efforts. Engaging local residents in ecological restoration projects not only fosters a sense of ownership but also strengthens the social fabric of rural areas. It can lead to the development of eco-tourism, creating additional income streams and bolstering community resilience. In conclusion, the restoration of natural heritage in rural areas is a linchpin for achieving sustainable development goals. By preserving and revitalizing rural ecosystems, we can ensure the continued provision of essential ecosystem services, promote economic prosperity, and empower local communities to become stewards of their natural surroundings. This abstract underscores the urgency of prioritizing rural ecology and sustainability in our global agenda, emphasizing the need for collaborative efforts among governments, NGOs, and local stakeholders to secure a harmonious future for both rural areas and our planet as a whole.

**Keywords:** Biodiversity, Ecological balance, Sustainable development.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### WASTE MANAGEMENT PRACTICES AMONG POULTRY FARMERS IN ENUGU NORTH SENATORIAL ZONE, ENUGU STATE, NIGERIA

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#### ABSTRACT

The study assessed waste management practices among poultry farmers in Enugu North senatorial zone in Enugu State, Nigeria. Multistage sampling technique was used in selecting a total of (64) respondents for the study. Data was collected using of structured interview schedule. Percentages, charts, frequency counts and mean scores were used to analyze the data. Result show that the means age of respondents was 42.19 years. The majority (43.8%) of respondents had household size of between 4-6 persons. Effect of odour from poultry farms on the health of farmers include; skin irritation ( $\bar{x}$ =3.56), eye irritation ( $\bar{x}$ =3.37) and psychological distress ( $\bar{x}$ =3.30). All (100.0%) the respondents indicated that they manage poultry waste by using it as manure for improving plant growth, 98.4% of the farmers dry the poultry manure and bag for sale in future while 84.4% of the farmers indicated that they dry poultry litter for re-feeding. Government should therefore provide health insurance coverage for the farmers to enable them receive maximum treatment against effects of odour from the poultry farm. They should also provide workshops or training sessions for farmers on trending poultry waste management practices in order to improve their safety and production.

**Keywords:** poultry farmers, Nigeria



**EXPLORING THE IMPACT OF INDUSTRIAL DISCHARGES ON SOIL  
CONTAMINATION BY HEAVY METALS: A CASE STUDY IN THE SOIL OF  
MOHAMMEDIA, MOROCCO**

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**ABSTRACT**

The Mohammedia region, near Casablanca, has become increasingly industrialized. The industrial activities in the area release liquid, solid, and gaseous waste into the environment, underscoring the need to assess soil pollution caused by this industrial activity. The objectives of this study include collecting and synthesizing available data, analyzing the study area's characteristics, and evaluating metallic contamination of Mohammedia soils due to industrial activity. Ten soil samples were taken at a depth of 20 cm from three sites in the city. Seven trace metals (cadmium, lead, copper, chromium, zinc, nickel, and cobalt) were analyzed. Four physico-chemical parameters (pH, conductivity, organic matter, and the total limestone content) were also assessed for each sample. The results show that an alkaline pH, low salinity, and a low concentration of organic matter characterize the soils in the study area. The concentrations of heavy metals in the soils studied varied as follows: from 27.16 to 99.17 mg/kg for Zn, from 12 to 31 mg/kg for Pb, from 14 to 36 mg/kg for Ni, from 9 to 36 mg/kg for Cu, from 48 to 151 mg/kg for Cr and from 11 to 20 mg/kg for Co. Specific pollution indices for each metal revealed moderate soil contamination by copper (Cu), chromium (Cr) and cobalt (Co). The pollution index showed that the industrial zones adjacent to the freeway (ZI and AR2) are the region's most heavily affected by heavy metals.

**Keywords:** Contamination, soil, Heavy Metals, industrial pollution, Mohammedia.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### AN REVIEW ON ANTIOXIDANTS: SOLUTION TO OXIDATIVE STRESS

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#### ABSTRACT

In recent times, there has been a lot of discussion on the mechanism of free radicals and how antioxidants neutralize them. Oxidative stress results from an unfavorable oxidant-antioxidant ratio that delays development, impairs immunity and causes other clinical manifestations. The fundamental goal of using antioxidants is to reduce oxidative stress by eliminating oxidants, restoring damaged biomolecules and membranes, boosting the immune system and preserving physiological homeostasis. The current review provides significant data on superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) as enzymatic, glutathione, uric acid and lipoic acid as endogenous non-enzymatic antioxidants. This study focuses on natural and synthetic non-enzymatic exogenous antioxidants. Its purpose is to provide a description of the roles that antioxidants serve in feed and food industry with regard to animal's health and product's quality and it briefly focuses on the future recommendations as well. Thus, novel and innovative ideas are required to extract and develop antioxidant compounds for feed and food sectors that are economical and kind to environment.

**Keywords:** Antioxidant; feed additive; free radical; glutathione; oxidative stress



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **A REVIEW ON HARMFUL ALGAL BLOOMS: ITS CAUSES, IMPACTS AND MITIGATION**

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#### **ABSTRACT**

Harmful algal blooms (HABs), an unchecked growth of algae, have become more prevalent and widespread over the past decades. These HABs produce biotoxins which has resulted in loss of biodiversity, fisheries as well as economy. Marine HABs belongs to dinoflagellates and diatoms whereas cyanobacteria are freshwater HABs. This review is the global overview of toxic genera of algae, its causes, impacts and particular attention is given to its mechanisms. Eutrophication, climate change and ballast water transport are the main reasons for the dispersion of HABs. Various outbreaks of this wreaking havoc have been and continue to be reported on the entire globe that critically damage the terrestrial and aquatic life. To combat the deleterious effects, its monitoring and control is requisite. New strategies for the management, mitigation, and control of HABs should be developed to make them more cost effective and environment friendly.

**Keywords** biotoxins, eutrophication, monitoring, mitigation





**EFFECT OF THE METHANOL FRACTION OF *CUMINUM CYMINUM* LEAVES ON  
ACETAMINOPHEN-INDUCED HEPATOTOXICITY IN WISTAR RATS.**

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**ABSTRACT**

Hepatotoxicity induced by acetaminophen (APAP) over dose is a commonly used experimental model to assess hepatoprotective activity of new pharmacological agents. Administration of conventional drugs for the treatment of liver disorder is facing severe side effects. Most times when synthetic drugs fail, the next available option is liver transplant which causes histoincompatibility in most individuals. Alternatives to curb current epidemiology and avert future projections: medicinal plant (cumin) (*Cuminum cyminum*) native from East Mediterranean to South Asia, today is grown all over the world because of its pharmacological effects (anti-inflammatory, anti-cancer and anti-diabetic) due to its phytochemical constituents (phenolic acids, flavonoids and alkaloids) exhibiting good *in-vitro* anti-oxidative properties in scavenging free radicals. The aim of this study was to evaluate the effect of the methanol fraction of *Cuminum cyminum* leaves (MFCCL) on acetaminophen-induced hepatotoxicity in wistar rats. Thirty (30) wistar rats weighing 150-200 g were grouped into six of five animals each. Note: all drugs were administered 30 min before the induction. Group I served as normal control. Hepatotoxicity was induced using 400 mg/kg. b.w of APAP in groups 2 - 6 orally once daily for seven days. Group 2 received no treatment; group 3 was treated with 200 mg/kg. b.w of silymarin and groups 4-6 were administered 100, 200 and 400 mg/kg.b.w of MFCCL respectively. Extraction 1200 g of pulverized *Cuminum cymium* leaves with methanol yielded 7.34 %. The phytochemical analyses of MFCCL revealed the presence of alkaloids, flavonoids, glycosides, saponins and tannins in high amounts. The *in-vitro* antioxidant analyses revealed a dose dependent increase in DPPH radical-scavenging activity, ferric reducing power (FRAP) and TAC (Total Antioxidant Capacity). The LD<sub>50</sub> revealed the MFCCL was not toxic. GC-MS analysis of MFCCL revealed different peaks determining the presence of fifteen phytochemical compounds with different therapeutic activities. The major phytochemicals are cyclopentasiloxane, decamethyl (5.4 %), cyclotrisiloxane, hexamethyl (41.9 %), cyclotetrasiloxane octamethyl (14.9 %), cycloheptasiloxane tetradecamethyl (9.1 %) and minor compounds were also present. GC-FID analysis of MFCCL revealed the presence of ten bioactive flavonoids anthocyanin, chalcones, isoflavones, flavonones, flavan -3-ol, flavones,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

aglycone, gallicocatechin, catechin and epicatechin. MDA concentration of group 2 (untreated group) was found to be significantly ( $p < 0.05$ ) higher than the treatment groups with a corresponding decrease in the activities of SOD, CAT, GPx, GST and GR. GSH level in group 2 (untreated group) was significantly ( $P < 0.05$ ) lower than the treatment groups. AST, ALT, ALP and Total bilirubin were found to be significantly ( $p < 0.05$ ) higher in group 2 compared to treatment groups. Total protein content of group 2 was significantly ( $P < 0.05$ ) lower than the treatment groups. Body weights revealed no significant ( $P > 0.05$ ) different among all the groups. There was no significant ( $P > 0.05$ ) different among all the groups in the weight of spleen and lungs. Liver and kidney weights of group 2 were significantly ( $P < 0.05$ ) higher than the treatment groups. Histological examination of liver tissues of the treatment groups revealed the normal hepatic histoarchitecture when compared to group 2.

**Keywords:** *Cuminum cyminum*, Hepatoprotective, Acetaminophen, Silymarin



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**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ÇEVRE SORUNLARININ SANATA DÖNÜŞÜMÜ

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#### ÖZET

Atık malzemenin önemli bir yere konulduğu tüketim toplumunda çöpün değerli görülmeye başlanarak geri dönüştürülmesi ve gelir elde etmek için toplanıp saklanması, muhafaza edilmesi, ticarileşmesi, maddi gelir olarak görülmesi dönemini yaşamaktayız. Bu süreçte üretim sonrası atık olarak doğaya bırakılan nesnelerin üretim sürecinden yok olma sürecine kadar doğaya zarar vermesi göz ardı edilen en önemli konu olmuştur. Üretimi sırasında açığa çıkan zararlı maddelerin ekolojik denge üzerindeki olumsuz etkileri kıtalar arası sorun olmaktan çıkmış, önü alınamaz bir durum haline gelmiştir. Doğal dengeyi olumsuz etkileyen yapay nesnelerin üretim süreci ekolojik dengeyi en üst seviyede etkilemeyi başarmıştır. Önüne geçilemeyen bir atık sorunu, eriyen buzullar, çölleşen bir yer yüzü doğal dengeyi etkileyecek olan bütün olumsuzlukların yaşandığı bir dönemden geçilmektedir. Peki bu durum nasıl düzeltilebilir? sorusunun cevabını sanatta aramak mümkündür. Neden mi? Sanat eğitiminin kişisel gelişim üzerindeki olumlu etkileri doğaya, çevreye faydalı olmayı beraberinde getirmektedir. Örneğin; artan endüstriyel gelişimlerin sonuçları sanatçıların doğaya bakışını değiştirmiştir. 1960 yılından itibaren sanat çalışmaları anlam değişikliğine uğrayarak yeni yaklaşımlar oluşturmuştur. Farklı bakış açılarına yönlendirilen insanlar toplum içerisinde faydalı bir birey olmak için varlıklarını sürdürmektedirler. Doğal süreç ve faaliyetleri ekolojik durumlara uygulamak amacıyla eleştiren, doğrulayan, çözüm projeleri sunan ve sanatsal pratiklerle çevre problemlerini ele alan sanatçılar yetişmektedir. Doğa için çalışan sanatçılar bu konuda örnek teşkil etmektedir. Farkındalık yaratmayı hedef haline getiren yaklaşımların yaygınlaşması daha az kirlilik, daha az sorun demektir. Yeryüzü Sanatı, Çevresel Sanat, Ekolojik Sanat gibi sanat alanında faydacı yaklaşımlar görmek mümkündür. Bu faydacı yaklaşımın başlıca sanatçıları; Alan Sonfist, Mierle Laderman Ukeles, Robert Smithson, Helen-Newton Harrison, Agnes Denes, Mel Chin, Joseph Beuys, Mehmet Ali Uysal, Varol Topaç'tır.

**Anahtar Kelimeler:** Çevre, Ekoloji, Sanat, Farkındalık



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### TRANSFORMATION OF ENVIRONMENTAL PROBLEMS INTO ART

#### ABSTRACT

In a consumer society where waste material has an important place, we are living in a period where garbage is starting to be seen as valuable, recycled, collected and stored to generate income, preserved, commercialized, and seen as financial income. In this process, the most important issue that is ignored is that the objects left to nature as waste after production harm the nature from the production process to the destruction process. The negative effects of harmful substances released during production on the ecological balance have ceased to be an intercontinental problem and have become an unavoidable situation. The production process of artificial objects that negatively affects the natural balance has managed to affect the ecological balance at the highest level. We are going through a period in which an inevitable waste problem, melting glaciers, a desertified earth and all the negativities that will affect the natural balance are experienced. So how can this situation be fixed? It is possible to look for the answer to the question in art. You ask why? The positive effects of art education on personal development bring benefits to nature and the environment. For example; The results of increasing industrial developments have changed the artists' view of nature. Since 1960, art works have changed their meaning and created new approaches. People who are directed to different perspectives continue their existence to be a useful individual in society. Artists are trained who criticize, verify, present solution projects and address environmental problems through artistic practices in order to apply natural processes and activities to ecological situations. Artists working for nature set an example in this regard. The spread of approaches that aim to raise awareness means less pollution and fewer problems. It is possible to see utilitarian approaches in the field of art such as Earth Art, Environmental Art, Ecological Art. The main artists of this utilitarian approach are; Alan Sonfist, Mierle Laderman Ukeles, Robert Smithson, Helen-Newton Harrison, Agnes Denes, Mel Chin, Joseph Beuys, Mehmet Ali Uysal, Varol Topaç.

**Keywords:** Environment, Ecology, Art, Awareness



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

İnsan ihtiyaçlarının sınırsızlığı yaşanan doğayı sınırlı kullanım durumuna getirmektedir. İnsanoğlu yüzyıllar boyunca kendisine hizmet etmesi için kullandığı doğayı sömürmeye başladığı anda kendini ona hizmet ederken buldu. Attığı tohumun geri dönüşünde aldığı verim azalınca yetersizlik sorunu ortaya çıkmıştır. Bu mücbir sebepler başka bir yol araması için kişileri yanlış çözümlere yönlendirmiştir. Doğal gelişim yerini hormonlu, hızlı ve aşırı üretime bırakmıştır. Aşırı üretim doyumsuzluğa ve aşırı tüketime sebebiyet vermiştir. Kentler çoğalıyor, üretim artıyor, makineler çalışıyor, kimyasal atıkların kullanımı yaygınlaşıyor, yaşam modernleşiyor fakat dünya yok oluyor. Üretim tüketim dengesinin aynı ayar da tutulmamasının bedeli buzulların isyanıyla, ekolojik dengenin bozulmasıyla, bitki türlerinin yok olmasıyla, kuraklıkla ödenmektedir. Bilinçsiz yaşama tarzından kaynaklanan sorunların geri kalan zamanda kazandırılması için hala zamanımız varken eğitimin önemli olduğunu özellikle sanat eğitiminin ve sanatçı hassasiyetinin kazandırılması olduğunu sanatçıların doğaya bakış açılarından görebiliriz ve bu yaklaşımı yaygınlaştırabiliriz.

### ÇALIŞMANIN AMACI

Sanatın insan hayatındaki yerinin sadece kendi duygularını yansıtmak olmadığını ekoloji için hareketler başlatan ve bunu on yıllarca devam ettiren sanatçılardan görmek mümkündür. Ekolojik dengenin bozuk yapısını ele alarak farkındalık yaratmak isteyenler çalışmalarını yaparken düzensizliğe düzen, bozuk olana çözüm üretmektedir. Doğada süreklilik ve varlıkların devamlılığı için çalışan sanatçılarımızın eserlerinden ilham alarak planlanacak olan çalışmaların ilk adımlarını atmak çalışmanın en önemli amaçlarından biridir.

### MATERYAL ve YÖNTEM

Materyal: İçinde bulunduğumuz dünya çalışma alanımızdır. Yüzlerce yıldır bahsi geçen ve adı unutulmuş bir çok bitkinin yok olduğu, sürekli olarak istismara maruz kalmış olan yerküremiz en önemli enstalasyon alanımızdır.

Yöntem: Geçmiş zamanlar referans alınarak bölgeler üzerinde incelemeler yapılmaktadır. Kötü yaşam koşullarından etkilenerek zarar gören bölgeler üzerinden iyileştirme çalışmalarının yapılması planlanabilmektedir. Bu yaklaşımlar gerçekleştirilirken sanat ve estetik bakış açısıyla yaklaşımlar hem kişilere olan iletişimi hızlandıracaktır hem de dünya üzerinde görsel şölenlere misafirlik edecektir.



## BULGULAR

Sanatın kapsayıcı ve iyileştirici etkisi kurak topraklara ormanları mümkün kılmaktadır. Farklı bakış açılarının sorunları ele alma ve çözüm üretme şekillerinin faydacılığı sanatın dahil olduğu çalışmalarda açıkça görülmektedir.

‘Bireylerde yaşadığı çevrenin şartlarına uyumda ve çevreyi biçimlendirme de düşündürücü, geliştirici fikirleri entegre ederken, çevresel sorunlarla yüzleşme de motive edici bir rol üstlenir. Ayrıca sanatsal yapılar dijital haberleşme ve paylaşım ağlarının gelişmiş olduğu bilgi toplumunda entelektüel gelişim ve öğrenmeyi teşvik edici araçlar olabilirler. Sanatsal görseller; birer tarihi belge gibi sanatsal bilgi üreten ve bilgiye aracı olan sosyal boyutu, tarihsel süreci, stili ve üretim tekniği ile sorgulamayı geliştiren konumdadırlar’ (Kaya, s.141, 2022)

### TIBET IS THE HIGH GROUND

The Seven Rivers and their headwaters that flow from the Tibetan Plateau. Their constant flow endangered by rapidly melting glaciers and the disappearance of snow melt.



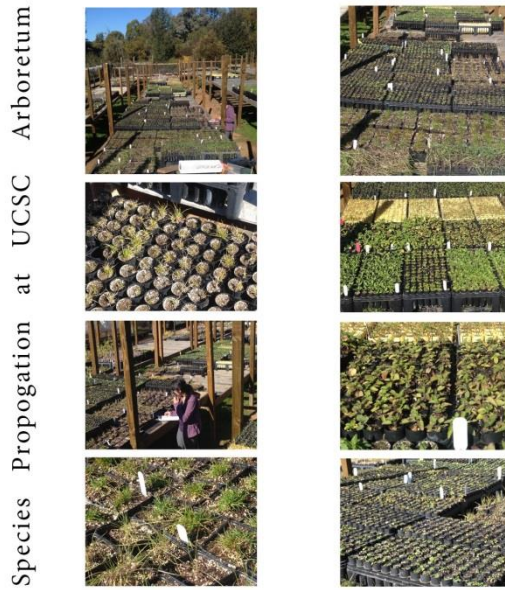
Brahmaputra Headwaters

10

### Görsel 1: Helen-Newton Harrison, Mücbir Sebep 2009

‘Pratikte, anlayabildiğimiz kadarıyla çoğu gezegen ekosisteminde entropi hızlanmıştı. Aslında, eğer gerçekten de bir entropi oku varsa, Eko-sistem açısından konuşursak, büyük bir çaba, yaratıcılık ve yaratıcılıkla hep birlikte onu yanlış yöne yönlendirdiğimizi hayal etmek mümkündür. Bunu, sadece birkaçını saymak gerekirse, nüfus patlaması, enerji kullanımı

patlaması ve kontrolden çıkan ekonomik kalkınmayı içeren "uygarlaşma" süreçlerimiz aracılığıyla yapmıştık. Bizim için görünmez olan şey, yaratıcılar olarak bizim yarattığımız büyük bir gücün sonucuydu' (Harrison). Çalışma planlanırken dikkat edilen ve çözüm üretilmesi gereken temel konu tüm gezegeni ve içinde bulunan canlıları katlanarak çoğalan dokunup etkileyen ne var ise bölgede artan sıcak hava dalgasından kaynaklandığının bilincinin var olmasıdır. Kaynakların üretim, tüketim kar amacıyla kullanılması yanlış bir karardır. Bulunulan şartlar altında bölgeye göre hareket edilmesi alınacak olan faydanın miktarını da etkilemektedir. Bu anlamda bölgede çeşitli bitkilerle yaşam alanlarının oluşturulması kurak hale gelen yerlerde yeniden hayat bulmayı desteklemektedir. Çalışmalar yapılırken çevreyle olan uyumu, kişilere hitabı ve doğa şartları durumu en önemli konudur. 'İnsanlığın en eski sanat ürünlerinden, kendine özgü anlam taşıyan ve güzel sanatların bir kolu olan heykel, tarih boyunca farklı amaçlarla yapılmış ve aynı zamanda bir tasarım sanatı olan heykeller, belirleyici özellikleriyle yer aldıkları alanlarda insanları, kültürleri kaynaştırmış, çevrelerindeki diğer elemanlarla, kamusal alanlarda kent ve çevre plastiğini, birlikte oluşturmuşlar ve bunlar gibi, pek çok önemli işlevler, üstlenmişlerdir' (Bulat & Bulat, s.3, 2016)



**Görsel 2:** Helen-Newton Harrison, Mücbir Sebep 2009

"Bir ömür boyu sürececek çalışmanın bu geç aşamasını yazarken, "belirgin" özellikler dediğimiz bir şey için neredeyse 45 yıllık varoluşu ve yaptıklarımızı gözden geçirmeye başladık. Bizim bakış açımıza göre göze çarpan bir özellik, "herhangi bir genişletilmiş anlatıda tekrar tekrar ve şu veya bu şekilde ortaya çıkan bir şeydir." Çalışma grubumuz bir istisna değildi. Basitlik

amacıyla, göze çarpan bir özelliği, sanat yapma süreçlerine rehberlik etmek veya yardımcı olmak için ruh tarafından bilinçaltında oluşturulan bir buluş olarak tanımladık.” (Harrison). Çöp yığınlarına ev sahipliği yapan bir yer sanatçı bakış açısı, yorumu ve ortaya koyduğu sonuçla iletişim kurabilmektedir. ‘Yenilik ve özgürlükten taviz vermeyen sanatçılar sanatsal üretimin her aşamasında ilerlemeci bir tavır ile eserler yapmışlardır’(Zengin, s. 272, 2022)



**Görsel 3:** Agnes Denes, *Buğday Tarlası - Bir Çatışma: Battery Park Çöp Sahası, Manhattan Şehir Merkezi, 1982*

“Aylar süren hazırlıklardan sonra, Mayıs 1982’de, Aşağı Manhattan’da, Wall Street ve Dünya Ticaret Merkezi’nden iki blok ötede, Özgürlük Anıtı’nın karşısında bulunan bir çöp sahasına 2 dönümlük bir buğday tarlası ekildi. İki yüz kamyon dolusu toprak getirildi ve 285 oluk elle kazılarak kaya ve çöplerden arındırıldı. Tohumlar, toprakla kaplı oluklara elle ekildi. Tarlanın dört ay boyunca bakımı yapıldı, buğday pisliği temizlendi, yabancı otlar temizlendi, gübrelendi ve küf mantarına karşı ilaçlama yapıldı ve sulama sistemi kuruldu. Mahsul 16 Ağustos’ta hasat edildi ve 1000 poundun üzerinde sağlıklı, altın buğday elde edildi. 4,5 milyar dolar değerindeki arazide buğday tarlasının ekimi ve hasadı güçlü bir paradoks yarattı. Buğday tarlası bir sembol, evrensel bir kavramdı; gıdayı, enerjiyi, ticareti, dünya ticaretini ve ekonomiyi temsil ediyordu. Kötü yönetime, israfa, dünyadaki açlığa ve ekolojik kaygılara atıfta bulundu. Yanlış yerleştirilmiş önceliklerimize dikkat çekti. Hasat edilen tahıllar, Minnesota Sanat Müzesi’nin (1987-90) düzenlediği "Dünya Açlığının Sonu İçin Uluslararası Sanat Gösterisi" adlı sergiyle



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

dünya çapında yirmi sekiz şehre gitti. Tohumlar, onları dünyanın birçok yerine eken insanlar tarafından taşındı.

Anket, insani değerlere, yaşam kalitesine ve insanlığın geleceğine ilişkin varoluşsal sorulardan oluşuyordu. Yanıtlar çoğunlukla konuştuğum veya çalışmalarımı sergilediğim çeşitli ülkelerdeki üniversite öğrencilerinden geliyordu. Zaman kapsülü bağlamında anket, açık bir iletişim sistemi olarak işlev gördü; nesillerimizin bizi, zaman kapsüllerinde alışlageldiği gibi yarattığımız nesnelere göre değil, sorduğumuz sorulara ve bunlara nasıl yanıt verdiğimizize göre değerlendirmesine olanak tanıdı. Mikrofilm kurutuldu ve üç metrelik betonun içindeki ağır bir kurşun kutunun içindeki çelik bir kapsülün içine yerleştirildi. Bir levha bu noktayı işaret ediyor: Hindistan ormanının kenarında, böğürtlen çalılarıyla çevrili. Zaman kapsülü, gömülmesinden bin yıl sonra, yani 30. yüzyılda, 2979 yılında açılacak. Halen bu proje kapsamında dünyada ve uzayda gelecekte farklı zaman dilimlerine yönelik planlanmış birçok zaman kapsülü bulunmaktadır” (Denes)

### SONUÇ

Yerkürenin sonunu hazırlayan sebeplerden vazgeçmek için hala zamanımızın olduğu inancıyla faydalı üretime devam etmemiz gerekmektedir. Yapılan çalışmalar toprak üzerinde olup daha fazla kullanıma yönelik bir durumda olmamalıdır. Doğanın kendi dinamiğinde var olan dengesini kazanmak için faaliyetler gerçekleştirilmelidir. Bu anlamda estetik bakış açısının önemi bilinçli kitleler yaratmak için değerlendirilmiştir. Bahsi geçen sanatçılar dünün kırıklarını onarıp yarın için umut yaratmaktadırlar. Uzun yıllar alacak olan çalışmalarla devam edecek olan projeleri kurtuluş için iyi niyet tohumları gibidir. Bilinçli toplumlar yaşanabilir, sürdürülebilir bir hayat mottosuyla geleceğe ışık yakılmaktadır. ‘Doğaya yaptıkları müdahalelerdeki yöntemlerinde sanat yoluyla kalıcılık uğruna kendilerinde her şeyi yapma gücünü görmeleri gizli bir insan merkezilik taraflarının olduğunu ya da devam ettiğini göstermektedir.’ (Özer, s. 459, 2022)





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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Görsel 2: <https://www.theharrisonstudio.net/art-projects-2/force-majeure-synthesis-2009-present>

Görsel 3: <http://www.agnesdenesstudio.com/works7.html>



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE EFFECT OF DESIGN DECISIONS ON ENERGY PERFORMANCE IN RESIDENTIAL BUILDINGS: EXAMPLE OF LOCAL HOUSING PROJECTS

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#### ABSTRACT

Today, urbanization and the need for rapid housing have led to the emergence of buildings without identity due to the disregard of site-specific construction. Accordingly, the Ministry of Environment, Urbanization and Climate Change (MEUCC) have produced type housing projects and these projects have been introduced as local housing. Whether these projects are designed using site-specific design decisions and their energy performances have aroused curiosity within the scope of professional practice. Therefore, in this study, type housing projects planned for Adıyaman and Sivas are considered and heating and cooling demand and primary energy demands are determined using a dynamic simulation program. In addition, in order to evaluate the design and construction performance of the type projects, the performances of the planned projects in both Sivas and Adıyaman were determined and whether the projects were designed in a location-specific manner was examined with an alternative scenario. In this context, the effect of the right building envelope design on increasing the energy performance of the projects was also determined. As a result of the study, the heating demand of the building planned for Adıyaman was 63.79 kWh/m<sup>2</sup>, the cooling demand was 138.3 kWh/m<sup>2</sup> and the primary energy demand was 251.84 kWh/m<sup>2</sup>, while the heating demand of the building planned for Sivas was 61.8 kWh/m<sup>2</sup>, the cooling demand was 30.35 kWh/m<sup>2</sup> and the primary energy demand was 208.03 kWh/m<sup>2</sup>. When the building planned for Sivas is evaluated in Adıyaman climatic conditions, it is seen that it has 70% better performance in terms of heating demand, 22.5% better performance in terms of cooling demand and 27% better performance in terms of primary energy demand than the project designed for Adıyaman, and it is determined that the building planned for Sivas is more suitable for Adıyaman climatic conditions. This is due to the fact that the building envelope layer fiction of the project designed for Sivas is more successful. Therefore, it is clear that local housing projects should be reconsidered with location-specific design decisions. The study is expected to guide designers and administrative decision makers.

**Keywords:** Local housing, type project, site-specific design, energy performance, building envelope decisions





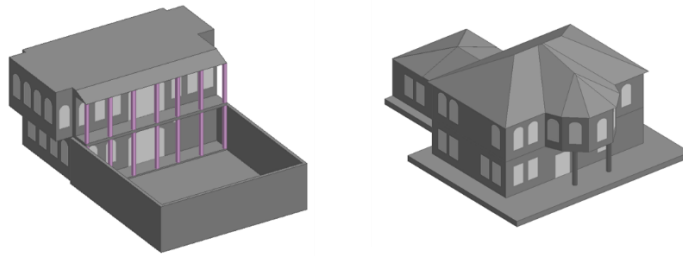
## **1. INTRODUCTION**

Rapid urban growth and lack of planning have led to a concentration of similar-looking buildings. Cost decisions, modernism and international design standards driven by globalization are also dampening local identities. Therefore, the homogenization of the character of our cities causes us to lose historical and cultural richness. Design and conservation efforts that emphasize local authenticity are needed to prevent de-identification. In this context, the Ministry of Urbanization, Environment and Climate Change has planned type projects under the name of local housing in different climate zones. Local housing projects require site-specific design decisions. These design decisions consist of location-specific decisions such as suitability to slope and topography, prevailing wind direction and solar aspect, and the use of local materials. For this reason, the fact that local housing designs are primarily type projects triggers problems in the production of the project.

Site-specific design decisions and sustainable building design decisions, which meet at a common denominator, converge at the energy performance cross-section. Site-specific buildings are expected to be climate compatible. The built environment consumes half of the world's energy resources (WGSC, 2004). Energy performance is one of the parameters that must be taken into consideration in the early design phase of the building in today's world where climate change is prominent (Mardookhy et al., 2014; Carbonari et al., 2002; Wong and Fan, 2013; Spanos et al., 2005; Salah and Tuna-Kayili, 2021). In this context, site-specific design decisions are similar to climate-appropriate energy-efficient building design decisions. Whether the projects assumed to be produced under these decisions are designed using site-specific design decisions and their energy performances have aroused curiosity within the scope of professional practice. In this context, it is aimed to simulate the energy performance of the housing building typologies of the local architectural housing projects of the Ministry of Environment, Urbanization and Climate Change in Adıyaman and Sivas. The study covers the comparison of the current heating, cooling loads and primary energy demand of the typologies created and the typologies that are not locally planned in TOKİ buildings and determining the recommendations that can be made. In addition, it is aimed to create a holistic comparison by observing the effect of the building envelope with an alternative scenario in which the provinces of the buildings in Adıyaman and Sivas are changed in order to evaluate the design and building performance of the type projects.

## 2.MATERIALS and METHODS

In this study, TOKİ/ÇŞB type housing projects located in Adiyaman and Sivas were selected in order to evaluate the effect of current climate data on buildings. The layers forming the building envelope of the selected buildings were processed into the program and simulation results were evaluated. A model was prepared to evaluate the energy performance of the selected buildings and simulation results were obtained by processing the current climate data into the program (Figure 1). In this study, Adiyaman Local Type Project with a construction area of 140 m<sup>2</sup> located in a rural area in Adiyaman were analyzed. The building has two floors and the floor height is designed as 3.2 meters. It is planned as a non-passable terrace roof. The building system is reinforced concrete frame in housing projects suitable for local architectural features in and around Adiyaman province. There is 1 living room, 1 sofa and 1 kitchen on the ground floor, and there are sleeping and bathroom units on the upper floor (Figure 2). The material properties are given in Table 1.



**Figure 1.** Adiyaman house model and Sivas house model prepared in DesignBuilder program.



**Figure 2.** Adiyaman local type project (render, plans and section)

In addition to the Adiyaman house, a local type project with a construction area of 200 m<sup>2</sup> located in the rural area of Divriği district of Sivas was analyzed. The designed building has two floors and the floor height is designed as 3.3 m. The building system of the project is reinforced concrete frame. On the ground floor, there is 1 kitchen, 1 dining area, 1 large gathering place, 1 living room and wc unit, and 1 living room, 3 bedrooms and bathrooms on the upper floor (Figure 3). The material properties are given in Table 2.



**Figure 3.** Sivas local type project (render, plans and sections)

In order to evaluate the design and building performance of the type projects, it is aimed to create a holistic comparison by observing the effect of the building envelope with an alternative scenario in which the provinces of the buildings in Adiyaman and Sivas are changed.



**Table 1.** Material properties of Adana local type project

		Layers	Thickness (m)	Thermal conductivity y W/(m.K)	U- Value (W/m <sup>2</sup> K)	
WALL	INTERIOR	Gypsum Plaster	0.025	0.4000	1.405 W/m <sup>2</sup> K	
		Aerated concrete	0.10	0.2400		
		Gypsum Plaster	0.025	0.4000		
		<i>Total</i>	0.15			
	EXTERIOR	Gypsum Plaster	0.025	0.4000	1.217 W/m <sup>2</sup> K	
		Aerated concrete	0.19	0.2400		
		Gypsum Plaster	0.025	0.4000		
		<i>Total</i>	0.24			
GROUND FLOOR	Wooden Laminate Flooring	0.01	0.3600	0.360 W/m <sup>2</sup> K		
	Alum	0.05	0.4100			
	Lean Concrete	0.2	2.5000			
	Leveling Concrete	0.05	1.1300			
	Waterproofing	0.01	0.2600			
	Leveling Concrete	0.05	1.1300			
	Gravel Backfill	0.1	0.8500			
	<i>Total</i>	0.47				
	FLOOR	Wooden Laminate Flooring	0.01		0.3600	2.253 W/m <sup>2</sup> K
		Alum	0.05		0.4100	
Reinforced Concrete		0.12	2.5000			
Gypsum Plaster		0.025	0.4000			
<i>Total</i>		0.21				
ROOF	Leveling Concrete	0.05	1.1300	2.050 W/m <sup>2</sup> K		
	Waterproofing	0.01	0.2600			
	Leveling Concrete	0.05	1.1300			
	Reinforced Concrete Slab	0.12	2.5000			
	Gypsum Plaster	0.025	0.4000			
	<i>Total</i>	0.26				
GLASS AND FRAME	3 mm glass	0.003		2.716W/m <sup>2</sup> K		
	13 mm air	0.013				
	3 mm glass	0.003				
	PVC	0.05	0.130	2.155 W/m <sup>2</sup> K		
	<i>Total</i>	0.21				
DOOR	GLASS DOOR	5 mm Quartz glass door	0.005	5.128 W/m <sup>2</sup> K		
		<i>Total</i>	0.005			

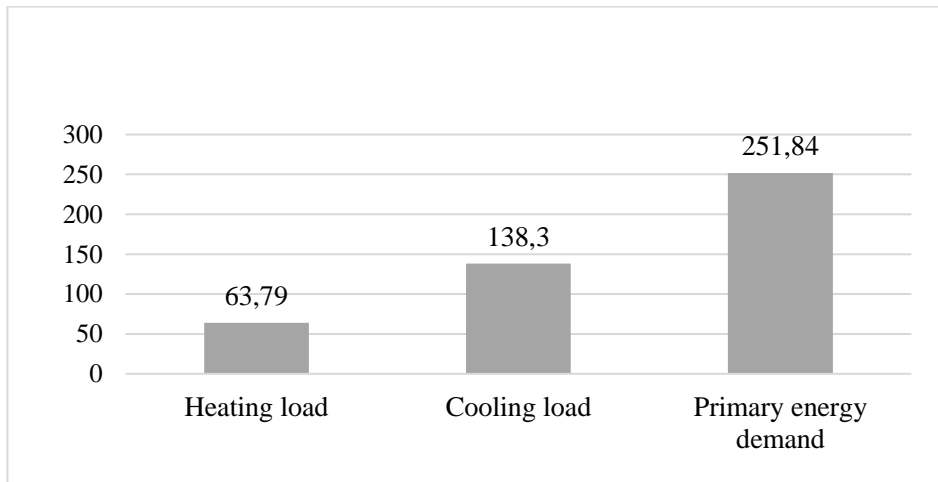


**Table 2.** Material properties of Sivas local type project

		Layers	Thickness (m)	Thermal conductivity $\gamma$ W/(m.K)	U- Value (W/m <sup>2</sup> K)
WALL	INTERIOR	Gypsum Plaster	0.025	0.4000	1.405 W/m <sup>2</sup> K
		Aerated concrete	0.10	0.2400	
		Gypsum Plaster	0.025	0.4000	
		<i>Total</i>	0.15		
		<hr/>			
	EXTERIOR	Gypsum Plaster	0.025	0.4000	0.502 W/m <sup>2</sup> K
		Aerated concrete	0.19	0.2400	
		XPS	0.05	0.034	
		Gypsum Plaster	0.025	0.4000	
		<i>Total</i>	0.24		
GROUND FLOOR		Wooden Laminate Flooring	0.01	0.3600	0.28 W/m <sup>2</sup> K
		Alum	0.05	0.4100	
		Lean Concrete	0.2	2.5000	
		Leveling Concrete	0.05	1.1300	
		XPS	0.05	0.034	
		Waterproofing	0.01	0.2600	
		Leveling Concrete	0.05	1.1300	
		Gravel Backfill	0.1	0.8500	
		<i>Total</i>	0.47		
		<hr/>			
FLOOR		Wooden Laminate Flooring	0.01	0.3600	2.253 W/m <sup>2</sup> K
		Alum	0.05	0.4100	
		Reinforced Concrete	0.12	2.5000	
		Gypsum Plaster	0.025	0.4000	
		<i>Total</i>	0.21		
FLOORING	ROOF	OSB	0.03	0.13	2.050 W/m <sup>2</sup> K
		Roofing Felt	0.005	0.19	
		Air Gap	0.02		
		Tile	0.025	1	
		<i>Total</i>	0.8		
GLASS AND FRAME		3 mm glass	0.003	0.130	2.716W/m <sup>2</sup> K
		13 mm air	0.013		
		3 mm glass	0.003		
		PVC	0.05		
		<i>Total</i>	0.21		
DOOR	WOOD DOOR	3 cm Oak wood door	0.005	5.128 W/m <sup>2</sup> K	
		<i>Total</i>	0.005		

### 3.FINDINGS and DISCUSSION

When the details of the type project designed for Adıyaman are examined, the building is located in a hot and arid climate zone, The long facades of the building placed on the east-west axis increase the heat gain from the sun. In the building designed as a terrace roof, unnecessary heat gain occurs from the floor especially in summer months. The uniform placement of the windows and doors used on the facades shows that the heat losses and gains from the sun were not taken into account during the design phase. Keeping the façade openings below 40% on the southern facades and below 20% on the other facades shows that the cooling load will increase on the southern facades. Wc and cores placed in the middle of the heated and cooled units in the planning cause extra heating and cooling demand in the building. According to simulation results, the heating demand is 63.79 kWh/m<sup>2</sup>, the cooling demand is 138.3 kWh/m<sup>2</sup> and primary energy demand is 251.84 kWh/m<sup>2</sup> (Figure 4).



**Figure 4.** Energy performance of Adıyaman local type Project (kWh/m<sup>2</sup>)

When the details of the type project designed for Sivas are analyzed, the building is located in a cold and rainy climate zone. The long facades of the building placed on the east-west axis increase the heat gain from the sun. The fact that the windows used on the east, west and north facades are placed uniformly and ignoring the heat losses shows that the heat losses and gains from the sun were not taken into account during the design phase. Keeping the façade openness close to 25% on all facades of the building shows that the heating load will increase on the east, west and north facades. The cores placed in the middle of the heated and cooled units in the planning and the kitchen, living room and guest room placed on the north facade cause an



increase in the heating demand in the building. According to simulation results, the heating demand is 61.8 kWh/m<sup>2</sup>, the cooling demand is 30.35 kWh/m<sup>2</sup> and primary energy demand is 208.03 kWh/m<sup>2</sup> (Figure 5).

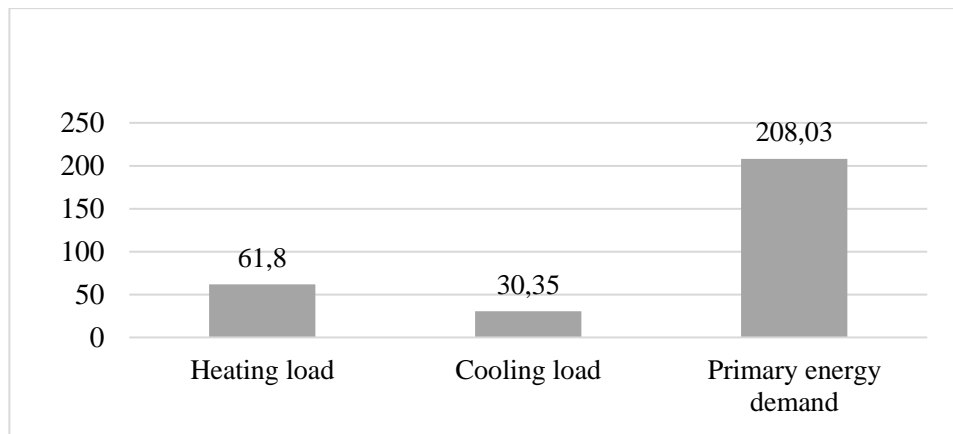
The heating load of the building in Sivas is lower compared to Adıyaman;

\*Shell insulation,

\*High day and night temperature difference in Adıyaman,

\*It is due to parameters such as façade openings.

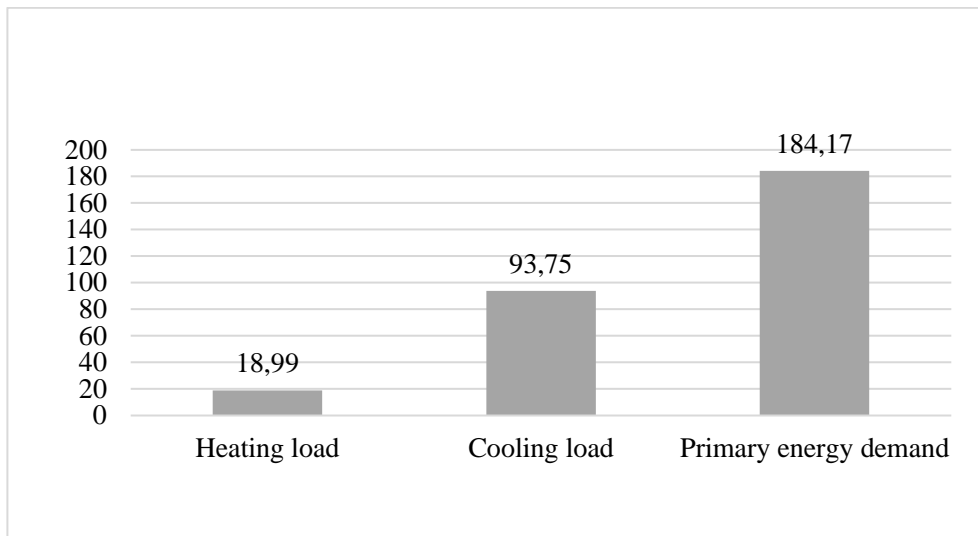
In the building located in Adıyaman, the primary energy demand increased due to the faster increase in the cooling load compared to the heating load, while in Sivas, the rapid decrease in the heating load decreased the primary energy demand.



**Figure 5.** Energy performance of Sivas local type Project (kWh/m<sup>2</sup>)

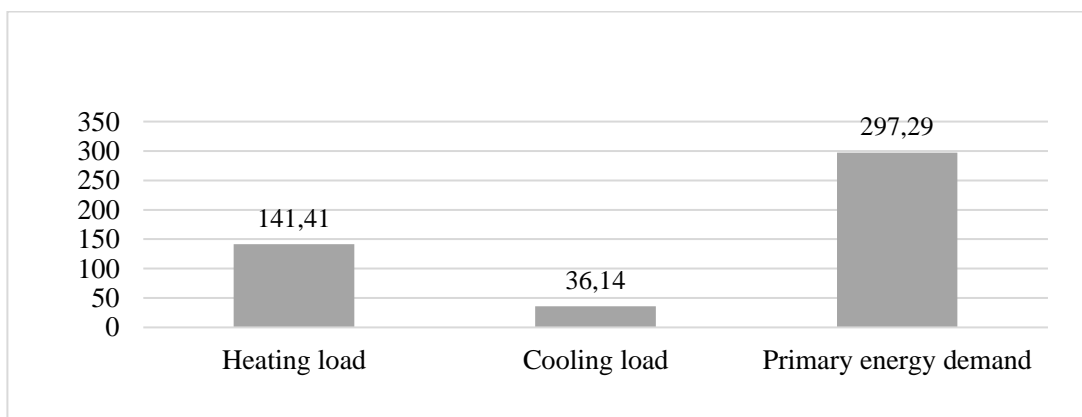
In the alternative scenario where the building in Sivas is assumed to be in Adıyaman, the energy demand is much lower compared to the building in Adıyaman due to reasons such as the higher proportion of openings on the north, east and west facades and higher shell insulation.

The current primary energy demand of 208.03 kWh/m<sup>2</sup> in Sivas is 184.17 kWh/m<sup>2</sup> in the scenario where the building in Sivas is assumed to be in Adıyaman, indicating that the building is actually more suitable for Adıyaman than Sivas (Figure 6).



**Figure 6.** Energy performance values when the project designed for Sivas is assumed to be built in Adiyaman

In the alternative scenario where the building in Adiyaman is assumed to be in Sivas (Sivas Alternative), the heating, cooling and primary energy demand is higher compared to the building in Sivas due to poor shell insulation and the roof type as a terrace (Figure 7).



**Figure 7.** Energy performance values when the project designed for Adiyaman is assumed to be built in Sivas

## **2. CONCLUSION and RECOMMENDATIONS**

In the study, energy performance simulation of the residential building typologies in Adiyaman and Sivas of the local architectural housing projects by the Ministry of Environment, Urbanization and Climate Change was carried out. In this context, the primary energy demand in Adiyaman increased due to the faster increase in the cooling load compared to the heating



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

load, while the rapid decrease in the heating load in Sivas reduced the primary energy demand. When the projects were analyzed in terms of space organization, material and shell design, many errors were identified. In addition, as a result of testing the projects in opposite climatic zones, it is shown that the structure designed for Sivas is more suitable for Adıyaman than for Sivas. In this sense, the local houses designed by the state should be reconsidered with the right design decisions. It is not possible to achieve success in terms of energy performance of projects that do not take into account climate-appropriate design decisions.

Improving energy performance in building design is directly related to the decisions made in the early design phase. These decisions should be analyzed with simulation programs in the preliminary design phase. For a more sustainable environment, it is essential to design buildings with an energy efficient design approach.

### **Thanks and Information Note**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MONITORING OF SÜNNET LAKE NATURAL PARK THROUGH GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING METHODS

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#### ABSTRACT

Wetlands have been negatively affected in recent years by factors such as urbanization, industrialization, agricultural activities, human activities, and the potential impacts of climate change. Sünnet Lake Natural Park, located in the Bolu province of Türkiye, stands out as an important wetland due to its natural beauty, flora and fauna diversity, and recreational potential. However, as in many other wetlands, these kinds of effects exert pressure on this area. In this study, Geographic Information Systems (GIS) and Remote Sensing (RS) methods have been used to determine the current status of the Sünnet Lake Natural Park, monitor potential threats for the lake and its surroundings, and develop conservation strategies. Accordingly, the study first reveals the natural, cultural, and recreational resource values of Sünnet Lake and its surroundings. The long-term changes in the area and its surroundings were monitored with the help of satellite images and remote sensing methods within the scope of the study. The potential impacts of human activities on the region, global climate change that we are combating at a global scale, and other natural factors' effects on these results were researched. The numerical results obtained in the study suggest that they can provide data that could guide the development of sustainable conservation and management strategies for such ecosystems

**Keywords:** Lake, natural park, protected areas, GIS, Bolu, Türkiye.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Human beings have interacted with the environment they live in, either positively or negatively, from past to present. Human beings have significantly affected the number and quantity of natural areas as a result of their destructive activities against nature. This has negatively affected natural areas (Yeşil & Hacıoğlu, 2018). The realization that this negative impact on natural resources causes irreversible consequences has triggered initiatives to protect these resources. In this context, efforts to preserve biological diversity have led to the declaration of protected areas in many parts of the world. Protected areas are of critical importance due to their features in terms of protecting and maintaining biological diversity (Akten & Gül, 2014).

Natural resources are of great importance in meeting the outdoor recreation needs of the society, which arise for the purpose of spiritual and physical renewal with nature and whose importance has reached international dimensions today. Chief among these are forests, unspoiled nature pieces and areas that have preserved their natural quality (such as National Park, Nature Reserve, Natural Park, Natural Monument, Special Environmental Protection Area) (Demirel, 1999).

The evaluation of the measures taken for conservation within the framework of the law, the carrying out of systematic nature conservation studies within the framework of the law, the separation of protected areas, the conduct of scientific studies on these issues, and the emergence of international organizations within the scope of conservation activities date back to the 19th and 20th centuries (Surat et al., 2014). In our country, areas within the forest regime that can be used for recreation/tourism purposes have been determined by law. For this purpose, according to the National Parks Law No. 2873 dated 1983, among the natural areas to be given protection status (National Parks, Natural Parks, Nature Conservation Areas, Natural Monuments), only National Parks and Natural Parks have been determined to serve recreation/tourism purposes (Gül et al. al., 2005). In this context, one of the most important natural recreational areas in our country is Natural Parks. Natural Parks in the National Parks Law No. 2873; it is defined as “pieces of nature with vegetation and wildlife features, suitable for public recreation and entertainment within the integrity of the landscape” (National Parks Law, 1983; Özen Öztürk & Gül, 2020).

Vegetation areas and wetlands with high ecological richness, which have an important place for living life; it has many functions in environmental, social, economic and recreational aspects (providing habitat, ensuring environmental sustainability, etc.) (Halls, 1997; Faruque et al.,





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

2022). Even though these areas with various characteristics are protected, they can turn into ecosystems that are gradually shrinking and disappearing due to the effects of both climate change and human activities. These areas have been negatively affected by factors such as increasing population and the resulting needs, as well as human activities and the potential effects of climate change in recent years.

While measures such as protection and maintenance can be carried out easily and effectively in urban areas, destruction, pollution and deterioration due to anthropological effects manifest themselves more intensely in areas outside the city where protection and control are more difficult. In this context; In order for nature not to be destroyed and not to lose its unique resource values, some areas need to be managed by taking into account the conservation-use balance (Yeşil & Hacıoğlu, 2018). Sünnet Lake Natural Park, located in the Bolu province of Turkey, is an important wetland that stands out with its natural beauty, flora and fauna diversity, and recreation potential. However, such impacts put pressure on this area, as on many other wetlands.

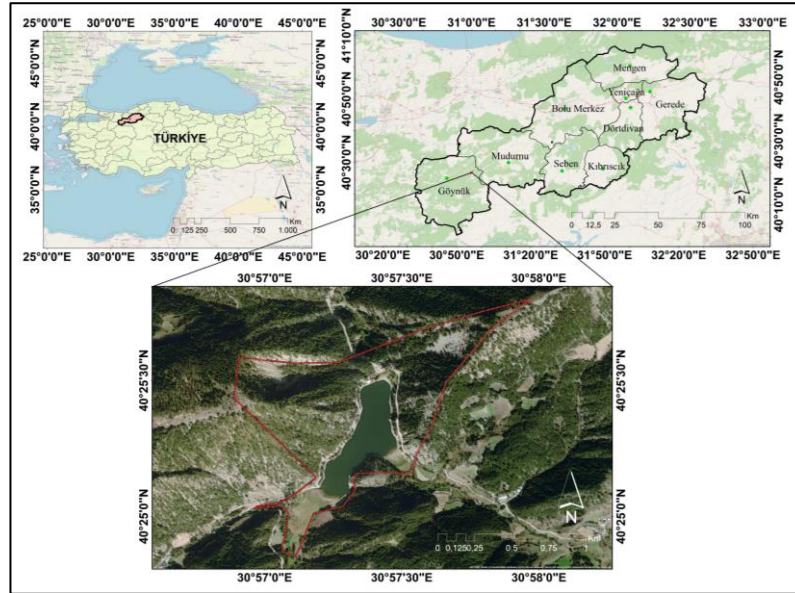
In this study, it was aimed to determine the current status of Sünnet Lake Natural Park, to monitor potential threats to the lake and its surroundings, and to develop recommendations for protection in this context. In this context, Geographic Information Systems (GIS) and Remote Sensing (RS) methods were used. In this direction, first of all, the natural, cultural and recreational resource values of Sünnet Lake and its surroundings were revealed in the study. Within the scope of the study, the change of the area and its surroundings in the 10-year period after the declaration of the Natural Park was monitored with the help of satellite images and remote sensing methods. The potential effects of human activities on the region, as well as the effects of climate change and other natural factors that we are struggling with on a global scale, on these results have been investigated.

## **2. MATERIALS and METHODS**

### **2.1. Material**

Sünnet Lake Natural Park is located 22 kilometers east of Göynük District of Bolu. It is 105 km away from Bolu center. Its altitude above sea level is 1060 m. Located between Erenler and Korudağ Hills, the lake is a typical landslide set lake formed as a result of the deep valley between these hills being blocked by landslide. Its area is 18 hectares. The lake is fed by Karaköy stream from the south, Kuru stream from the southwest and Gölbaşı stream from the southeast. The depth of the lake is 22 meters (Hoşgören & Ekinçi, 2004; URL-1, 2023; T.C.

Ministry of Agriculture and Forestry, 2023a). The location map of the research area is given in Figure 1.



**Figure 1.** Location Map of Sünnet Lake Natural Park

## 2.2. Methods

Landsat series satellite images were used to detect the change of Sünnet Lake over the years using remote sensing techniques. Such temporal changes in lakes can be calculated through Landsat Thematic Mapper (TM) and Landsat Enhanced Thematic Mapper Plus (ETM+) and The Operational Land Imager (OLI) images (Mu et al., 2020; Ashraf & Nawaz, 2015). Landsat 5 TM and Landsat 8 OLI\_TIRS images used in the study were downloaded free of charge from the United States Geological Survey (USGS). The cloudiness rate of these images is less than 10%. In the selection of images, images from July were used to prevent differences arising from seasonal water status changes. The features of the images used in the study are given in Table 1.

**Table 1.** Features of satellite images used in the study

Acquisition Date	Path/Row	Satellite	Sensor	Cloud cover	Spatial resolution	Temporal resolution
11/07/2011	178/032	Landsat 5	TM	< 10%	30x30 m	16 gün
08/07/2019	179/032	Landsat 8	OLI_TIRS		30x30 m	16 gün
29/07/2021	179/032	Landsat 8	OLI_TIRS		30x30 m	16 gün

Many water indices are used to detect water-covered areas (Wicaksono and Wicaksono, 2019; Mutlu et al., 2020; Yılmaz, 2023). Although it varies depending on the characteristics of the



research area, it has been proven in many studies that mNDWI gives more successful results than other indices in distinguishing wetlands from other land uses (Szabo et al., 2016; Güleci et al., 2019; Topal and Baykal, 2023).

The mNDWI was developed by Xu (2006) based on the water index model developed by McFeeters (1996). In the developed model, unlike McFeeters (1996), mid-infrared range (MIR) was used instead of near-infrared range (NIR). In the NDWI index, open water and residential areas are represented with a positive value. This can cause confusion in areas with high construction. In this index, Xu (2006) replaced the NIR band with the shortwave infrared 1 (SWIR1) band to separate the residential pixels from the water pixel, calling it the modified Normalized Difference Water Index (mNDWI). In this way, it reduced the mixing of open water bodies with residential areas (Ludwig et al., 2019). mNDWI is calculated with the following formula:

$$\text{mNDWI} = (\text{Green} - \text{SWIR1}) / (\text{Green} + \text{SWIR1})$$

According to this calculation, the resulting value varies between -1 and +1. According to Xu (2006), positive values above 0 indicate water, and values less than and equal to 0 indicate soil and plant areas. When the threshold value was set to 0 for mNDWI, a highly accurate classification was achieved (Xu, 2006; Karaman et al., 2011).

Producer accuracy, user accuracy, overall accuracy (OA), and kappa coefficient (kappa) were used to evaluate the accuracy of the generated maps (Jiang et al., 2021; Lombana & Martinez-Grana, 2022). For this purpose, a total of 70 sampling points were selected in the research area. High-resolution images were used as reference data to verify and set random sampling points, and then ground reference points were established. The accuracy of the method was evaluated by applying four evaluation indexes. For this purpose, a confusion matrix was created. By comparing the extracted water and non-water points with the reference data, four types of pixels were obtained (Table 2) (Acharya et al., 2018):

True positive (TP): The number of water pixels correctly extracted;

False negative (FN): Number of water pixels not detected;

False positive (FP): The number of incorrectly extracted water pixels; And

True negative (TN): Number of out-of-water pixels correctly rejected

These:

**Table 2.** Confusion matrix

		Reference Data		
		Water	Non- Water	User
Classified Data	Water	TP	FP	TP + FP
	Non-Water	FN	TN	FN + TN
Producer		TP + FN	FP + TN	T = TP + FP+ FN + TN

$$\text{Producer's accuracy} = \frac{TP}{TP + FN}$$

$$\text{User's accuracy} = \frac{TP}{TP+FP}$$

$$\text{Overall accuracy} = \frac{TP+TN}{T}$$

$$\text{Kappa coefficient} = \frac{T(TP + TN) - ((TP + FP)(TP + FN) + (FN + TN)(FP + TN))}{T^2 - ((TP + FP)(TP + FN) + (FN + TN)(FP + TN))}$$

### 3. FINDINGS and DISCUSSION

#### 3.1. Natural and cultural landscape characteristics of the research area

##### 3.1.1. Natural landscape characteristics of the research area

The lake surroundings are generally surrounded by old larch forests. According to the studies carried out in the lake and its surroundings, 88 families, 225 genera and 268 taxa belonging to these genera were identified in the area. There are a total of 6 endemic plant taxa in the research area and its immediate surroundings. Among these endemic taxa, except Foxglove, the others are geophytes and these species are generally found under and in the open spaces of larch forests in the region. As a result of the observations, it was observed that endemic plant species were concentrated in the forest areas in the north, west and south of the Natural Park, and some of these species were encountered to a lesser extent on the edges of the floodplains at the points where Karaköy Stream and Gölbaşı Stream meet the lake (T.C. Ministry of Agriculture and Forestry, 2023a).

According to the literature, there is a salamander species in the area. Frogs are divided into two groups: land and water frogs, and there are six different frog species in the area. There are 12 reptile species, six species in the Lacertilia suborder, which includes lizards belonging to the Squamata order, and four species in the Serpentes (Ophidia) suborder, which includes snakes. According to the literature, according to faunistic observations made in the immediate vicinity of the area, species belonging to the groups of mammals, insectivores, bats, rabbits, rodents,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

predators and hoofeds were examined and 23 species were identified (T.C. Ministry of Agriculture and Forestry, 2023a).

### 3.1.2. Cultural landscape characteristics of the research area

Göynük District is one of the rare Ottoman towns with its current state and historical texture intact. Göynük is rich with historical values such as residences, workplaces, baths, mausoleums, cemeteries and historical plane trees, the oldest of which is approximately 700 years old, and these works still continue their functions. In the district, which is still a living history with these values, cultural values and traditions, clothing, local folklore, local culinary culture and social relations are still kept alive while preserving their originality. In addition to the protected structures in the district, the entire residential area is an urban protected area. In 1991, with the joint work of the Bank of Provinces, Göynük Municipality and the Cultural and Natural Heritage Preservation Board, the “Conservation Plan” was prepared and put into effect (T.C. Ministry of Agriculture and Forestry, 2023a).

### 3.2. Protected area status of the research area

Sünnet Lake Natural Park, located in Bolu province, has been declared a protected area within the scope of the National Parks Law No. 2873. As of today, it is one of 266 natural parks. Protected Area National Classification Code is 05.01.0158. It is affiliated with the Region IX Directorate of the Ministry of Agriculture and Forestry. The protected area is 88.24 ha. It is located at latitude 40.424014 and longitude 30.956053 (T.C. Ministry of Agriculture and Forestry, 2023b).

### 3.3. Recreation opportunities offered by the research area

There are infrastructure and superstructure facilities within the Natural Park. Within the area, there are workers' huts, accommodation units, transformers, water tanks, children's playgrounds, toilets, prayer rooms, fountains, countryside coffeehouse, local product sales point-market, pier, wooden bridge, countryside restaurant, pergola, picnic areas and forest surrounding the lake (T.C. Ministry of Agriculture and Forestry, 2023a).

Accommodation is possible in the Hotel complex located within the Natural Park. There is an accommodation facility here, run by the private sector, with a capacity of 45 rooms and 115 beds (URL-1, 2023). Sünnet Lake Natural Park offers scenic beauties and recreational opportunities for visitors with its forest and lake landscapes. According to its resource values, it offers natural values such as forest, lake, plateau, and in terms of recreation value, it offers accommodation, daily use, photo safari and tent camping opportunities. In the Natural Park;



hiking, cycling, canoeing in the lake, picnic, sports, etc. angling activities are available. The Natural Park attracts many visitors, especially on weekends, with its proximity to provincial centers such as Bolu, Sakarya and Ankara, its ease of transportation, and its natural resource values (T.C. Ministry of Agriculture and Forestry, 2023a; T.C. Ministry of Agriculture and Forestry, 2023b). Some views from Sünnet Lake Natural Park can be seen in Figure 2.

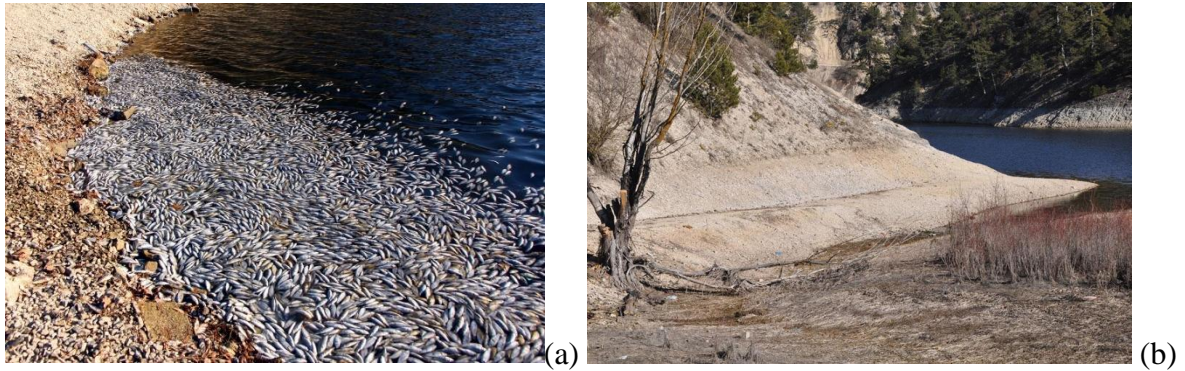


**Figure 2.** (a) Sünnet Lake general view, (b) accommodation in Sünnet Lake, (c) picnic areas, (d) canoeing (URL-2-5, 2023)

### 3.4. Some Problems of the Research Area

Sünnet Lake in the Natural Park is extremely popular for angling, although it is prohibited (URL-1, 2023). Among the fish caught in the lake are mullet, carp, tench and Abant trout. Fishing activities, which are currently prohibited, are carried out intensively, especially on weekends, on the existing wooden pier on and around the lake shore and on the bridge located at the intersection of Göldümen Hill and Gölbaşı Creek on the eastern borders of the lake (T.C. Ministry of Agriculture and Forestry, 2023a). Figure 3 shows the mass fish deaths in the lake and the receding of the lake waters in 2021 and 2023, respectively.

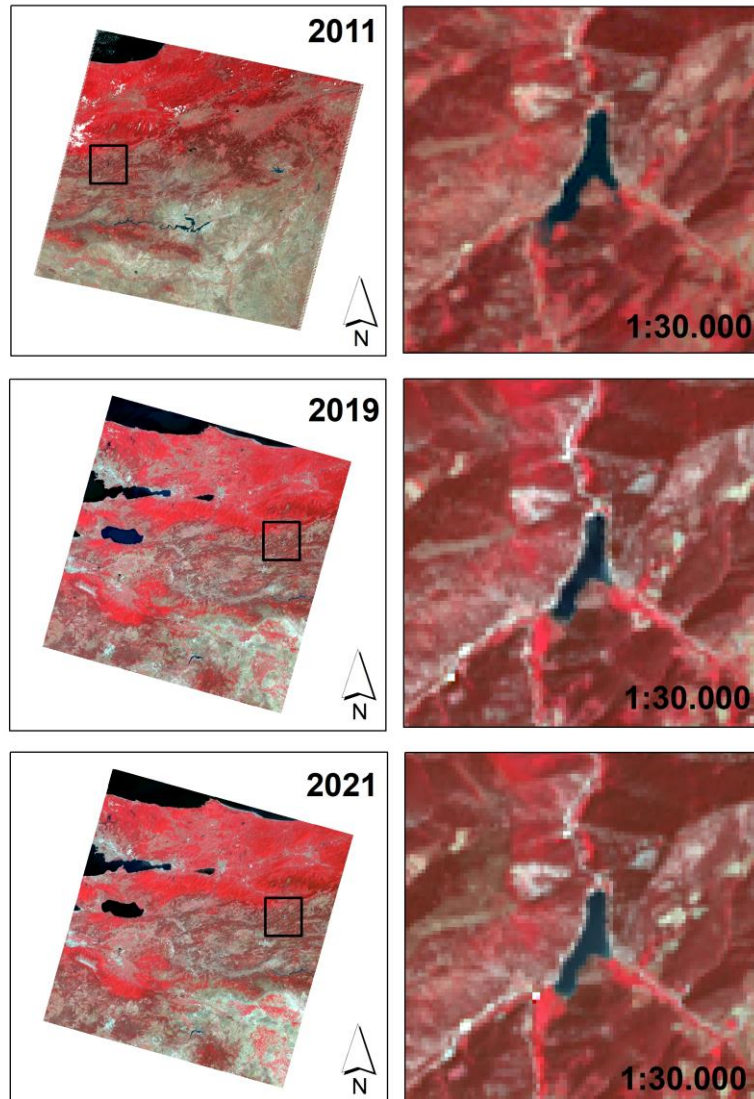




**Figure 3.** (a) Mass fish deaths, (b) receding of the lake waters (URL-6-7, 2023)

### **3.5. Monitoring the Research Area with Geographic Information Systems (GIS) and Remote Sensing (RS) Methods**

In the study, the research area was evaluated in terms of vegetation, water and other areas with band combinations of Landsat satellite images. Accordingly, Color Infrared (vegetation) images were obtained using 4-3-2 bands for Landsat 5 and 5-4-3 (near infrared, red and green) bands for Landsat 8 (Figure 4). Since chlorophyll reflects near infrared light, vegetation analysis can be performed with this band combination. In these images, bright red areas represent vegetation areas, dark black areas represent water availability, and white areas represent urban texture. The results showed that the most significant change in the lake and its immediate surroundings was in the water area. Additionally, when we look at the images, we see a decrease in the vegetation areas of the lake and its surroundings in 2019. It is thought that the increase in landslide exposure is effective in this result.

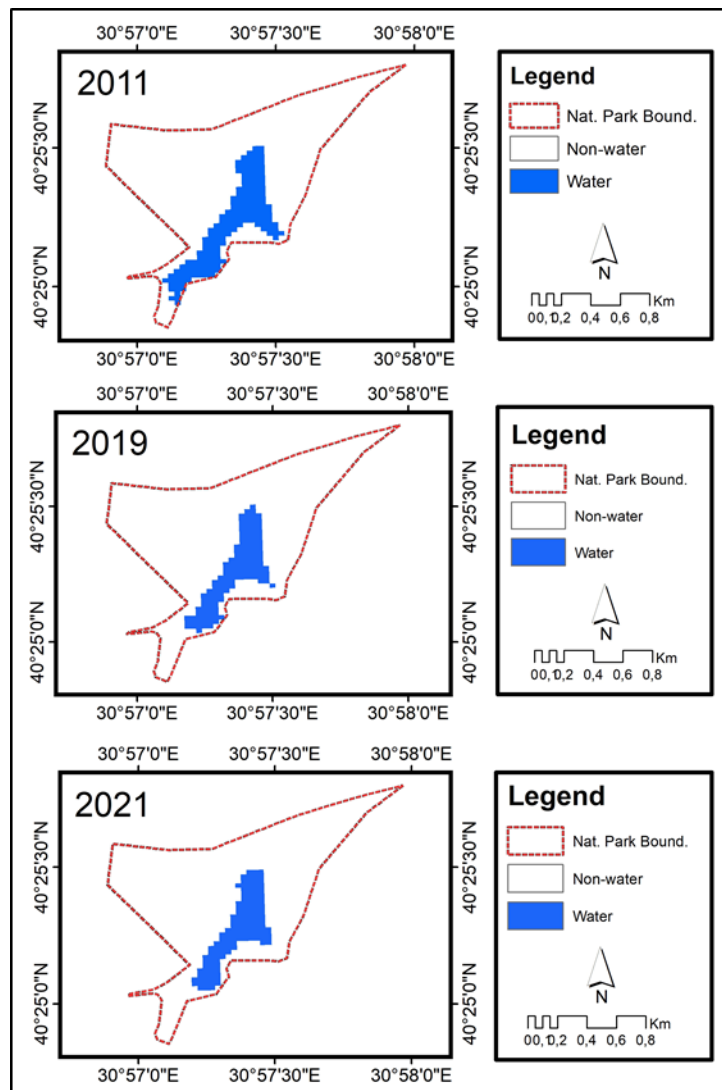


**Figure 4.** Color Infrared image of the research area in 2011, 2019 and 2021

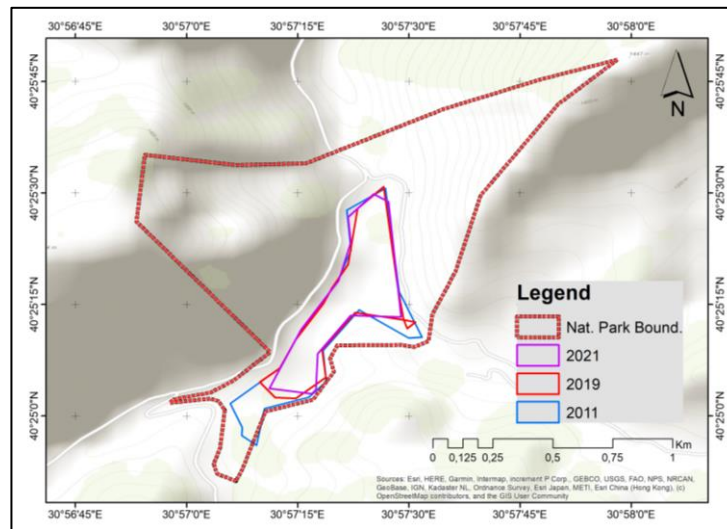
In the study, maximum, minimum, mean and standard deviation ( $\sigma$ ) values, which are classical statistical parameters, were examined. These results are seen in Table 3. According to the results of the mNDWI analysis, the lake area was calculated as 16.03 ha in 2011. By 2019, it was observed that the lake area decreased by -24% to 12.25 ha. By 2021, it was observed that the shrinkage in the lake area continued and the lake area was calculated as 11.88 ha. These results reveal that the lake shrank by -26% from 2011 to 2021 (Figure 5). The changes for the relevant years are presented in Figure 6 by obtaining the data as a vector. When you look at the image, the shrinkage in the lake is evident.

**Table 3.** Characteristics of the satellite images used in the study

Year	mNDWI Min	mNDWI Max	mNDWI Mean	mNDWI Dev.	Std.
2011	-0,31047	0,099433	-0,17289	0,058649	
2019	-0,3211	0,071657	-0,15946	0,053984	
2021	-0,32236	0,080074	-0,1511	0,057476	



**Figure 5.** mNDWI results of Sünnet Lake for the years 2011, 2019 and 2021



**Figure 6.** Water boundary lines of Sünnet Lake in 2011, 2019 and 2021, according to mNDWI results

### 3.5.1. Accuracy analysis of mNDWI results

The accuracy of the results of each year of the water mass extraction index mNDWI, which is used in mapping water and other areas for Sünnet Lake, was evaluated by applying Producer's Accuracy, User's Accuracy, Overall Accuracy and Kappa coefficient statistics. Overall Accuracy value was calculated as 94.29, 92.86, 97.14 for the years 2011, 2019 and 2021, respectively. Kappa values were calculated as 0.88, 0.85 and 0.94 for the relevant years, respectively (Table 4). The results showed that the mNDWI gave successful results with high accuracy in water extraction. Overall accuracy values above 90 percent and high kappa values calculated separately for each year showed that this index worked well.

**Table 4.** Accuracy analysis results of mNDWI values

		Producer's Accuracy		User's Accuracy		Overall Accuracy (%)	Kappa coefficient
		W* (%)	N* (%)	W* (%)	N* (%)		
<b>nMDWI</b>	<b>2011</b>	100.00	90.91	86.67	100.00	94.29	0.88
	<b>2019</b>	100.00	88.89	83.33	100.00	92.86	0.85
	<b>2021</b>	100.00	95.24	93.33	100.00	97.14	0.94





### **3. CONCLUSION and RECOMMENDATIONS**

In this study, Sünnet Lake Natural Park was monitored using Geographic Information Systems (GIS) and Remote Sensing (RS) methods. Images revealing vegetation, water and other areas using bands of high-resolution Landsat satellite images and results of mNDWI have shown that landslide areas around Sünnet Lake have increased, vegetation has become weaker and the lake area has shrunk by 26% between 2011 and 2021. mNDWI used in water surface area extraction gave high accuracy results. One of the common methods is to evaluate water resources and surrounding land cover situations and model them with remote sensing methods. In this context, multispectral satellite images have been found to be useful in providing important numerical information for ecosystem-based planning studies. The numerical results obtained in the study can be guiding in providing data for the development of sustainable conservation and management strategies for such ecosystems. Suggestions for the method used in the study are as follows: (1) More comprehensive results can be obtained by expanding the study years, (2) 30 m resolution Landsat data was used in this study, the result sensitivity can be increased with higher resolution data, (3) Since the water level will vary according to seasons, Analyzing images from different seasons can expand the scope of the study, (4) Land changes can be revealed in more detail by using different indexes and methods.

Natural parks are very important areas to meet recreational demands thanks to their ecological richness. However, as shown in the example of Sünnet Lake, these areas can be destroyed when protection and use are not ensured well. As a result of the investigations, it is thought that the following factors may be effective in the emergence of these results: the area's continued exposure to landslides due to the fact that it is a landslide barrier lake, the temperature and precipitation being outside the seasonal norms as a result of global climate change, the effects of which we have felt more in recent years, the area being under recreational pressure, the public unconscious behavior regarding conservation and increasing environmental pollution.

The biggest problem of protected areas in our country is that although they are protected by law, they cannot be protected in line with their purposes after they are planned. As a matter of fact, the area, which was taken under protection in 2011, is faced with many problems today. For this reason, it is necessary to take measures to ensure the sustainability of resources through laws, to implement conservation objectives, and to make administrative arrangements that contribute to the development of the region. In this context, development and management



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

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plans are especially important. On the other hand, visitor management in these areas is also very important. It is a great necessity to raise public awareness about conservation.

As a result, sustainable planning and management studies are very important for both the protection of biological diversity and the reduction of environmental problems that we are increasingly affected by. Thus, they can contribute to the development of these areas and be passed on to future generations.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RURAL AREA PLANNING AND ITS ECOLOGICAL FOUNDATIONS

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#### ABSTRACT

Rural is defined as "spaces outside urban areas". Rural life and rural-related economic activities depend significantly on the direct use and utilization of natural resources. Today, it is an important fact that the urban-rural balance is developing and differentiating dramatically at the expense of natural-rural areas and that a large part of the environments we live in with increasing population and global economic mobility are shaped by human hands. The planning developments of rural areas are directed by Zoning Law No. 3194, which is content for the zoning of urban areas. The economically oriented agricultural activities carried out with the characteristics of rural areas that are protected/need to be protected in terms of the ecological and cultural values they contain do not make them possible to evaluate and plan these areas as an "equivalent asset to the city". In our country, there is no legal basis for "Rural Planning". However, apart from the "Village Law" numbered 442, which was enacted in 1924, Municipal Laws and legal regulations based on the Zoning Law No. 3194 are important legislations that include the regulations in rural areas. In the direction of physical development in rural areas, the emphasis on "rural development" projects financed by external resources after the 1970s can be cited as one of the most important reasons why Regional Plans are not adequately addressed, and rural planning is not given enough importance in our country. Policies related to urban and rural areas are mostly considered separately from each other and problems related to rural areas are addressed with a piecemeal approach. In many studies for the development of rural areas, it has been mentioned that issues such as increase in agricultural production are mostly mentioned. The fact that the majority of the "special quality areas" are in the status of rural areas and the negative effects of the tourism purpose plans, national park development plans and special environmental plans on all natural and cultural resources underline the importance of planning studies in rural areas. In this paper, within the scope of the TÜBİTAK-KAMAG Project titled Conservation-Oriented Rural Area Planning: A Model Proposal (KOKAP), the process for rural area planning will be defined, and an approach based on the natural values of the rural will be mentioned and the techniques and methods to be used to integrate ecological sensitivities into spatial planning will be discussed and the information will be given about the legal and administrative changes to be made.

**Keywords:** rural planning, ecology, spatial planning, KOKAP



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION/Rural Planning

Action Area of Planning: "The Entire Country is the place". All actors of the country, different disciplines and their areas of interest, solution proposals and the products they produce are not independent of each other and there is direct or indirect interaction between them. Physical planning paradigms that are accepted as valid in the World,

They were formed according to the social realities of these countries. It is therefore consistent with the realities of the society in which it develops, both in terms of social support and economic resources (*İlhan TEKELİ*)

Rural is defined as "spaces outside urban areas". Rural life and rural-related economic activities depend significantly on the direct use and utilization of natural resources. Today, it is an important fact that the urban-rural balance is developing and differentiating dramatically at the expense of natural-rural areas and that a large part of the environments we live in with increasing population and global economic mobility are shaped by human hands.

The legislation on rural area planning in Turkey lacks spatial regulation tools that can achieve the goals of rural development and improving the quality of life.

Village Settlement Plan made within the scope of Village Law No. 442, which is a plan limited to the creation of new housing parcels and the introduction of some equipment for those living in villages outside the municipal borders.

- Plans Defined in Laws Related to Disaster and Settlement and
- Plans focusing on construction are being made in the villages within the scope of TOKİ applications (*Öğdül et al.,2018*).
- 

The inadequacy of the legislation regarding the planning of rural areas and the absence of "Legal Fundamentals of Rural Planning" in our country indicate that the intervention tools regarding rural area planning in Turkey need to be redefined.

The planning developments of rural areas are directed by Zoning Law No. 3194, which is content for the zoning of urban areas.

The economically oriented agricultural activities carried out with the characteristics of rural areas that are protected/need to be protected in terms of the ecological and cultural values they contain do not make them possible to evaluate and plan these areas as an "equivalent asset to the city".



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The economically oriented agricultural activities carried out with the characteristics of rural areas that are protected/need to be protected in terms of the ecological and cultural values they contain do not make these areas as an "equivalent asset to the city".

In the direction of physical development in rural areas, the emphasis on "rural development" projects financed by external resources after the 1970s can be cited as one of the most important reasons why Regional Plans are not adequately addressed, and rural planning is not given enough importance in our country.

Policies related to urban and rural areas are mostly considered separately from each other and problems related to rural areas are addressed with a piecemeal approach.

### LEGAL REGULATIONS IN RURAL AREA PLANNING

Important Legislations Containing Regulations in Rural Areas Today

- Village Law No. 442 dated March 18, 1924: Regulation of Village Settlement Plans
- "Unplanned Areas Zoning Regulation" issued based on the Zoning Law No. 3194
- "Special Provincial Administration Law" No. 5302 (2005) (preparation/approval of provincial environmental plans, construction/approval of village settlement plans, realization of infrastructure and superstructure investments for rural areas,

There is no direct legal regulation regarding settlements in rural areas and mountainous areas, but some regulations have been introduced that indirectly affect rural settlements and mountainous areas.

- Municipal Law" No. 5393, issued on 3/7/2005,
- "Metropolitan Municipality Law" numbered 5216, enacted on 10/7/2004 and
- "Law No. 6360 on the Establishment of Metropolitan Municipalities and Twenty-six Districts in Thirteen Provinces and Amendments to Certain Laws and Decree Laws" issued on 12.11.2012.

With the law no. 6360, the borders of the metropolitan municipality were expanded as provincial borders to include rural areas, and therefore mountains and mountainous areas. The new administrative and managerial structure established in metropolitan municipalities has undoubtedly had a direct and indirect impact on mountainous area settlements.

In the "*National Rural Development Strategy II*" covering the period between 2014 and 2020, the main objectives are to improve the working and living conditions of the population living in rural areas in line with the urban areas in line with the aim of bringing the minimum quality



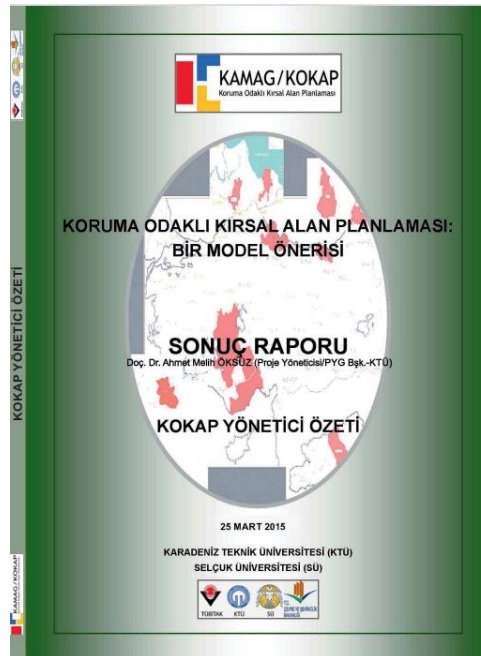
of life in rural areas closer to the Turkey average and to achieve this. expressed as making it sustainable.

*Sustainable Rural Area Management* is the formulation and implementation of necessary policies by planning with a holistic approach, considering the unique characteristics and living conditions of each of these areas, especially people, space, ecological structure and natural resources.

### **CONSERVATION-ORIENTED RURAL AREA PLANNING**

The project named Conservation-Oriented Rural Area Planning: A Model Proposal (KOKAP), Briefly known as the 1007 program by the Turkey Scientific and Technical Research Council (TÜBİTAK) Within the framework of the Public Institutions Research and Development Projects Support Program It is a supported project. The client institution of the project is the Ministry of Environment and Urbanization (Figure 1)

This research, which aims to create a model for how rural areas should be planned, will be a guide for the Ministry of Environment and Urbanization in planning rural areas. In this context, what the process steps will be for rural area planning, what methods and techniques will be used, and the legal and administrative changes that need to be made for this are suggested by this research.



**Figure 1.** Conservation-Oriented Rural Area Planning: A Model Proposal (KOKAP, 2015)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

In our country's zoning legislation, rural areas are not recognized as a separate planning level, but are handled within the scope of sectoral plans such as regional plan, environmental plan and tourism master plan, agriculture master plan.

Although plans were made for many basins in the 2000s and Regional Development Agencies were established to direct the implementation of the plans since 2006, the individualistic, sectoral approach of various public institutions has not changed, and institutional fragmentation has occurred (such as Village Services-Special Provincial Administration-Metropolitan) and is still continuing (KOKAP , 2015). Rural areas are under the jurisdiction of 18 institutions (Table 1).

**Table 1.** Institutions Responsible for Planning (Planning and/or Approving) (KOKAP, 2015)

Kurum	Alt birim	Kurum	Alt birim
Bakanlar Kurulu			Kalkınma Bak.(Kalkınma İdareleri ve Ajanslar)
Yüksek Kurullar	Boğaziçi İmar Yüksek Koor. Kurulu	Bakanlıklar	Kültür ve Turizm Bakanlığı
	Özelleştirme Yüksek Kurulu		Kültür Varlıkları Bölge Koruma Kurulu
	Bölgesel Gelişme Yüksek Kurulu		Orman ve Su İşleri Bakanlığı
Başbakanlık	TOKİ		Gıda, Tarım ve Hayvancılık Bakanlığı
	Afet ve Acil Durum Yönetim Kurumu Bşk.		Ulaştırma, Denizcilik ve İletişim Bakanlığı
Bakanlıklar	Çevre ve Şehircilik Bakanlığı		Valilik
	Bilim Sanayi Ve Teknoloji Bakanlığı	Belediye	Belediye
	Eneji ve Tabii Kay. Bak. (BOTAŞ/ Lisans sahibi firma)		Büyükşehir Belediyesi

Kaynak: Duyguluoer (2014)'den özetlenmiştir.

There are 26 Development Agencies in our country, and these agencies are affiliated with the Ministry of Industry and Technology.

Rural areas are included in the scope of more than 50 plan types (Table 2). The authority to make and implement plans granted to the sectors by sectoral laws also plays a big role in this.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 2.** Types of Plans Covering Rural Areas (KOKAP, 2015)

Plan türü	Plan türü
1/100000 ölçekli Çevre Düzeni Planı ( Birden çok il))	Mücvir Alan imar planı
1/250000 ölçekli Çevre Düzeni Planı (BİB)	Mücvir Saha planı (Çev. Düz. Planının ilk ismi)
1/500000 ölçekli Çevre Düzeni Planı (Ömek : Kocaeli)	Organize Sanayi Bölgesi imar planı
Bölge Eylem Planı	Özel Çevre Koruma Bölgesi Çevre Düzeni Planı
Bölge Planı (İmar Kanunu)	Özel Çevre Koruma Bölgesi İmar Planı
Bölge Planı (Kalkınma Ajansı- Düzey 2 bölgeler)	Özel Çevre Koruma Bölgesi Kıyı imar planı
Bölgesel Nitelikte Fiziki Plan (644KHK)	Özelleştirme Alanı Çevre Düzeni Planı
Bütünleşik Kıyı Alanları Planı	Özelleştirme Alanı imar planı
Doğal afetlerle ilgili planlama	Özelleştirme Alanı Kıyı imar planı
Doğalgaz Boru hattı imar planı.	Patlayıcı Madde Sahası İmar Planı
Endüstri Bölgesi imar Planı	Resen tasdik edilen planlar (Bakanlık)
Havza Planı	Sakınım Planı
İl Çevre Düzeni Planı	Sulama Alanı Uygulama Bölgesi köy imar planı
İl Stratejik Planı (ve Belediye Stratejik Planı)	Sulama Alanı Uygulama Blg. Tarımsal Arazi Kullanım Planı
Kentsel Dönüşüm ve Gelişim Bölgesi planı	Tarımsal Amaçlı Arazi Kullanım Planı
Kıyı Uygulama imar Planı (Bay. Ve İsk. Bak)	Teknoloji Geliştirme Bölgesi imar planı
Kıyı Yapılan Master Planı	Toplu konut iskan sahası planı
Koruma Amaçlı İmar Planı	Turizm amaçlı Kıyı imar planı
Köy imar planı	Turizm Master Planı
Köy Yerleşik Alan imar planı	Turizm Merkezi imar planı
Köy Yerleşme Planı	Türkiye Turizm Stratejisi Eylem Planı
Kültür ve Turizm Koruma ve Gelişim B. imar planı	Ulaşım Ana planı
Kültür ve Turizm Koruma ve Gelişim Bölgesi ÇDP	Ulaşım Master Planı,
Mekânsal Strateji Planı	Ulusal nitelikte fiziki plan (644KHK)
Metropolitan Nazım İmar Planı	Uygulama İmar planı
Mevzi İmar planı	Uzun Devreli Gelişme Planı
Milli Park Uzun Devreli Gelişme Planı	
Milli Park imar planı	Ülke Planı (İmar Kanunu)
	Yenileme Alanı imar planı

Kaynak: Duyguluier (2014)'den sadeleştirilerek alınmıştır.

Plan Grading» and «Plan Types (Spatial Plans Making Regulation)» and «KOKAP's Suggestion» in rural areas (Table 3-4-5).

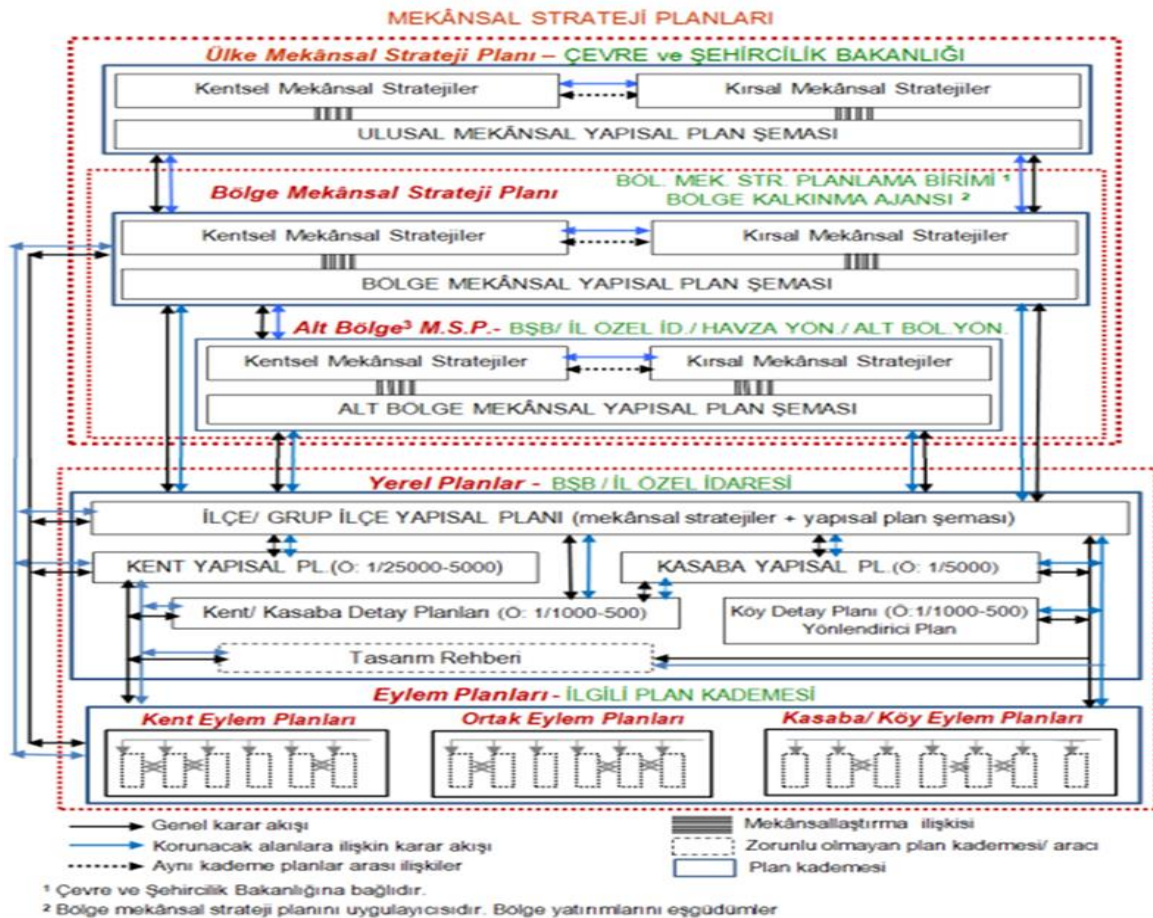
**Table 3.** KOKAP's Suggestion in rural areas (KOKAP, 2015)

Kentleşme Şurası (2009)		Mekânsal Planlar Yapım Yönetmeliği (2014)		KOKAP	
1	Ülke	1	Ülke	1	Ülke
2	Bölge /Alt Bölge <sup>1</sup>	2	Bölge	2	Bölge (IBBS 2)
3	Kentsel Bölge İlçe	3	İl (çevre düzeni planı için)	3	Alt Bölge Büyükşehir (IBBS 3) İl (IBBS 3) Bütünlük gösteren özel bölge <sup>2</sup>
		4	Yerleşme (bir ya da birden çok yerleşmenin tamamı ya da bir kısmı)		
4	Yerleşmeler		Özel alanlar: kıyılar, sulak alanlar	4	İlçe/ Grup ilçe <sup>3</sup> (IBBS 4) Kentsel yerleşmeler Kırsal yerleşmeler
				5	Kademe bağımsız-Eylem planları

Table 4. KOKAP study plan stages and relevant institutions

Kad.	Plan türü	Coğrafya	Kurumlar	Kurullarda temsil edilecek yönetim ve toplumsal örgüt
1	Ülke Mekansal Strateji Planı	Tüm ülke	<ul style="list-style-type: none"> <li>Ulusal Mekansal Strateji Planlama Kurumu</li> <li>Ulusal Mekansal Strateji Planlama Üst Kurulu</li> </ul>	
2	Bölge Mekansal Strateji Planı	İBBS (NUTS) 2	<ul style="list-style-type: none"> <li>Bölge Mekânsal Planlama Birimi</li> <li>Bölge Kalkınma Ajansı</li> <li>Bölge Mekânsal Planlama Kurulu</li> </ul>	<ul style="list-style-type: none"> <li>İl Kentsel Alanlar Belediyeler Birliği</li> <li>İlçe Kırsal Alanlar Belediyeler Birliği</li> <li>İlçe Köy Muhtarlar Birliği</li> </ul>
3	Alt Bölge (İl/ Büyükşehir/ Havza/ ...Alt Bölge) Mekansal Strateji Planı	İBBS 3	<ul style="list-style-type: none"> <li>İl/ Büyükşehir/ Havza/ ...Alt Bölge Mekânsal Planlama Bürosu</li> <li>İl/ Büyükşehir/ Havza/ ...Alt Bölge Kalkınma Ajansı Bürosu</li> <li>İl / Büyükşehir/ Havza/ ...Alt Bölge Mekânsal Planlama Kurulu</li> </ul>	<ul style="list-style-type: none"> <li>İlçe Kırsal Belediyeler Birliği</li> <li>İlçe Köy Muhtarlar Birliği</li> </ul>
4	Yerel Planlar <ul style="list-style-type: none"> <li>İlçe Yapısal Planı</li> <li>Kent/ Kasaba Yapısal Planı</li> <li>Kent/ Kasaba Detay Planı</li> <li>Köy Yapısal/ Detay Planı</li> <li>Tasarım Rehberi</li> </ul>	BBS 4 Kent, Kasaba,  Köy (İBBS 5)	<ul style="list-style-type: none"> <li>İlçe Mekansal Planlama Bürosu</li> <li>İlçe Mekansal Planlama Kurulu</li> <li>Kent/ Kasaba Mekansal Planlama Kur.</li> <li>Köy Kurulu</li> </ul>	<ul style="list-style-type: none"> <li>İlçe Kırsal Belediyeler Birliği</li> <li>İlçe Köy Muhtarlar Birliği</li> <li>Kent/ Kasaba/ Köy Mahalle Engelli Temsilcisi/ Temsilcileri</li> <li>Kent/ Kasaba/ Köy Mahalle Kadın Temsilcisi/ Temsilcileri</li> <li>Kent/ Kasaba/ Köy Mahalle Erkek Temsilcisi/ Temsilcileri</li> <li>Kent/ Kasaba/ Köy Mahalle Gençlik Temsilcisi/ Temsilcileri</li> </ul>
5	Eylem Planı	Her kademe	Kamu, Özel, Kamu-Özel	

Table 5. Plan gradation proposed in the KOKAP study (KOKAP, 2015)





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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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### **RESULT and EVALUATION**

#### **PROBLEM**

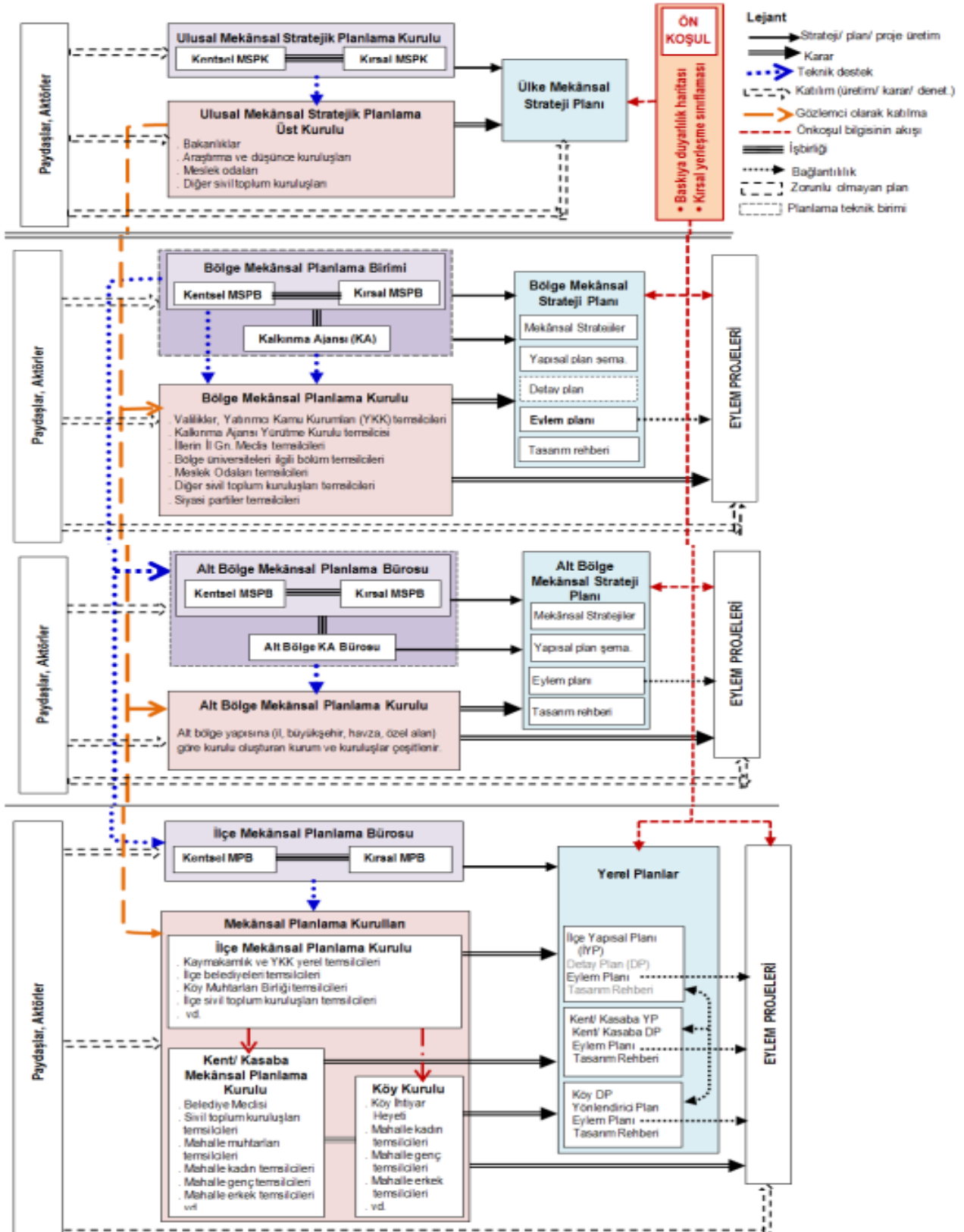
It does not guide sub-scale plans due to the absence of a spatial planning system and strategies associated with national development planning.

#### **SOLUTION**

- The zoning planning approach and its implementation is not limited to the physical arrangement dimension, but takes on new roles in producing livable and sustainable spaces in terms of ecological, social, spatial and environmental aspects.
- Due to the lack of the concept of rural planning, plan levels and norms in our current planning system and the fact that rural areas are losing their identity, the Development Plan designed in urban context needs to be reconstructed to include Rural Planning and Rural settlements, as given in the example (Table 6).



**Table 6.** Proposal Plan Levels, Institutional Structure and Relationship







## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A CRITIQUE OF PROTECTED AREAS MANAGEMENT EFFECTIVENESS ASSESSMENTS IN TURKEY

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#### **ABSTRACT**

In Turkey, legal and administrative works and procedures for protected areas are developing rapidly. The sustainability of the resource values of protected areas can be realised with effective management. For this reason, it is crucial to determine the "Management Effectiveness of Protected Areas" and to establish control mechanisms at certain time intervals. Whether the protected areas in the world and Turkey have a healthy structure is evaluated with various "Management Effectiveness" scales. Management effectiveness requires the evaluation of protected areas according to separate sub-criteria for Planning, Organising, Execution, Coordination and Supervision, which are the functions of management. Many Protected Areas Management Effectiveness data collection tools and methods have been developed since the 1990s to monitor the management effectiveness of protected areas. This study analyses management effectiveness evaluation approaches developed for protected areas worldwide and in our country. Rapid Assessment and Prioritization of Protected Area Management, the management effectiveness assessment systems used extensively in our country, are examined regarding management functions. The criteria used in implementing both systems in Turkish protected areas and the compatibility of these criteria for the Planning, Organising, Execution, Coordination and Supervision functions of management are critical and have not been discussed. This discussion will also provide essential contributions to decision-makers in the senior management of protected areas in Turkey.

**Keywords:** Protected Areas, Management functions, management effectiveness assessment systems



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1-GİRİŞ

Korunan alanların ilk ilanından 1872 Yellowstone Milli Parkı (Amerika) günümüze kadar geçen süreçte oldukça büyük değişimler ortaya çıkmıştır. Ancak bu değişim ve gelişmeler yeterli görülmemektedir. Korunan alanlar için ilk ve en önemli noktalardan birisini de “*korunan alan*” anlamı ve içeriğidir (Kurdoğlu, 2007; Gül, 2018; Atmış vd., 2020; Gül ve Kurdoğlu, 2021; Gül ve Metin, 2021, Demirel 2023; Gül, 2023). Bu korunan alanların ne amaçla korunması gerektiğinin temel ölçütünü oluşturmaktadır. Korunan alanların ülkemizdeki statüleri bu anlamda önemlidir. Her bir sayal statü için değişik yaklaşımlar oluşturulmuştur. Bu nokta da tartışma kapsamında yer almaktadır.

Korunan alanlar için oluşturulan yönetim planlamaları da bu süreçte her ülkenin öznel koşullarına göre farklılıklar oluşturmuştur. Ancak günümüzde de halen üzerinde durulan en önemli noktayı “korunan alanların yönetimi” oluşturmaktadır. Ülkelerin gelişmişlik düzeyine göre korunan alan yönetimlerinin oluşması, gelişmesi farklı şekilde işlemektedir. Birçok ülke bir araya gelerek “Dünya Koruma Birliği” (IUCN) oluşturarak korunan alanlarla ilgili sorunları ortak kaygı olarak görmüş ve bu yönde çalışmalar oluşturma gayreti sergilemişlerdir. IUCN’e bağlı Dünya Korunan Alanlar Komisyonu (WCPA) söz konusu değerlendirmeler için bir çerçeve yaklaşım geliştirmiştir. Tüm korunan alanlar için öncelikle bu alanların yönetim planlarının yapılması ve bu alanlardaki yönetimin etkinliğinin saptanması ana amaç olmuştur (Kuvan, 1999; Kuvan, 2005, Demirel, 2005; Demirel vd., 2005; Güneş, 2011).

Bir doğa parçasının “*korunan alan*” ilan edilmesi, bu alan içerisinde veya etrafında yaşayan nüfusun da doğrudan veya dolaylı olarak etkilenmesine neden olmaktadır. Bu olgu ise korunan alan yönetiminin daha da karmaşık bir yapıya bürünmesine neden olmaktadır. Bu boyutuyla değerlendirildiğinde korunan alanlar üzerindeki ilgi ve çıkar gruplarının talep ve beklentileri değişmektedir. Koruma statüsünden kaynaklanan yararlanma kısıtlarının boyutları ekonomik gelir yoksunluklarına kadar gidebilmektedir. Dolayısıyla korunan alan yönetimiyle ortaya çıkacak gelirin yöredeki ilgi ve çıkar grubuyla paylaşılmasına yönelik çatışmalar doğmaktadır (Yıldız, 2019; Yıldız ve Atmış, 2023). Bu nedenle korunan alanın etkin yönetimi için ekonomik kaynaklar ve bu kaynakların yönetimi ile bölüşümü de ayrıca bir boyut olarak sosyal etkiler şeklinde ortaya çıkmaktadır (Jones, 2000; Jones et al., 2018; Coşgun, 2019; Çuhadar ve Coşgun, 2019; Coşgun, 2023).

Günümüzde korunan alanların yönetiminin etkinliği tüm korunan alanlar için önemli bir unsur haline gelmiştir. Bu nedenle de WCPA değişik korunan alan statülerine özgü “korunan alan



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

etkinliği değerlendirme rehberi/sistemi” adı altında çok sayıda ve çeşitli değerlendirme yöntemleri oluşturmuştur (Hockings et all., 2004).

Korunan alan yönetim ve yönetim etkinliğinin “yönetim bilim” açısından da değerlendirilmelidir. Bu iki kavramı bir yaklaşım altında kabul ederek korunan alan yönetimi ve yönetim etkinliğinin değerlendirilmesi gerekmektedir. Bu bağlamda yönetim tanımı ile yönetim işlevlerinin korunan alanlar açısından irdelenmesi daha rasyonel bir yaklaşım olacaktır.

Çalışanların etkin yönetimi için üretim sürecinde gerçekleştirilecek iş süreçlerinin iyi analiz edilerek planlanmış olması ilk koşullardan birisidir. Bunu iş görececek personelin eğitim ve yetenekleriyle eğitim ve bilgisine dayanan bir işlendirme yani işe yöneltme izlemektedir. İşletmelerin etkin bir yönetim oluşturabilmesi için örgütlenme de üzerinde durulması gereken bir diğer konudur. (Budak ve Budak, 2013; Bingöl, 2019; Çetin vd., 2019; Agarwal, 1982; Akat vd. 1999; Aykaç, 1999; Elif, 2002).

Yönetim ve organizasyon kavramlarının birbirinden çok farklı kavramlar olduğunu çeşitli açıklamalarla ortaya konmuştur. Agarwal 1982’ye göre çok sayıda yönetici olmasına rağmen lider olarak tanımlanabilecek insan sayısı çok daha azdır. Yönetim ve organizasyon birlikte var olan ancak birbirinden çok farklı ikiz kavramlardır. Yönetecek bir yönetim yoksa organizasyonlar hareketsiz ve işe yaramaz olacak, yönetilecek bir organizasyon yoksa yönetim içi boş ve anlamsız olacaktır (Agarwal, 1982).

İşletme; “iş” kökünden gelmektedir. Bu yönüyle üç temel noktayı kapsamaktadır. i) Alet ve makine gibi herhangi birtakım araçları çalıştırma, iş gördürme, ii) çeşitli iş etkinliklerinin yürütüldüğü birim, yani işyeri ve iii) Maddesel ve insan unsurlarından meydana gelen bir üretim şeklinde tanımlanabilmektedir (Budak ve Budak, 2013).

Eren’e göre (2009) yönetim; belirli birtakım amaçlara ulaşmak için başta insanlar olmak üzere parasal kaynakları, donanımı, demirbaşları, hammaddeleri, yardımcı malzemeleri ve zamanı birbiriyle uyumlu, verimli ve etkin kullanılacak kararlar alma ve uygulama süreçlerinin toplamıdır (Elif, 2002; Eren, 2017).

Yönetim kavramı içinde başta insan olmak üzere üretim faktörlerinin amaçlar doğrultusunda etkin ve verimli kullanımı söz konusudur. Organizasyon ise; işletmenin amaçlarına erişebilmesi için hangi işlevleri yapması gerektiğine ve bu işlevleri yapacak kısımların birbiriyle ahenkli çalışacak şekilde oluşturulmasına, bu organlarda çalışmak üzere gerekli olan maddi ve beşerî sermaye unsurlarının tedariki ve uyumlu hale getirilmesine ilişkin süreçlerden oluşmaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bu özellikleri ile organizasyon beşerî bir özellik arz etmektedir. Türker'e göre, işletmelerin yönetim işlevi; karar alma, alınan kararları uygulama, alınan kararlarla hedeflenen amaçlarla, uygulama sonuçlarını karşılaştırma ve bir uyumsuzluk varsa, düzeltici eylemlerde bulunma aşamalarından oluşan bir bütün olarak tanımlanmaktadır (Türker, 2001). Özdönmez ve arkadaşlarına göre ise yönetim iki anlama gelmektedir; birincisi bir etkinliği yönetmek, sevk ve idare etmek anlamında kullanılmaktadır. İkincisi bir etkinliği yürüten örgütü, onun tüm personel ve bürolarını ifade etmektedir. Organizasyon sözcüğü ise hem örgütlenme hem de örgüt anlamında kullanılmaktadır (Özdönmez vd., 1998).

Yönetimin işlevlerini oluşturan planlama, yürütme, eşgüdüm, örgütlenme ve denetim unsurlarının her birisi için korunan alan yönetiminin bütün aşamaları dikkate alınmalıdır. Yönetim işlevleri bazında korunan alan yönetimi ve yönetim etkinliğinin değerlendirilmesi gereklidir.

Çalışmanın amacı; yönetim bilim açısından ve yönetimin işlevleri dikkate korunan alan yönetim etkinliği değerlendirmelerinin eleştirel bir irdelenmesini sağlamaktır. Bu bağlamda WCPA tarafından oluşturulmuş çok sayıdaki korunan alan yönetim etkinlik değerlendirmeleri bulunmaktadır. Ülkemizde yoğun olarak korunan alanların yönetim etkinliğinin belirlenmesinde ise Korunan Alan Yönetiminin Hızlı Değerlendirilmesi ve Önceliklendirilmesi (RAPPAM) ve Yönetim Etkinliği Takip Aracı (METT) uygulamalarına yer verilmektedir. Bu çalışma ise RAPPAM kapsamında uygulanan yönetim etkinliği değerlendirmelerinin yönetim bilim işlevleri kapsamında irdelemektir.

## 2-MATERYAL ve YÖNTEM

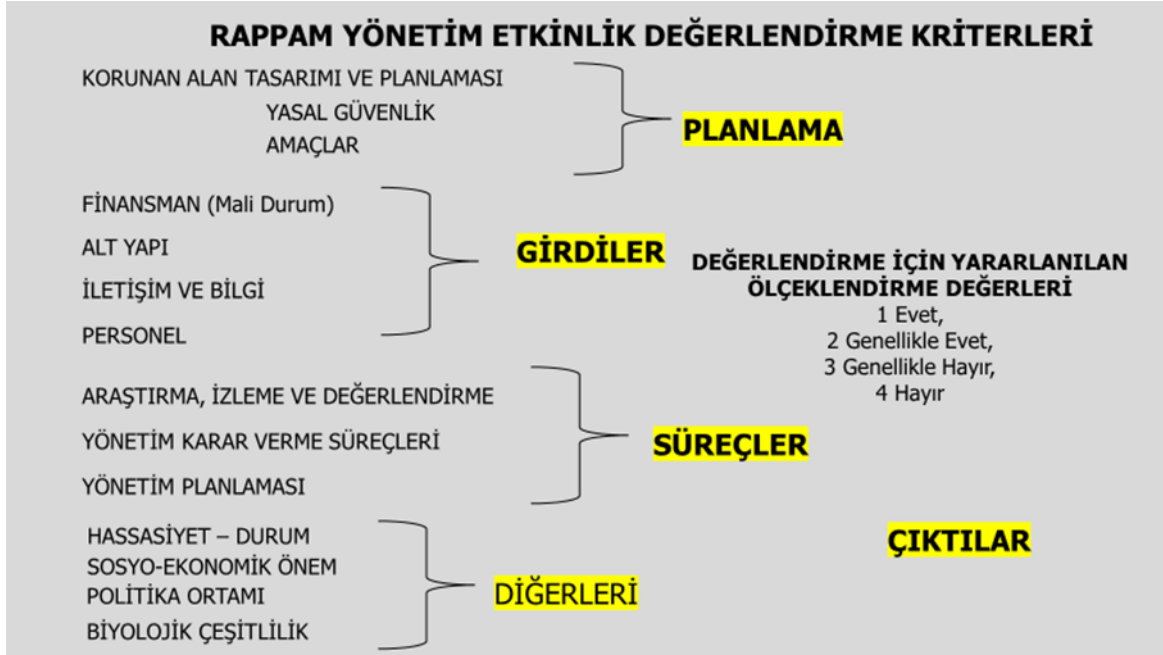
Çalışmada korunan alan yönetimi ile yönetim etkinliği konusunda ulusal ve uluslararası bilimsel yayınlar irdelenmiştir. Yönetim bilimi açısından yönetim ve yönetim işlevleri konusundaki ulusal ve uluslararası bilimsel yayınlar kaynak tarama yöntemiyle incelenmiştir. Ülkemizdeki korunan alan yönetim etkinliği değerlendirmelerinde yararlanılan ve WCPA tarafından geliştirilmiş olan Korunan Alan Yönetiminin Hızlı Değerlendirilmesi ve Önceliklendirilmesi uygulamasında yararlanılan ölçek ve kriterleri Yönetimin işlevleri dikkate alınarak irdelenmiştir. Bu irdelemede RAPPAM uygulamasının yeterliliği tartışılarak Ulusal Korunan Alan Yönetim Etkinliği oluşturma yönünde nasıl bir yöntem izlenmesi gerektiği ortaya konulmaya çalışılmıştır.

### 3-BULGU ve TARTIŞMALAR

#### 3.1. Korunan Alanlar için Etkin Yönetim Değerlendirme Yaklaşımı ve Yönetim İşlevleri Çerçevesi

Yönetimin işlevlerinden olan; Planlama, Örgütlenme, Yürütme, Eşgüdüm ve Denetim için korunan alanlar dikkate alındığında temel olarak hangi başlıca ana unsurların dikkate alınması gerektiğine ilişkin kavramsal çerçeve şekil 1’de sunulmuştur. Ancak RAPPAM değerlendirme unsurları bu çerçeve yaklaşımından oldukça farklılıklar içermektedir. Bu nedenle de yönetim bilim çerçevesinde ve yönetimin işlevler kapsamında dikkate alınarak değerlendirilmesi gereklidir.

RAPPAM yönetim etkinlik değerlendirmesi altı ana unsur kapsamında yönetimi dikkate alarak değerlendirmektedir. Bunlar aşağıda genel olarak belirtilmiştir.



Şekil 1: Korunan Alan Etkin Yönetim Değerlendirme Yaklaşımı

**Ortam: Şimdi neredeyiz?** Alanın önemi, alana yönelik tehditler ve politika ortamının değerlendirilmesi anlamındadır. Bu kapsamda korunan alan için; i) korunan alanın önemi, ii) korunan alandaki tehditler, iii) korunan alanın hassaslık durumu, iv) korunan alanın Ulusal düzlemdeki size göre yeri, v) korunan alanlara yönelik ortaklıklar dikkate alınmalıdır.

**Planlama: Nerede olmak istiyoruz?** Korunan alanın tasarım ve planlamasının değerlendirilmesidir. Bu kapsamda korunan alan için; i) korunan alan mevzuatı ve politikası,



ii) korunan alanlar sisteminin tasarımı, iii) korunan alan tasarımı, iv) yönetim planlaması dikkate alınmalıdır.

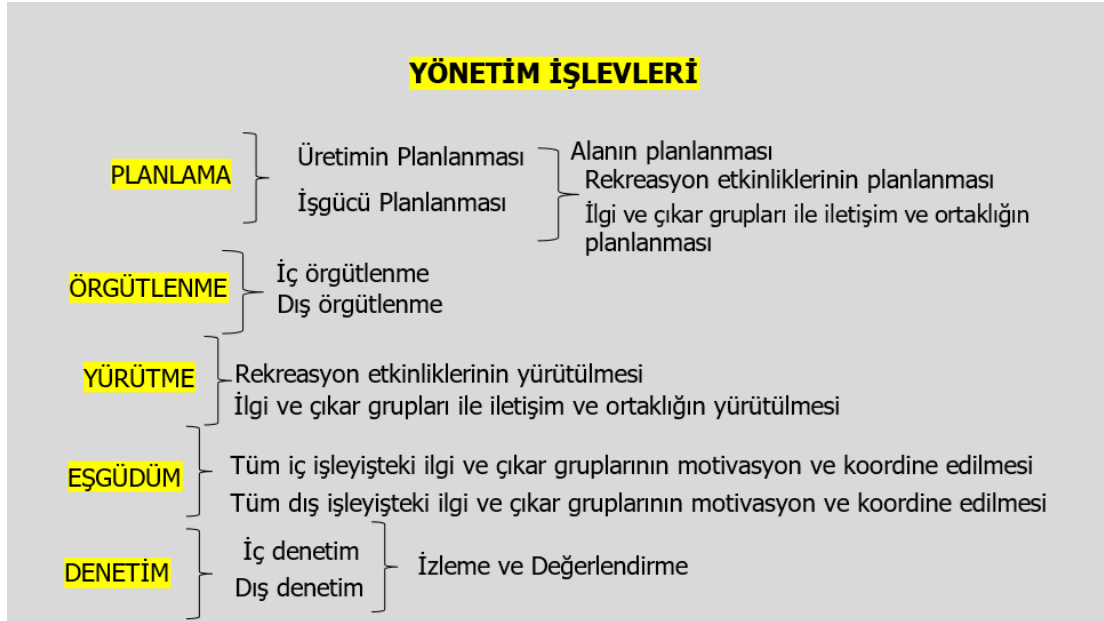
**Süreçler/Yönetim: Süreci nasıl yürütüyoruz?** Yönetim şeklinin değerlendirilmesidir. Bu amaçla; Yönetimsel süreçlerin uygunluğu/verimliliği dikkate alınmalıdır.

**Girdiler: İhtiyacımız nedir?** Korunan alanın etkin yönetimi için ihtiyaç duyulan girdilerin değerlendirilmesidir. Bu kapsamda korunan alan için; i) kurumun ihtiyaç duyduğu kaynaklar, ii) Korunan alanın ihtiyaç duyduğu kaynaklar dikkate alınmalıdır

**Çıktılar: Sonuçlar nelerdir?** Yönetim programlarının ve yönetsel eylemlerin uygulanması ile hedeflenen ürün ve hizmetlerin gerçekleşme durumunun değerlendirilmesidir. Bu bağlamda; i) yönetsel eylemlerin sonuçları, ii) ürün ve hizmetler ve bunlara yönelik etkinlikler dikkate alınmalıdır.

**Sonuçlar: Neyi gerçekleştirdik?** Sonuçlar ve sonuçların amaçları gerçekleştirme derecesinin değerlendirilmesidir. Bu amaçla; i) etkiler: yönetim, amaçlara ilişkin etkileri dikkate alınmalıdır.

Bu altı unsur ve içerikleri ne yazık ki yönetim bilim açısından ve onun işlevleri açısından başarılı ve rasyonel bir değerlendirme olanağı sunmakta yetersizdir. Yukarıda ana hatlarıyla vurgulanan kavramsal çerçeve bağlamında konu irdelenerek daha etkin olmayı sağlayabilecek ana ölçütler ve bunlara bağlı olarak alt ölçütlerin geliştirilmesine ihtiyaç bulunmaktadır (Şekil 2). Böylece Ulusal Korunan Alan Yönetim Etkinlik Rehberi oluşturulabilecektir.



Şekil 2: Yönetim İşlevleri Korunan Alan Etkin Yönetim Değerlendirme Kavramsal Çerçeve Yaklaşımı



### **3.2. Korunan Alan Etkin Yönetimi İçin Uygulanan RAPPAM Ölçütlerinin Yönetim İşlevleri Çerçevesinde İrdelenmesi**

Ülkemizde 2005, 2009 ve 2022 yıllarında olmak üzere korunan alanların yönetim etkinliği değerlendirilmesi gerçekleştirilmiştir. Bu süreçlerde RAPPAM değerlendirme ölçütleri rehberlik etmiştir. Diğer bir yönetim etkinlik değerlendirmesi olarak Yönetim Etkinliği İzleme Araçları (Management Effectiveness Tracking Tool/METT) yaklaşımı da korunan alanlar için dikkate alınan bir başka değerlendirme unsurudur. Bu değerlendirme rehberinin benzer şekilde yönetim işlevleri temelinde irdelenmesi gereklidir.

RAPPAM değerlendirmesi için oluşturulmuş olunan temel altı ölçütler dışın diğer ölçütler diye adlandırabileceğimiz ölçütleri de bulunmaktadır (Şekil 1). Hassasiyet, Sosyo-Ekonomik Önem, Politika Ortamı ve Biyolojik Çeşitlilik başlıkları “Diğerleri” olarak değerlendirilmektedir. Yani Korunan Alan Etkin Yönetim Değerlendirme Rehberi çerçevesinde yer alan ve yukarıda vurgulanan altı başlık dışındaki bu dört başlık ayrıca incelenmektedir. Bu da değerlendirme sürecinde bütünlüğü zorlaştırmaktadır. Diğer yandan, bu dört temel ölçüt ve bunlara bağlı alt kriterlerinde yönetim işlevleri kapsamında daha da geliştirilerek değerlendirilmesi olanaklıdır. RAPPAM Yönetim Etkinlik Değerlendirme Rehberindeki temel ölçütlerden bazıları ve bunlara ait alt kriterlerin yönetim işlevleri açısından irdelenmesi şekil 3-5’te sunulmaktadır.

Bu değerlendirme yaklaşımıyla RAPPAM ana ve alt ölçütleri incelendiğinde hem ana hem de alt ölçütlerin farklı yönetim işlevlerinin bir ya da aynı anda birkaçının ilgi alanında veya tanımı kapsamında yer aldığı görülmektedir. Dolayısıyla herhangi bir değerlendirme unsurunun yönetim işlevinde hangi kapsamda yer alarak değerlendirilmesi gerektiği sorunu ortaya çıkmaktadır. Yürürlükteki bu değerlendirme sisteminin uygun bir etkin korunan alan değerlendirme sistemi olmaktan uzak olduğu görülmektedir. Çünkü yönetimin her bir işlevi ve bu işlevlerinin birbirleriyle olan organik bağı bir hiyerarşik işleyişi ortaya koymaktadır. İşlevler bazında değerlendirme bir bütün olarak ve daha sistemli daha da önemlisi daha algılanabilir ve sorgulanabilir bir değerlendirmeye olanak sağlayabilecek niteliktedir. İşlevlerin önceliklendirilmesi, işlev alt ölçütlerinin sayılar olarak değerler içermesi yoluyla da değerlendirmenin bir kantitatif nitelik taşıması sağlanabilecektir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RAPPAM PLANLAMA BİLEŞENLERİ VE ÖLÇÜTLERİ

KORUNAN ALAN TASARIMI VE PLANLAMASI	
a) Korunan alanın konumu koruma amaçları ile uyumlu mudur ?	(Planlama/Örgütlenme)
b) Korunan alanın yerleşimi ve yapısı, biyolojik çeşitliliğin korunmasını optimize ediyor mu ?	(Planlama/Yürütme)
c) Korunan alanın bölgeleme sistemi korunan alanın amaçlarına erişmek için yeterli midir ?	(Planlama/Denetim)
d) Korunan alanın çevresindeki arazi kullanımı etkili korunan alan yönetimine olanak sunuyor mu ?	(Planlama/Yürütme/Denetim)
e) Korunan alan, koruma altındaki bir başka korunan alan ile bağlantılı mıdır ?	(Planlama/Yürütme/Denetim)
YASAL GÜVENLİK	
a) Korunan alan, uzun vadeli yasal bağlayıcılığı olan bir korumaya sahip midir ?	(Yürütme/Örgütlenme/Denetim)
b) Arazi mülkiyeti veya kullanım hakları ile ilgili herhangi bir anlaşmazlık bulunuyor mu ?	(Planlama/Yürütme/Denetim)
c) Sınır işaretlemeleri, korunan alanın amaçlarını karşılamak için yeterli midir?	(Planlama/Yürütme/Denetim)
d) Personel ve mali kaynaklar, kritik yasal yaptırım uygulamalarını yerine getirmek için yeterli midir ?	(Planlama/Yürütme/Denetim)
e) Yerel halkta olan anlaşmazlıklar adil ve etkili bir şekilde çözülmekte midir ?	(Planlama/Yürütme/Denetim)
AMAÇLAR	
a) Korunan alanın amaçları, biyolojik çeşitliliğin korunmasını ve sürdürülmesini sağlayabiliyor mu ?	(Planlama/Yürütme/Denetim)
b) Biyolojik çeşitlilik ile ilgili spesifik amaçlar, yönetim planında açıkça belirtilmiş midir ?	(Planlama/Yürütme)
c) Yönetim politikaları ve planları, korunan alanın amaçları ile tutarlı mıdır ?	(Planlama/Yürütme)
d) Korunan alan çalışanları ve yöneticileri, korunan alanın amaçları ve politikalarını açıkça bilmekte ve anlamakta mıdır ?	(Planlama/Yürütme/Denetim)
e) Yöre halkı korunan alanın genel amaçlarını desteklemekte midirler ?	(Planlama/Yürütme/Denetim)

Şekil 3: RAPPAM Planlama Ana ve Alt Ölçütlerinin Yönetim İşlevleri ile İlişkileri

Korunan Alan Tasarımı ve Planlanması, Yasal Güvenlik ve Amaçlar ana ölçütleri RAPPAM planlama unsurunda yer alan üç temel unsuru oluşturmaktadır (Şekil 3). Bu ana ve alt ölçütlerin yönetim işlevleri açısından irdelenmesine yönelik yaklaşım incelendiğinde her bir alt ölçütün bir veya birden fazla ölçüt ile ilişkilendirilebileceğini göstermektedir. Bu durum aynı zamanda ölçütlere ilişkin kavramların da değerlendirici açısından karmaşıklık içereceğini göstermektedir.

### RAPPAM GİRDİLER BİLEŞENLERİ VE ÖLÇÜTLERİ

İLETİŞİM VE BİLGİ/Eşgüdüm, Yürütme, Örgütlenme	
a) Saha ve ofis personeli arasında iletişimi sağlayacak yeterli iletişim araçları mevcut mudur?	(Eşgüdüm)
b) Mevcut ekolojik ve sosyo-ekonomik veriler yönetim planlaması için yeterli midir?	(Planlama)
c) Yeni veri toplamaya yönelik uygun araçlar mevcut mudur?	(Örgütlenme)
d) Verilerin analizi ve işlenmesi için uygun sistemler mevcut mudur?	(Yürütme, Eşgüdüm)
e) Yerel halk ile personel arasında etkili bir iletişim var mıdır?	(Eşgüdüm, Örgütlenme)
PERSONEL/Örgütlenme, Eşgüdüm, Denetim	
a) Personel sayısı, alanı etkin bir şekilde yönetmek için yeterli midir?	(Örgütlenme)
b) Personel, alan yönetimi ile ilgili önemli faaliyetleri yürütmek için yeterli becerilere sahip midir?	(Örgütlenme, Yürütme, Denetim)
c) Eğitim ve geliştirme fırsatları personelin ihtiyaçlarına uygun mudur?	(Yürütme, Eşgüdüm, Örgütlenme)
d) Personelin performansı ve hedeflere yönelik ilerlemeler periyodik olarak gözden geçirilmekte midir?	(Denetim)
e) Personel çalışma koşulları, yüksek nitelikteki personeli elde tutmak için yeterli midir ?	(Örgütlenme, Denetim)

Şekil 4: RAPPAM Girdiler Ana ve Alt Ölçütlerinin Yönetim İşlevleri ile İlişkileri



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Girdileri oluşturan Finansman, Alt Yapı, İletişim ve Bilgi ile Personel ana ölçütleri ve bu ölçütlerin alt kriterleri için de yukarıda vurgulanan kısıtlılık durumu geçerlidir. Bu ana başlıkta yer alan iletişim ve bilgi yönetim işlevinde yürütme kapsamında, personel eşgüdüm, yürütme ve denetim ana başlıkları altında değerlendirilmiştir (Şekil 4).

RAPPAM değerlendirmeleri kapsamında ana başlıklar altında yer almayan ancak ölçütler halinde olan ve alt ölçütleriyle değerlendirme kapsamında yer alan Hassasiyet, Sosyo-Ekonomik Önem, Politik Ortam ve Biyolojik Çeşitlilik ana ölçütleri de belirtildiği gibi farklı yönetim işlevleri kapsamında yer alabilmektedir (Şekil 1).

HASSASİYET – DURUM	
a) Korunan alan içindeki yasadışı faaliyetlerin izlenmesi zor mudur ? (Denetim)	
b) Bölgede kanun yaptırımı düşük müdür ? (Denetim)	
c) Rüşvet ve yolsuzluk tüm bölgede yaygın mıdır ? (Denetim)	
d) Alanda sivil karışıklık ve / veya siyasi istikrarsızlık yaşanıyor mudur ? (Yürütme/Örgütlenme)	
e) Kültürel uygulamalar, inançlar ve geleneksel kullanımlar korunan alan hedefleriyle çelişiyor mudur ? (Yürütme/Denetim)	
f) Korunan Alanın kaynaklarının market değeri yüksek midir ? (Planlama/Denetim)	
g) Alan yasadışı faaliyetler için kolay erişilebilir midir ? (Örgütlenme/Planlama)	
h) Hassas korunan alan kaynakları için şiddetli/yoğun bir talep var mıdır? (Yürütme/Eşgüdüm/Denetim)	
i) Korunan alan yöneticisi, korunan alan kaynaklarından aşırı derecede yararlanma istekleri baskısı altında mıdır ? (Yürütme/Denetim)	
j) Çalışanların işe alınması ve elde tutulması zor mudur ? (Örgütlenme/Eşgüdüm/Denetim)	
SOSYO - EKONOMİK ÖNEM	
a) Korunan alan yöre halkı için önemli bir istihdam kaynağı niteliğinde midir ? (Yürütme/Örgütlenme)	
b) Yöre halkı, geçimini sağlamak için korunan alan kaynaklarına bağlı mıdır ? (Yürütme/Örgütlenme)	
c) Korunan alan sürdürülebilir kaynak kullanımı yoluyla toplumu geliştirme fırsatları sağlamakta mıdır? (Planlama/Yürütme)	
d) Korunan alanın dini veya manevi önemi var mıdır ? (Planlama)	
e) Korunan alan estetik önemi bakımından alışılmadık/sıra dışı özelliklere sahip midir ? (Planlama)	
f) Korunan alan yüksek oranda sosyal, kültürel veya ekonomik öneme sahip bitki türlerini içermekte midir ? (Planlama/Yürütme)	
g) Korunan alan yüksek oranda sosyal, kültürel veya ekonomik öneme sahip hayvan türlerini içermekte midir ? (Planlama/Yürütme)	
h) Korunan alan yüksek bir rekreasyon değerine sahip midir ? (Planlama/Yürütme)	
i) Korunan alan önemli ekosistem hizmetlerine katkıda bulunur ve topluluklara faydalar sağlamakta mıdır? (Planlama/Yürütme/Örgütlenme)	
j) Korunan alan yüksek bir eğitsel ve / veya bilimsel değere sahip midir ? (Planlama/Yürütme/Örgütlenme)	

Şekil 5: RAPPAM Diğer Değerlendirme Unsurlarını Ana ve Alt Ölçütlerinin Yönetim İşlevleri ile İlişkileri

RAPPAM kapsamında değerlendirmede yer alan “Diğer” bölümünde vurgulanan dört başlık, içerik itibarıyla yönetim işlevlerinden yürütme, örgütlenme ve planlama kapsamında değerlendirilmesi gereken konular olarak görülebilir (Şekil 5).

### 4-SONUÇ ve ÖNERİLER

Dünya’da olduğu gibi ülkemizde de korunan alanlar en hassas ekosistemlerdir. Bu alanların gerektiği gibi yönetilebilmesi oldukça önemlidir. Önemlidir çünkü bu alanlar üzerindeki baskı ve tehditler tüm dünyadaki korunan alanlarda giderek artmaktadır. Böyle bir durumda da korunan alanların yönetimlerinin ne düzeyde etkin olduğunun saptanması öne çıkmaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Tüm bu anlayışlar IUCN tarafından görülerek çok çeşitli yönetim etkinliği değerlendirme rehberleri geliştirmişlerdir. Uluslararası düzeyde bir değerlendirme rehberi oluşturarak uluslararası düzeyde korunan alanların yönetim etkinliğinin gözlemlenmesinin arzulanması hiç şüphesiz çok olumlu bir gelişmedir. Ancak her ülkenin korunan alan özgün biyolojik, ekolojik, sosyo ekonomik ve politik koşulları bulunmaktadır. Bu nedenle de değerlendirme rehberleri arasında bazı farklılıkların bulunması kaçınılmazdır.

Ülkemizin de kendisine özgü biyolojik, ekolojik, sosyal, kültürel ve politik unsurları bulunmaktadır. Bu unsurlar korunan alanların korunmasının sağlanmasındaki ilk adım olan bu alanların yönetimini kısıtlılıklarla doldurmaktadır. Bu durumda her bir korunan alan için baskı ve tehdit unsurları ile yönetimin karşı karşıya kaldığı yönetsel etkinliğin süreç içerisindeki gelişim evrilmesi de farklı olmaktadır. İşte bu evrilmeyi her ülke kendi özgün koşullarında ama aynı zaman da uluslararası ortamlarda da geçerli olabilecek bir zemine oturan değerlendirme rehberleri geliştirebilmeli ve uygulamalıdır.

Ülkemiz korunan alan yönetim etkinliği değerlendirmesi süreçlerinde 2005, 2009 ve 2022 yıllarında yararlanılan RAPPAM değerlendirme rehberi, yönetim bilimi ve yönetim işlevleri çerçevesinde irdelenmiştir. En belirgin olarak uygulanan değerlendirme rehberinin yönetim bilimi ve işlevleriyle ilişkilendirilmesinde çeşitli karışıklıkların olduğunu ortaya çıkarmıştır. Uygulanan sistemin kendisine özgü değerlendirme yaklaşımlarında yer alan ana başlıkların yönetim işlevleriyle örtüşmediği tespit edilmiştir. Bu durum değerlendirme yapan ilgi gruplarının konuya bir bütün ve bütünün parçaları şeklinde tüme varım ve tümenden gelim ilişkisinin kurulamamasına neden olmaktadır. Bu nedenle de değerlendirmelerin sağlıklılığı tartışılabilmektedir. Oysa yönetimin işlevlerinin kavramsal boyutlarının algılanması daha kolaydır. Yönetim işlevlerinin birbirleriyle olan organik hiyerarşisi de yönetimin etkinliğinin tüme varım ve tümenden gelim süreçleri kapsamında algılanmasını kolaylaştıracak niteliktedir. Bu ise daha sağlıklı bir değerlendirme süreçlerinin oluşturulmasına olanak verecektir.

Bu çalışma kapsamında RAPPAM yönetim etkinliği değerlendirme temel ve alt ölçütlerinin kavramsal niteliğinin de algılanma güçlükleri içerdiğini ortaya koyması açısından önemlidir. Oysa etkin bir yönetim etkinlik değerlendirmesi kavramların kolaylıkla algılanmasını, bir neden sonuç sorgulaması içerisinde, süreçlerin birbirleriyle ilişkilerinin rahatlıkla kurulabildiği, değerlendirici ilgi gruplarında soru işaretleri bırakmayacak nitelikte olmalıdır. Fakat RAPPAM değerlendirme yaklaşımında bunu göremiyoruz.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Yönetim işlevlerinin tanımları korunan alanlar sistemlerine özgü olarak gözden geçirilerek tekrar tanımlanmalıdır. Bu tanımlar çerçevesinde korunan alan yönetim işlevlerinin kavramsal çerçevesi içerisinde tüm alt ölçütler de gerekli tanımları içerecek şekilde saptanmalıdır. Yani hangi alt ölçüt sorusundan ne algılanması gerektiği açık, net ve kısa bir şekilde belirlenmelidir. Bu saptamalar içerine RAPPAM değerlendirme ölçütlerinin de yer almasına özen göstermek önemlidir. Çünkü bu değerlendirmelerin uluslararası ortamlarda de geçerliliğinin sürdürülmesi önemlidir. Dolayısıyla RAPPAM ölçüt ve alt kriterlerinin yönetim işlevlerinde hangi bölümde yer alabileceği katılımcı bir yaklaşımlarla kararlaştırılmalıdır. Bunlara ek daha net tanımlayıcı ana ve alt ölçütlerin eklenmesi de sağlanarak daha işlevsel bir değerlendirme rehberi oluşturulmalıdır. Yine burada dikkat edilmesi gerek bir noktayı da bazı korunan alanların kendine özgülüğü oluşturmaktadır. Kendisine özgü yapıları olan korunan alanlar için bu özgün yapılarını içeren özel ölçütlerin de geliştirilerek değerlendirme rehberinde yer alması sağlanmalıdır.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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#### ÖZET

Doğadaki olguları, nesnelere gözlemlemek ve incelemek sanatçının form bilgisini ve yaratıcılığını zenginleştirmektedir. İnsanoğlunu var eden çevre ve onu içine alan doğa, sanatçıların ilham aldığı en önemli varlıklardan birisidir. Doğanın formsal çeşitliliği de sanatçıyı doğaya yaklaştıran önemli bir olgudur. Bir fikri, duyguyu ve etkileşimi var edebilmek için doğa formları üzerindeki gözlem ve incelemeler, sanatsal form dilini meydana getirmede önemli bir misyonu bulunmaktadır. Doğanın bir parçası olan sanatçı ve doğaya yönelik olduğu için, sanatsal çalışmalar ortaya koymadan önce, doğanın bir parçası olan kendisiyle birlikte doğayı dikkatli bir biçimde gözlemlemelidir. Sanatçı sırrını çözemediği olguları, doğadan yola çıkarak, kusursuz dengeler, zıtlıklar, estetik güzellikler ve çeşitlilikler içerisinde, her zaman kendi yaşamına ait bir başka dünya ve kendine ait yeni bir doğa yaratır. İnsanoğlu, yaşamını sürdürebilmek ve doğada var olabilmek için, doğa ile bağlantılar kurmak zorunda olan bir varlıktır. Doğa çok iyi etüd edildiğinde, insanoğluna, beslenme barınma ve kendini geliştirmesine, kendi varoluşunu gerçekleştirip gerçek yerini bulmasına ve tüm evreni anlamasına yardımcı olur. Geçmişten günümüze farklı kültürlerde tarihsel süreç içerisinde insanoğlu, dinsel boyutta doğaya tapmış, ondan zaman zaman nefret etmiş, onu kendisi için kutsallaştırmış ve aynı zamanda da onu tahrip ederek ortadan kaldırmaya çalışmıştır. Sanatçılar sanat yapıtları aracılığıyla, çevresel sorunlara dikkat çekme ve çözüm sunma potansiyelini kullanarak, insanlarda doğa hakkında daha çok bilinçlenmeye ve doğadaki bozulan dengenin yeniden sağlanmasına katkıda bulunmaya çalışır. Doğa sanat uygulamalarının temel amacı, insanları doğaya karşı bilinçlendirmek, bozulmuş alanları dönüştürerek, doğaya yeniden kazandırmak ve çevreyle ilgili kalıcı çözümler üreterek dünyanın ekolojik ve çevresel bütünlüğünü korunmasını sanat yoluyla sağlamaktır. Günümüzde sanatçılar, eserlerinin malzeme ve biçimlerini, sanatın toplumdaki işlevini ve rolünü de değiştirmiştir. Çevreyi ve doğayı korumak, çevresel bilinç ve duyarlılık yaratmak ve sürdürülebilir bir gelecek inşa etmek için, sanatın gücünü kullanarak, sanatın doğayı korumadaki rolüne yönelik yeni bir anlayışın doğmasına olanak vermiştir.

**Anahtar Kelimeler:** Sanat, Doğa, Arazi Sanatı, Ekoloji ve Sanat.



## **NATURE AND ART**

### **ABSTRACT**

Observing and examining phenomena and objects in nature enriches the artist's knowledge of form and creativity. The environment that creates human beings and the nature that embraces them are one of the most important entities that draw inspiration from artists. The formal diversity of nature is also an important phenomenon that brings the artist closer to nature. Observations and studies on natural forms in order to create an idea, feeling and interaction have an important mission in creating the language of artistic form. Since the artist is a part of nature and is oriented towards nature, he should carefully observe nature along with himself, who is a part of nature, before creating artistic works. The artist always creates another world of her own life and a new nature of her own, within the perfect balances, contrasts, aesthetic beauties and diversity, based on the phenomena whose secrets she cannot solve, and nature. Human beings are creatures that have to establish connections with nature in order to survive and exist in nature. When nature is studied very well, it helps human beings to feed, shelter and develop themselves, to realize their own existence and find their true place, and to understand the entire universe. Throughout the historical process in different cultures from past to present, human beings have worshiped nature in a religious dimension, hated it from time to time, sanctified it for themselves, and at the same time tried to destroy it and eliminate it. By using the potential of drawing attention to environmental problems and providing solutions through their works of art, artists try to raise people's awareness about nature and contribute to the restoration of the disturbed balance in nature. The main purpose of nature art practices is to raise people's awareness about nature, to transform degraded areas and reintroduce them to nature, and to ensure the preservation of the ecological and environmental integrity of the world through art by producing permanent solutions for the environment. By using the potential of drawing attention to environmental problems and providing solutions through their works of art, artists try to raise people's awareness about nature and contribute to the restoration of the disturbed balance in nature. The main purpose of nature art practices is to raise people's awareness about nature, to transform degraded areas and reintroduce them to nature, and to ensure the preservation of the ecological and environmental integrity of the world through art by producing permanent solutions for the environment.

**Keywords:** Art, Nature, Land Art, Ecology and Art.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Doğadaki olguları, nesnelere gözlemlemek ve incelemek sanatçının form bilgisini ve yaratıcılığını zenginleştirmektedir. İnsanoğlunu var eden çevre ve onu içine alan doğa, sanatçıların ilham aldığı en önemli varlıklardan birisidir. Doğanın formlar çeşitliliği de sanatçıyı doğaya yaklaştıran önemli bir olgudur. Bir fikri, duyguyu ve etkileşimi var edebilmek için doğa formları üzerindeki gözlem ve incelemeler, sanatsal form dilini meydana getirmede önemli bir misyonu üstlenmektedir. Doğaya yönelik ve doğanın bir parçası olan sanatçı, sanatsal çalışmalar ortaya koymadan önce, doğanın kendisiyle birlikte doğayı dikkatli bir biçimde gözlemlemelidir.

Sanatçı sırrını çözemediği olguları, doğadan yola çıkarak, kusursuz dengeler, zıtlıklar, estetik güzellikler ve çeşitlilikler içerisinde, her zaman kendi yaşamına ait bir başka dünya ve yeni bir doğa yaratır.

İnsanoğlu, yaşamını sürdürebilmek ve doğada var olabilmesi için, doğa ile bağlantılar kurmak zorunda olan bir varlıktır. Doğa çok iyi etüdü edildiğinde, insanoğluna, beslenme barınma ve kendini geliştirmesine, kendi varoluşunu gerçekleştirip gerçek yerini bulmasına ve tüm evreni anlamasına yardımcı olur. Geçmişten günümüze farklı kültürlerde tarihsel süreç içerisinde insanoğlu, dinsel boyutta doğaya tapmış, ondan zaman zaman nefret etmiş, onu kendisi için kutsallaştırmış ve aynı zamanda da onu tahrip ederek ortadan kaldırmaya çalışmıştır.

İnsanlığın geçmişten günümüze yaptığı gibi tapınma, avlanma, içgüdüsel olarak, doğa ile birlikte kendisinin ve doğada var olan canlıların geçiciliğini vurgulamak, kimi zaman da doğaya karşı üstünlüğünü ortaya koyma uğraşı için, geleceğe ve doğaya kalıcı izler bırakır. Sanat ve doğa işbirliğinden ortaya çıkan uygulamaların kökenini oluşturan bu erken dönem izler araştırıldığı zaman, karşımıza geçmiş dönemlere ait dikkat çeken uygulamalar olarak çıkar. Sürekli devinim halinde olan doğanın ve matematiksel düzenin içerisinde basit geometrik biçimleri kullanan insan, nesnelere kaygıları doğrultusunda farklı biçimler vermiş ve doğanın parçalarını sanat yapıtlarına dönüştürmüşlerdir.<sup>1</sup>

Yazar, bu konuya ilişkin; *“Yerkabuğu, insanoğluna barınma, ticaret, savunma, mezarlık ve tapınma için mekan işlevini üstlenirken, insanın, çevresini süsleme içtepisi için de olanak sağlamıştır. İlkel yeryüzü sanatı olarak adlandırabileceğimiz yeryüzü eserleri, özellikle geçmişte Kuzey ve Güney Amerika sanatında İnka ve Maya uygarlıklarındaki geometrik düzenlerin veya büyük hayvan figürlerinin toprağa kazılmasıyla olmuştur. Benzer işler Avrupa kıtasında özellikle Britanya adasındaki Stonehenge’ler ve at-insan figürlü arazi işaretleri*

<sup>1</sup> Daşkesen, H., 2016, s. 270





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

olarak örneklenebilir.”<sup>2</sup> bu örnekler, sanatın doğadaki tarihine göndermede bulunur. Yazar sanatı; “Sanat, toplumun diğer alanlarındaki yaratılarıyla birlikte gelişmekte, onları etkilemekte ve onlardan etkilenmektedir. Yeni toplumun sanatçısı, yeni duygu ve düşüncelerini biçimlendirmede dilini yaratmada, yeni teknik ve malzemelerden yararlanmaktadır. Bu yeni teknik ve malzemeler sanatçıyı yeni plastik dil yaratmaya itmekte ve sanatta iki yanlı bu alışveriş ve etkilenme hep devam etmektedir”<sup>3</sup> ifadeleriyle tanımlamaktadır.

Yazar sanatçıyı, “Sanatçı kimdir? sorusuna sanatın bugün geldiği noktayı esas alarak- verilecek çok sayıda cevap vardır. Tarihte sanatçı figürünün ortaya çıkışına dair bir başlangıç noktası bulmak mümkün değildir. Elbette kolaycı akıl yürütmeye, olma/oluş hali bağlamında düşünüldüğünde sanatçının varlığı ile sanatın ortaya çıkışının eş zamanlı olduğu söylenebilir. Ancak bir bilgi nesnesi olarak sanatçının varlığının en azından adıyla kayda geçirilmesinin tarihi sanat kadar eski değildir.”<sup>4</sup> ifadeleriyle tanımlamaktadır.

XX. yüzyıl öncesi doğayı anlatan çoğu sanat yapıtları manzara resimleridir. Bu görseller süreç içerisinde doğanın varoluşunu ve ekolojiyi araştıran daha kompleks çalışmalara evrilmiştir. Aydınlanma çağı boyunca popülerleşen bu anlayış, öteki dünya için bir pencere sağlamış ve artan gelişmelere bir zıtlık oluşturmuş, zamanla insanlar doğal dünyayla olan manevi bağlarını kaybetmiştir. Geçmiş kültürlerin temelinde yatan ve sanatsal çalışmalara yaratım kaynağı olan doğadan etkilenme, doğa ile kurulan organik bağ, sanayinin taleplerinin artması doğrultusunda ortadan kalkmıştır. Sanat çoğu zaman, doğadan fikirleşilen bir alan olarak ele alınıp yorumlanmış, geçmiş çağlardan günümüze sanatçılar, doğa ile bağlantılı eserler yaratmayı sürdürmüşlerdir.

Yazar konuyla bağlantılı olarak, “Yaşamdan kopuk ve bilimsel bir mutlak hakikat görüşü, teknolojik gelişmeler, insanlığın gezegenin diğer kısmından ayrılması gerektiği konularında takıntılı bir sanatın ortaya çıkmasına neden olmuş. Batı kültürü, sanatın ve sanatçının toplumun geri kalan kısmından kopuk olduğu bir inanç sistemini miras olarak almıştır.”<sup>5</sup> görüşlerini ileri sürer.

Doğa, modern ve öncesi dönemlerde sanatçılar için yapıtlarına konu olarak ele alınmış ve post modern dönemden itibaren konu olarak doğa daha yoğun olarak ortaya çıkmış ve çevre kirliliğinin neden olduğu bir çok sorun, yeni bir sanatsal yaklaşımları da beraberinde

<sup>2</sup> Karavit, 2008, s. 10

<sup>3</sup> Yağmur, Ö., Bulat, S., Aydın, B., 2014, s.263

<sup>4</sup> Küçüköner, F., & Özkul, T., D., 2022, s. 223

<sup>5</sup> Strewlow ve Prigann, 2004, s. 90



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

getirmişlerdir. Çevre problemlerine karşı daha büyük bir değişim ve bilinç başlamış, bu değişimle birlikte sanatsal çalışmaların anlamı, mekan, araçları ve teknik yöntemleri de değişmiştir. Sanatçılar, gerçekte varolmayan ideal doğa kavramlarını anlatmakta yetersiz kalmış, ancak doğanın bozulması gibi var olan sorunlar ve insanlığı aydınlatma konusunda da önemli görevler üstlenmişlerdir.

Yazar çalışmasında konuyla ilgili olarak, *“1960’lardan bu yana, yeni ve önemli bir sanat hareketi doğayı deneyimleyip onunla iletişim kurarak, doğayla hayati bir bağı yeniden kurmak üzere ortaya çıkmıştır. Sanatçı doğal olaylar ve güçlerin yanı sıra özel çevre sorunlarını da yorumlar. Heykel ve resim ile doğa ve insan arasında bir denge sağlayan daha önceki sanatçıların aksine, çağdaş sanatçılar gerçekte doğal ekosistemleri yeniden yaratır, onarır veya düzenlerler. Onların sanat çalışmaları büyük şehirlerde veya bu şehirlerin yakınlarındadır. Çöp sahaları, terk edilmiş boş kentsel alanlar, nehirler, sulak alanlar, kıta sahanlıkları gibi yerlerde sanatçılar tarafından yaratıcı bir şekilde islah ve iyileştirme çalışmaları gerçekleştiriliyor. Bu alanlar sadece doğal, yöreye özgü hayvan ve bitki türleri için bir yer, bir davet oluştursun diye değil, ayrıca insanların doğa ile daha yakın bir ilişki geliştirebileceği kamusal mekanlar olarak tasarlanmıştır.”*<sup>6</sup> ifadelerine yer verir.

Çevresel Sanat, ‘Outdoor Art / Kapı Dışı Sanat eylemleri, xx. yüzyılın ikinci yarısından itibaren ortaya çıkmış ve aynı *Sokak Sanatı* gibi ününü geçmişte olduğu gibi günümüzde de devam ettirilmekte ve konuyla ilgili olarak, festivaller, çalıştaylar gibi etkinlikler yürütülmektedir.

1960 sonrası diğer sanat eylemleri gibi *Çevresel Sanat* eylemlerinde, var olan sanat olgularına karşı çıkılması sonucu, sanatçılar kapitalizm karşıtı bir tutum sergileyerek kendini göstermiş ve alınıp satılmama, kalıcı olmama gibi görüşler bu hareketin temel taşı görevini üstlenmiştir. Minimalizm, Arte Povera, Kavramsal Sanat gibi sanat akımları birbirleriyle benzerlikler gösteren ve zengin bir malzeme, ifade çeşitliliğine sahip olan Çevresel Sanat anlayışı içerisinde, doğrudan doğa olaylarına bağlantılı olan sanatçılar ortaya çıkmıştır. Doğanın kendisine, hayat döngüsüne odaklanan bu sanatçılar, insanın doğayla ilişkisindeki çelişkileri çalışmalarında göndermeler yaparak, sanatın hayattan, insanın doğadan kopmasına yönelik eleştirel yaklaşımlar getirmişlerdir. Günümüze doğru gelindiğinde, çevresel sorunlar bu sanat hareketinin temel konuları haline gelmiştir. Çevreci olan sanatçılar, geniş bir kavram olan *Doğa ve Sanat* bağlamında insanın sanat-hayat-doğa bağlantılarını sorgulamışlardır.

<sup>6</sup> Matilsky, 1992, s. 4



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sanat ve sanat objelerinin alınıp-satılması ve bu kapsamda ortaya çıkan elitist sanat alıcıları eleştirilerek yeniden gözden geçirilmiş, böylece sanat alanlarında alternatif bakış açıları geliştirilmeye çalışılmıştır. Sanatçılar arasındaki bu farklı bakış açıları *“Bir yandan gelecek kuşaklar için sanatçının ve izleyicinin rolü ile sanat nesnesinin statüsünü yeniden biçimlendirirken, bir yandan da, sanatın tanımını genişletmişlerdir”*<sup>7</sup>. XX. yüzyılın öncü sanat eylemi olan Dadaizm Sanat Akımı ve en önemli sanatçısı olan Marcel Duchamp, olguları yeniden farklı bakış açılarıyla ele almaya başlamış, 1960’lı yıllarından itibaren, Yeni-Dada Sanat Akımı bağlamında Pop Art Sanat Akımı ile beraber, Kavramsal Sanat, Arte Povera, Arazi Sanatı ve Minimalizm gibi postmodern sürece dair yeni sanat hareketleri gündeme gelmiştir.

Toplumsal yaşamdan uzaklaşan sanatın artan bir biçimde toplumla doğal bir bağıntı içerisinde olduğu çağlara duyulan özlem sonucu, yeni arayışların bir diğer itici gücünü oluşturmuştur. Sistem dışına itilen sanatçının karşısında iki seçenek var gibi durmaktadır. Konuyla bağlantılı olarak Lynton; *“Bir gün ünlü olma umudunu taşıyarak, pasif bir rolü mü kabullenecektir? Bu durum sistemin çok az kişiye layık gördüğü bir durumdur, aksi takdirde bu sistem olmadan ve bu sisteme özel popülizmi önemsemeden var-oluşunu devam ettirmek için, ortaya koyacağı manüpleri mi inceleyecektir? Başka bir kamuoyu bulma, başka bir sanat pazarı, sanatın çağdaş toplumla yeniden bütünleşebilmesi için bir çıkar yol olabilir”*<sup>8</sup> görüşlerini ileri sürmektedir.

1960’lı yılların Post Modern durumun eğilimleri içerisinde Minimalist Sanat Akımının üç boyutlu tasarım ortaya koyan sanatçıları, Çevresel Sanat hareketinin de ilk avangartları olmuşlardır. Sanatçılar, geometrik nesnelere kendi biçimleriyle el değmemiş bir formda doğal çevrelere konuşturmuşlar ve gerçek doğal mekânında yapıyla uyum sağlaması için çok önemli hassasiyetlerde bulunmuşlardır. Yazar konuyla bağlantılı olarak; *“Sanatçılar, yüzyıllar boyunca doğayı yansıtan görünüşleri resim ve heykel gibi alışlagelmiş mecralar içinde sunarken, 1960’lardan itibaren ‘manzara’ gerçek bir mekâna dönüşerek arazi sanatçılarının müdahalesine uğramaya başlamıştır”*<sup>9</sup> görüşlerini dile getirir.

Minimalizmin prensibiyle ‘Az çoktur / Less is more’ biçim ve renkte tutumluluk ve mekânsal espası yapıttan ayırmayan yaklaşımı yeni sanatsal oluşumlara yol açmış ve Çevresel Sanat da bu açılan yolda kendini var etmiştir. Bu sanat hareketi döneminin diğer sanat akımlarıyla da paralellikler göstermiştir: Antmen Çevresel Sanata yönelik; *“Arazi Sanatı, sade,*

<sup>7</sup> Atakan, 1998, s. 36

<sup>8</sup> Lynton, R., 1982, s. 329

<sup>9</sup> Antmen, A., 2014, s. 251.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

geometrik şekillerin açık alanlara uygulanması açısından Minimalizm ile, taş/toprak gibi doğal malzemelerin kullanımı ve süreçselliği açısından *Arte Povera* ile, yapıtların genellikle gelip geçici doğası nedeniyle 'Happening'le, hatta bazen sanatçının doğaya bizzat müdahale sürecine odaklanması açısından *Performans Sanatı* 'yla ve projelerin zaman zaman salt belge, fotoğraf, harita ve benzeri 'artakalan' malzemeyle sergilenmesi dolayısıyla *Kavramsal Sanat* ile yakınlık taşıyan bir akım olarak nitelendirilmiştir<sup>10</sup> ifadelerlerini ileri sürmektedir.

Atakan Çevresel Sanat Akımlarıyla bağlantılı olarak; "*Arte Povera / Yoksul Sanat* akımı, sanatçıların doğa ile etkileşime geçip imge üretmek yerine maden, toprak, su, hava, ateş, ot, elektrik, yerçekimi gibi "doğal öğelerle ilişkiye geçip, onların bir parçası gibi olmaları gerektiğini öne sürüyordu"<sup>11</sup> görüşlerine yer vermektedir. Bu yaklaşımlarda, çevreye yönelik çalışan sanatçıların doğal unsurları ve süreçleri uygulamalarının bir parçası haline getirmelerini sağlamıştır.

Çevresel sanatçılar yalnızca<sup>12</sup> kendi sanatsal amaçları bağlamında doğaya kazma, yığma, yerleştirme, paketleme gibi yöntemlerle müdahale ederlerken, doğanın döngüsü ve olayları da kaçınılmaz olarak çalışmalara dâhil olmaya başlamıştır. Bu süreç içerisinde Robert Smithson, Utah'ta bulunan tuz gölünün içerisine, tonlarca kamyon dolusu toprağı sızdırarak, "*Spiral Dalgakıran*" adlı çalışmasını gerçekleştirmiş ve gel git olayını anlatan anıtsal bir biçim tasarlamıştır. Walter Da Maria, "*Yıldırım Tarlası*"nda yapay olarak şimşek çakma eylemleriyle, çalışmalarına doğa olayını da katmış, Richard Long ise doğa yürüyüşlerinde, doğa ait malzemeleri kullanarak çevresel çalışmalar gerçekleştirmiştir (Görsel 1).

Diğer yandan dönemin olağan sosyal hareketliliği içerisinde, Almanya'da çevresel kirliliklere yönelik duyarlılıklarla hareket eden çevreci sanatçılar, konuyla bağlantılı projeler ortaya koymuşlardır. '*Her ne kadar atık gücünü iletme için insani bir standarda ihtiyaç duyarsa da atığın yer çekimini bir zaman aşımı içinde iletme becerisi, aslında zamansal deneyimin tüm canlı maddelerin doğal olan ve insan yapımı olanın yanı sıra önlenemez bir bozulma göstermiş olmasına dayanmaktadır. Zamanın ve içinde bulunulan hızın yıkıcı etkilerini bir nebze olsun düzeltmeye çalışmak isteği kurtarıcı etkilere yol açabilecektir. Atık olan madde ister çöp niyetiyle olsun isterse yeniden kullanılmak üzere ayrılmış tüketim maddesi olsun dünya yüzeyinde zamana yenik düşecektir. Elden çıkarılan malzemeleri atmak, yakmak, geri*

<sup>10</sup> A.g.e., s. 253

<sup>11</sup> Atakan, 1998, s. 38

<sup>12</sup> Gökova, H., 2020, s. 178

*dönüştürmek, işlenmemiş malzeme kullanımını azaltma atık/çöp olgusunun gündelik deneyime karışmamasını temin etmenin yollarıdır. Günümüz toplumunda tüketim mallarının hacminde meydana gelen artış katı bir şekilde yeniden düzenlenmesini mecburi kılabilir öyle ki nesnelere bozulmadan ortadan kaldırılabilirler*<sup>13</sup> Kavramsal Sanat Akımının öncü sanatçılarından Alman sanatçı Joseph Beuys'un yedi bin adet meşe ağacı dikimine ait performans sanatı çalışmasıyla toplumsal bilinci oluşturmanın yanısıra, çevreci anlayışın temelleri atmış oldu. Diğer çevresel sanatçılardan Alan Sonfist, doğa olayları konusunda bilinç oluşturmaya yönelik bir eylem olarak önerdiği sanat çalışmalarıyla, çevreci öncü sanat uygulamaları ortaya koymuştur. Çevreci ve doğa dostu her iki sanatçının ağaç dikme projeleri, doğanın kendini yenileme döngüsüne ve yenilenme sürecine çok önemli katkılar sağlamıştır.



**Görsel 1.** Richard Long, “Çocukluk Hattı”, 2015.

1960 sonrası dönemde, sanat uygulamalarına karşı getirilen eleştiriler içinde ‘*sanat eserlerinin bir meta olarak alınıp satılması*’ konusu önemli bir yer teşkil etmektedir. ‘*Eğer bir sanat yapıtı, endüstriyel olarak üretilmiş bir ürün gibi fiyatlandırılarak piyasanın arz talep sistemine sokuluyorsa sanat değil, kapitalist üretim-tüketim zinciri içinde yer alan bir metadır*’ biçimindeki fikirler, bu süreçte alternatif sanat eylemlerinin yaygın olan görüşlerini temsil etmektedir. “*Günlük kâr amaçlı üretimden sıyrılarak sanat tarihinde yer edinmek, bireysel*

<sup>13</sup> Taşar E., & Bulat, M., 2021, s. 488





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

*hırsların yerine kolektif hareketlere dâhil olmak, yeni ütopyalar üretmek, toplumsal farkındalık yaratmak, özgün arayış-ların peşinden giderek sanat literatürüne katkıda bulunmak, bu hastalıklı alışkanlığın sanat ortamında terk edilebilmesi için ihtiyaç duyulan dinamiklerdir”<sup>14</sup>.*

Bu anlamda çevresel sanat yapıtları ortaya koyan sanatçılar, Kapitalist Pazar sistemine ait alım-satımı ortadan kaldırmak için başka bir yere taşınamaz ve yerinden alınamaz nitelikte sanat yapıtları ortaya koymuştur. “*Güncel sanat ortamında iktidarın ve sermayenin kül-tür-sanat politikalarına göre oluşan ideal sanatçı modelinin başarı ölçütü, sermaye gruplarının düzenlediği organizasyonlara dâhil olabilmek ve eser satabilmekle belirlenirken, sanatçı olabil-menin tek yolu olarak işaret edilmektedir”<sup>15</sup>. Çevresel ve kalıcı olmayan geçici sanat yapan sanatçılar, sanatsal yapıtlar ortaya koyduktan sonra, doğadaki görüntülerinin fotograflarını çekip belgeleyerek kalıcı hale getirmekte ve eserlerini doğaya, üretilmiş oldukları mekanlarda kalmaktadırlar. Yazar konuya yönelik; “*Sanatçıların doğaya yönelmesinde, sanat piyasasının dinamiklerine karşı bir direnç rol oynamış, aykırı malzeme ve yöntemlerin kullanılmasıyla piyasa sisteminin kolay kolay metalaştırılamayacağı işlerin üretimi bir yandan da anti-kapitalist bir tavrın ifadesi olmuştur”<sup>16</sup> görüşlerine yer verir.**

Heykel sanatını, farklı bir gözle ele alan Minimalizm Sanat Akımın’ın sanatçıları, Çevresel Sanata yönelik sanatsal bakış açıları farklılaşmıştır. Yazar; “*Minimalizm Sanat Akımı ’yla beraber üç boyutlu yapı, artık klasik bir kaide üzerinde duran ya da saf sanat olarak görülen bir yapıt olmaktan çıkarak nesnelere arasına konumlanıp ve var olduğu ortama özgü tanımlanmıştır Alıcı, yapıtların materyal özelliklerinin topografik haritasını çıkarmak için, yapıtların yüzeyini detaylı bir biçimde araştırmak yerine; belirli bir alana yapılmış müdahalenin algısal sonuçlarını keşfetmeye yönlendirilir. Minimalizmin getirdiği temel yenilik budur”<sup>17</sup> ifadelerine yer verir.*

Çevresel Sanat / Environmental Art (*Arazi Sanatı / Land Art, Toprak Sanatı / Earth Art*) çölde, denizde, ovada ve dağlarda, gerçekleştirilen çalışmalar ve kamusal çevrede ortaya konulan çalışmaları da içine alan çok geniş bir kavramı içerir. Mekân düzenlemesi (*Enstelasyon*) ya da mekânın çeşitli materyaller ile kurgulanması anlamındaki güncel sanat uygulamaları, Environment ile karıştırılmaması gerekir. Çevresel Sanatın geçmişi antik uygarlıklara kadar gerilere gider.

<sup>14</sup> Şengünel, C., 2019, s.140

<sup>15</sup> A.g.e., s.144

<sup>16</sup> Antmen, A., 2014, s. 253

<sup>17</sup> Foster, 2009, s. 65





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Dünyadaki küresel değişimler, çevre sorun haline gelmiş olan küresel ısınma ekolojik bozulmalar, arazi sanatçılarından Goldsworthy ve Eliasson tarafından, erime ve çözülme süreçleri temel olarak ele alınıp sorgulanmış ve sanatçıların bu uygulamaları sayesinde toplumlar bilinçlendirilmeye başlanmıştır. Gündelik hayattan alıntılar yapan sanatçının yapıtını ortaya çıkarırken anlam olarak gerçeklikten kopmadan, ancak görsel açıdan varlık ve yokluk arasında bir kavrayışı sunma olanaklarını kullanmaktadır. Gerçeklik ve sanat arasındaki bu etkileşim, yapıt ile kaide arasında ve aynı zamanda bir bütün olarak yapıt ile mekânı arasında gelişir. Eser ile mekân arasındaki bu ilişki, çoğu zaman eserin metaforik anlamını tamamlamaya gelen ek bir unsur olarak karşımıza çıkar.<sup>18</sup>

Doğal süreçlerin, doğanın kendisinin ve döngülerinin Çevresel Sanat yoluyla sanatsal platforma taşınması, doğa, sanat ve hayat bütünlüğünün sağlanması bakımından önemli bir adım olmuştur. Bu ayrışmanın son evresinde modernizm, sanatı hayattan ve yaşamdan ayırıştırıp fildişi kulesine taşıyarak, kendini beğenmiş, elitist tutum sergilemiştir. Sanatı yeniden doğayla ve yaşamla birleştirmek için doğanın kendisini ve öğelerini yeniden merkeze taşıyan sanatçıların mücadeleleri büyük öneme sahip olmuştur. Dünyamızda ve üstünde yaşayan tüm canlı varlıkların gelecekleri bakımından yapılan çalışmalar gelecekte de daha da önemli kazanacaktır.

İnsanoğlunun doğaya yönelik karşı her türlü yanlış hareketi, doğayla var olan iletişimini problemleri duruma getirmekte ve böylelikle doğa, afet ve yıkımlarla kendi yasalarını uygulamaktadır. İnsanlık doğa ve dünyamız ile arasında oluşan mesafeyi katetmek, yabancılaşmayı ortadan kaldırmak, barışı, bütünlüğü ve dengeyi yeniden inşa etmek zorundadır. Heykel sanatçıları doğa ile barışma sürecine, doğanın kendisini ve elemanların yapıtlarında sürekli olarak kullanarak, bir farkındalık yaratıp, topluma uyarı niteliğinde olan çalışmalarını yaparak, sürekliliğini devam ettirmektedir.

Önceleri sanatın ilham kaynağı olan doğa, sanatın nesnesi konumunda iken 1960'lardan itibaren çevresel bozulmanın sonucunda yeni sanatsal yaklaşımları gündeme getirmiştir. Bu yaklaşımlar doğayı artık saygı duyulan ve duyarlılığı ön plana çıkaran bir özne konumuna getirmiştir. Bu anlamda doğa tanımında değişimle birlikte sanatçılarda yaptıkları çalışmalarda ekolojik bozulmaya karşı iyileştirici politik bir söylem oluşturmuşlardır.<sup>19</sup>

<sup>18</sup> Daşkesen, H., 2022, s.93

<sup>19</sup> Yağmur&Özer,2022,s.453



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Doğal yaşam için habitatlar meydana getirmeyle ilgili yapıtlarıyla tanınan Amerika'lı sanatçı Lynn Hull'un yapıtlarında, estetik duyarlılıkla birlikte fonksiyonun daha ön de tutulmuş olduğu gözlemlenir. Hull yapıtlarında, "Türler üstü Sanat" (Trans Species Art) kavramına yönelik ilişkilendirmelere gider. Ekolojik sanat, aslında türler üstü ortaya konulan ve özel olarak doğal hayat için tasarlanan bir sanat türüdür. Sanatçı, çevresel sorunlara pratik çözümler bulmada ve her zaman alımlayıcılarıyla estetik açıdan tatmin edecek biçimde, iletişim halindedir. Sanatçı, tasarlama aşamasının başlangıcında, inceleme ve derin araştırmalar yapar ve bilim adamlarıyla, mühendislerle çalışmış olduğu disiplinlerin gerekli kıldığı diğer alan uzmanlarıyla işbirliği halinde yapıtlar ortaya koyar. Hull, daha sonra yapıtların estetik özelliklerini göz önünde bulundurur. Sanatçının yaratıcı süreçlerinin son evresinde ortaya koymuş olduğu yapıtlarındaki amacı, ekolojik amaçlara ne ölçüde yaklaştığını ortaya koyan verileri araştırıp incelemektir.<sup>20</sup>

Bu bağlamda, İngiliz sanatçı Andy Goldsworthy, İngiltere İskoçya ve başka ülkelerde doğayla ilintili spontan çalışmalar yaratmış ve çalışmalarına dair; *"Ben sadece keskin bir taş, kuş tüyü, dikenler gibi bulduğum malzemeleri ve ellerimi kullanma özgürlüğünün tadını çıkarırım. Eğer kar yağıyorsa kar; sonbaharsa sonbahar yapraklarıyla; çiçeklenmiş bir ağaçtaki sürgünler ve dallarla her günün bana sunduğu fırsatları kullanırım. Bir malzemeyi almak için veya yerleştirmek için dururum çünkü keşfedilecek şeyin orada olduğunu hissederim. Öğrenebileceğim yer orasıdır. Baktığımda, dokunduğunda, malzeme, yer ve biçim ortaya çıkan çalışmayla tamamen bütünleşir. Bir şeyin nerede durup nerede başka bir şeyin başladığını söylemek zordur. Bir malzemenin etrafındaki boşluk ve enerji içindeki boşluk ve enerji kadar önemlidir. Dışarıdaki boşluğu görünür yapan havadır. (yağmur, güneş, kar, dolu, sis) Bir kayaya dokunduğumda onun çevresine de dokunarak çalışırım"*<sup>21</sup> ifadelerine yer verir (Görsel 2).

Goldsworthy çevresinden bağımsız olarak hareket etmez ve orada nasıl bu hale geldiğini anlatır. "Hareket, değişim, ışık, büyüme ve çürüme doğanın can damarları, çalışmalarım sayesinde dokunmayı denediğim enerjileridir. Doğa değişim halinde... Sanatımda mevsim, hava, malzeme değişikliklerine duyarlı ve tetikte olmak istiyorum. Her iş büyür, kalır ve bozulur. Süreç ve bozulma kesindir. Çalışmalarımdaki geçicilik doğadaki yansır.<sup>22</sup> sözleriyle doğadaki kendi yerini ve sürecini, doğanın süreçleriyle anlamaya çalışan onunla

<sup>20</sup> Song, 2009

<sup>21</sup> Karavit, C., 2008, s. 75

<sup>22</sup> [http://www.morning-earth.org/artistnaturalists/an\\_goldsworthy.html](http://www.morning-earth.org/artistnaturalists/an_goldsworthy.html)

bütünleşen, doğada geçici zararsız dokunuşlarla ilerlemeyi tercih eden bir sanatçı olmuştur (Görsel 3). Goldsworthy’de materyal doğanın kendisi, çalışmalarına yaşam veren ise mevsimsel döngüler olmuştur. Sanatçının amacı, doğaya estetik bir kaygıyla yaklaşarak, doğaya karşı insanlara fakındalık sağlamak, hissettirmek ve düşündürmek ve ortaya koymuş olduğu yapıtlarıyla da doğaya zarar vermemektedir.



**Görsel 2.** Andy Goldsworthy ,Dokuma Şube Dairesel Kemer,1986, Dumfrieshire

İki farklı sanatsal dili kullanan sanatçıların doğada kullanmış olduğu ve ortak sanat malzemesi olan dallarla ortaya konulan çalışmalardan Goldsworthy’nin yapıtlarında, titiz bir el işçiliği estetik duyarlılık dikkat çeker. Goldsworthy, doğada bulunan kırılmış ağaç dallarını, kendi içinde ve doğayla bir bütün meydana getirecek biçimde yeniden ele almıştır. Bazen de, mevsimsel olarak dikkat çeken doğanın kendi renklerinden, sarı, kırmızı renlerden oluşan ve yine doğaya ait doğal bir materyal olan renkli killerden faydalanarak çalışmalarına katmıştır. Ortaya koymuş olduğu yapıtlarında Goldsworthy için önemli olan doğa algısını güçlendirmek, gelişmeyi ve çevresinde olan varlıkları algılamak, onlarla yakın bağlamalar oluşturmaktır (Görsel 2).

Sanatçı Goldsworthy’nin sanatsal yaratım alanlarını hava, su, toprak olarak kabul edilen bu üç doğal elemanın kar, buz, çamur, kum, gibi bağlantılarını da içine almaktadır.



**Resim 3.** Andy Goldsworthy, Rowan Bir Deliğin Etrafında Yapraklar, 1987

Goldsworthy, diğer Çevresel Sanat temsilcileri gibi doğanın kendisini hem sonsuz materyalin yer aldığı bir uygulama atölyesi hem de bir sanat galeri mekânı olarak düşünmekte ve sanatsal materyallerini doğadan belirlemektedir.

Sanatçı, doğadan buluntu nesne ya da bu nesnenin kendileri sanatsal olmayan kar buz parçası, kaya parçası, taş parçası, çerçöp, yaprak, dallar gibi buluntu doğal nesne sanatı yaratıcılarıdır. Çalışma yaratıldığında, başlangıç aşamasında olduğu gibi, üretilmiş olduğu mekânda sergilenme süreci başlar ve bu sanatsal olan süreç devam eder (Görsel 4).

Doğada uygulanan sanatsal çalışmaların amacı her ne olursa olsun, bu belirli bölgelere işaretler koyma insana ilham veren başlıca estetik niteliklerden biri olduğu düşünülmektedir.<sup>23</sup>

Goldsworthy'in amacı, doğanın işleyiş mantığını, görünen nesnenin altına inerek doğayı yeniden yaratmaktır. Doğanın enerjisi olan hareket-ritim, ışık-gölge, gelişme ve bozulma

<sup>23</sup> İlhan Kaya, 2023, s.374



süreçleri, dokunmanın büyüleyici etkisi, toprağın direnci Goldsworthy'in yapıtlarının çıkış noktalarını ve can damarını oluşturur.

Goldsworthy, çalışmasını kurgularken, tüm sanatsal işlemlerini yaratırken, pek çok öge kimi zaman bir girdap biçiminde iç içe girerek sonucu değiştirir. Goldsworthy'e yapıtlarını tasarlarırken; *“Bakma, dokunma, malzeme, yer ve form, bunların tümü sonuçlanan işten ayrılmaz. Birinin nerede durup nerede başladığını söylemek zordur. Yer, havanın ve mevsimlerin belirlediği yönde ilerleyerek bulunur. Ben, her günün bana sunduğu fırsatları yakalarım. Eğer kar yağıyorsa,*



**Görsel 4 . Andy Goldsworthy, Kuzeye dokunmak, North Pole, 1989,**

*karla çalışırım, bu yaprak dökümünde yapraklarla olacaktır. Rüzgârda sallanan bir ağaçta, ince ve kalın dallar bir kaynak olur. Bir yerde durur veya malzemeleri toplarım; çünkü keşfedilmesi gereken bazı şeylerin varlığını hissederim. İşi orada öğrenmeye başlarım”*<sup>24</sup> ifadeleriyle konuya açıklar.

Çağımızın sanatçıları amaç ve niyetleri doğrultusunda geleneksel malzemenin dışında yeni malzemeler ile anlatım biçimleri yaratma çabasına girmişlerdir.<sup>25</sup>

<sup>24</sup> [http://www.morning-earth.org/artistnaturalists/an\\_goldsworthy.html](http://www.morning-earth.org/artistnaturalists/an_goldsworthy.html)

<sup>25</sup> Zengin, M., Z., & Bulat, M., 2022, s. 267



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sonuçta, sanatçı doğadan yola çıkarak yaratılarını oluştururken, organic bir forma sahip olmayan bu biçimsiz, doğal olan yapıları kurgulamış ve sonradan oluşturulan formlarla beraber hayatiyet kazandırmayı amaçlanmıştır. Formsal soyutlama süreci içinde kabul gören bu sanatsal anlayış ve kullanılan yöntem, yapıtlarda izlenen ortak form dilini ortaya koymuştur. Bu sürecin sonunda ulaşılan biçime kişisel bakış açısıyla yaklaşıldığında, tamamen soyut biçime ulaşıldığını söylemek zor olacaktır. Ortaya konulan yeni nesneye bakıldığında, sanatçının çıkış noktasını meydana getiren doğal yapıyı anımsatan özelliklere sahiptir. Yaratılmış olan form, hala doğal formu anımsatmaktadır. Doğadan yola çıkılarak yaratılmış olan bu yapıtların, doğanın soyutlanmış olduğu ileri sürülebilir. Çevresel sanatçı, çıkış noktası nesne olan, soyutlama macerası içerisinde adım adım kendi biçiminden uzaklaşmadan sanatsal yeni bir biçim dili kendi doğasını yaratmıştır.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DOĞAYI İLHAM KAYNAĞI OLARAK KULLANAN ART NOUVEAU VE TAKI SANATÇILARI

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#### ÖZET

Her zaman görselliğe önem veren insanoğlu, kendi görünümüne de büyük önem vermiştir. Taştan kemik ve deniz kabuğu parçalarına, boncuklardan taş ve metale kadar pek çok malzemeye çağın beğeni ve beğenisiyle varlığını günümüze kadar koruyan takı sanatı, etkileşim ve etkileşim açısından geniş bir potansiyele sahiptir. Anlam. Her dönemin ve her kültürün anlam ve ifade gücünü temsil etmek için kullanılan takı sanatı eserleri, art nouveau sanat akımında da önemli bir yere sahip olmuştur. 1800'lerin dördüncü çeyreği ve 1900'lerin birinci çeyreğinde Fransa'da kendini gösteren Art Nouveau takılar, doğayı önemli bir ilham kaynağı olarak alan simetrik olmayan dalgalı çizgilere, incelen ve uzayan bitki saplarına, irili ufaklı bitkisel motiflere ve hayvan motiflerine sahiptir. Bu sanat anlayışının ortaya çıkmasının nedeni ise doğaya dönüş olup, doğayı ve doğanın kendine özgü estetiğini keşfedip yorumlayan çok önemli mücevher sanatçıların ve yaptıkları mücevher çalışmaları günümüz mücevher sanatçılarına ilham kaynağı olmaya devam etmektedir. Art Nouveau, Paris ve Brüksel sanatçılarından yoğun bir şekilde etkilense de diğer Avrupa ülkelerinin sanatçılarından da etkilenecek dünya çapında tanınır hale geldi. En tanınmış Art Nouveau mücevher tasarımcılarından bazıları arasında Rene Lalique ve Louis Comfort Tiffany bulunmaktadır. Günümüzde takıları dünyanın en çok tercih edilen ve aranan takıları arasında yer almaktadır. Lalique, Fransa'nın en önemli mücevher tasarımcılarından biriydi ve yaratımları doğası gereği şehvetli nitelikteydi. Tiffany, özellikle çiçek motifleriyle tanınan önemli bir Amerikalı mücevher sanatçısıydı. Bu çalışmada Art Nouveau sanat akımı incelenerek doğanın önemli sanatçılar ve takı tasarımlarına etkisi araştırılacaktır.

**Anahtar kelimeler:** Art Nouveau, takı, Rene Lalique, doğa, bitkisel motifler



**ART NOUVEAU AND JEWELRY ARTISTS WHO USED NATURE AS THEIR  
INSPIRATION**

**ABSTRACT**

Human beings, who have always attached importance to visibility, have also attached great importance to their own appearance. The art of jewellery, which has preserved its existence with the taste and appreciation of the age until today with instruments ranging from stone to bone and shell pieces, beads, stone and metal and many other materials, has a wide potential in terms of interaction and meaning. Jewellery art works, which are used to represent the meaning and expression power of every period and every culture, have also had an important place in the art nouveau art movement. Art Nouveau jewellery, which emerged in France in the late 1800s and early 1900s, has unsymmetrical wavy lines, thinning and elongating plant stems, large and small floral motifs and animal motifs, which take nature as a significant source of inspiration. The reason for the emergence of this understanding of art is a return to nature, and the very important jewellery artists who explored and interpreted nature and nature's unique aesthetics and their jewellery works continue to be a source of inspiration for today's jewellery artists. Although Art Nouveau was heavily influenced by the artists of Paris and Brussels, it was also influenced by the artists of other European countries and became recognised worldwide. Some of the most well-known Art Nouveau jewellery designers include Rene Lalique and Louis Comfort Tiffany. Today, their jewellery is among the most preferred and sought-after jewellery in the world. Lalique was one of France's most important jewellery designers and his creations were inherently sensual in nature. Tiffany was an important American jewellery artist, particularly noted for his floral motifs. In this study, the Art Nouveau art movement will be analysed and the effect of nature on important artists and their jewellery designs will be investigated.

**Keywords:** Art Nouveau, jewellery, Rene Lalique, nature, floral motifs



## **1. Giriş**

### **1.1. Modern Sanat**

İlk çağlardan günümüze kadar, toplumun sürekli bir ilerleme süreci içinde olmasından dolayı birçok kültürler gelip geçmiş, yeni bir düşünce, teknolojiye var olan gelişmeler, sanatın biçimini özünü hatta estetik kavramlarını, bu gelişime paralel olarak değiştirmiştir (Bulat, 1999). İnsanoğlu yaşadığı dünyayı sorgularken, kendi dünyası arasında gidip gelerek, yeni bir bakış açısının ortaya çıkmasına neden olmuş, buradan hareketle de dış dünya üzerine algıları değiştirebildiği ölçüde yaratıcılığa dayalı yeni bir yaşantı biçimini bizlere sunmuştur. Sanat (Daşkesen, 2021) insanoğlunun yaşam ile olan ilişkisinden kaynaklanmaktadır. Sanat Yapıtı aracılığı ile insanoğlunun kendi içerisinde bütünleştiği sosyal ve psikolojik etkinlikleri ile bilinmeyi, anlaşılmayı ve korkulan düşüncelerini ele alarak sanatın biçim diliyle konuşup bir imge yaratmaktadır (Bulat, 2014).

Toplumda (Küçükosman & Şengünel, 2022) ve kültürde var olan küresel bir hareket olarak bilinen Modern Sanat, 20. yüzyılın başında sanayi devrimi (Taşar & Bulat, 2021) sonrasında ortaya çıkan yaygın kentleşmeye tepki olarak gelişmiştir. Modernizm olarak da adlandırılan Modern Sanat (Safarlı Aghasoy, 2022), ortaya çıktığı dönemde hem sanat hem de felsefi bir akım olarak görülüyordu. Bu hareket, sanatçıların yeni gelişen dünyayı tam olarak yansıtan yeni sanat biçimleri (Kaya, 2022), felsefe ve toplumsal yapılar üretme konusundaki büyük özlemini yansıtıyordu. Modernizm, geniş hareket içinde çeşitli farklı tarzları, teknikleri ve medyayı içeriyordu. Ancak Modernizm içindeki her hareketin tüm sanat eserlerinde ortaya konan temel prensip, tarihin ve gerçekçilikle ilişkilendirilen geleneksel kavramların tamamen reddedilmesiydi. Sanatçılar, hızla modernleşen toplumlarda var olan gerçekleri ve umutları daha iyi yansıttığını düşündükleri sanat eserleri yaratmak için yeni görüntü, malzeme ve tekniklerden yararlanmaya başladılar.

Modernizmin en önemli etkisi Empresyonizm hareketi ile olduğu kabul edilmektedir, çünkü bu dönemde çalışan sanatçılar konuları tasvir ederken natüralist olmayan renkleri kullanmaya başladı. Empresyonizm (Öztüfekçi & Dilmaç, 2021) o zamanlar yüksek tabakalarında pek popüler değildi, çünkü geleneksel sanat yapma biçimine uymayan unsurları benimsiyordu. Böylece normdan bu sapmanın, henüz keşfedilmeyi bekleyen soyut eğilimlerin başlangıcını kucakladığı için Modernizm Sanatının başlangıcına zemin hazırladığı söylenmektedir.

Modernistler, sanat eserlerinin nasıl inşa edilmesi gerektiğine dair kendi vizyonlarını yaratmak amacıyla renk, perspektif ve kompozisyonla ilgili eski kuralları göz ardı etmişlerdi (Görsel 1). Bu tutumlar, sanayi devriminin (Kuru, 2016) getirdiği hızlı değişimler ve 1914'te Birinci Dünya Savaşı'nın başlamasıyla daha da güçlenmişti. Sanatçılar, savaş sonucu toplumda görülen dehşet ve vahşete tepki olarak sanat eserlerinde aklı bırakıp sezgiyi tercih ettiler ve dünyayı tam olarak gözlemedikleri gibi resmetmişlerdi.



**Görsel 1.** Georgia O’Keeffe, Lake George Reflection (1921-1922)

<https://www.artistsnetwork.com/art-inspiration/women-celebrating-women/>

Bu hızlı değişim dönemi, o dönemin toplumunu karakterize etmiş ve sanatçıların, gelişen modern dünyanın özlemlerini ve hayallerini doğru bir şekilde tasvir etmek için sanat yaparken tekniklerini sürekli olarak güncellemelerine yol açmıştır. Modernizm, sanayileşmenin yükselişi ve savaş zamanlarının başlaması nedeniyle hızla değişen yaşam koşullarına, sanatçıların yeni konular, çalışma teknikleri ve materyallerle bir yanıydı (Sarı, 2018).

Buna ek olarak sanatçılar geleneksel sanat biçimlerini modern toplumda (Zengin & Bulat, 2022) geçerliliğini yitirmiş olarak görmekte, hissettiklerini yeterince yansıtmayacak yeni ifade biçimleri aradıklarını belirtmekteydiler. Modernizm, zamanın farklı sosyal ve siyasi gündemleri tarafından büyük ölçüde şekillenmekte ve sanatçılar bu ideal yaşamı ve toplum vizyonlarını eserlerinde yansıtmaya çalışmaktaydı.

Modern Sanat (Uca, 2017), esasen yaratıcı dünyanın, sanayileşmenin, teknolojik ilerlemelerin sağladığı yeni yaşamların ve fikirlerin rasyonalist geleneklerine ve bakış açılarına verdiği cevaptı. Sanatçılar, çalıştıkları sanatsal türden bağımsız olarak, modern yaşam deneyimlerini yenilikçi yollarla temsil etmeye çalışıyorlardı. Böylece Modern Sanat, geleneksel üslup ve değerleri reddeden, bunun yerine kendi bakış açılarını eserlerine dahil eden ve konularını tam olarak dünyada var oldukları gibi resmeden sanatçılar tarafından karakterize ediliyordu.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

1960'lara gelindiğinde Modernizm, sanat alanında önemli bir hareket haline gelmişti. Bazı akademisyenler bu akımın 21. yüzyıla kadar devam ettiğini söylerken, bazıları da "Postmodernizm" olarak adlandırılan geç bir Modernizm türüne dönüştüğünü belirtmiştir. Postmodern sanat hareketi, adında "modernizm" terimini kullanmasına rağmen, yeni bir sanat türü üretme çabasıyla temel varsayımlarını reddettiği için Modernist ilkelerden büyük bir sapma göstermiştir (Şahin, 2012).

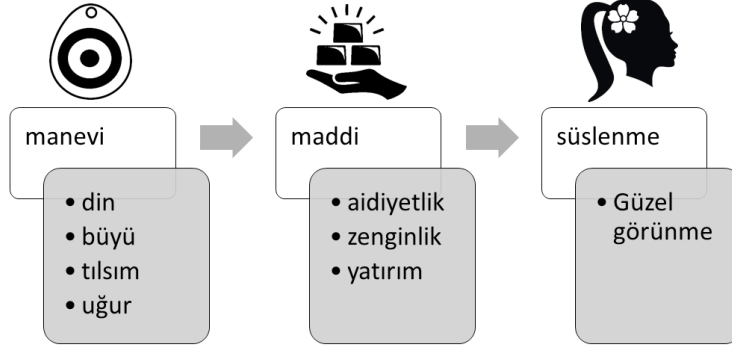
Neredeyse bir yüzyıl boyunca süren Modern Sanat, her biri farklı unsur ve tekniklerden oluşan çok sayıda farklı sanat hareketini içermektedir. Modernizm sonraki hareketlerinde saf soyutlama, hiperrealizm ve sanat karşıtı tarzlar da dahil olmak üzere her şeyi kucaklamıştır. Hareketin büyük çeşitliliği nedeniyle bu dönemi tanımlamak için kullanılacak birleştirici özellikler dikkate almak zordur. Ancak kendisini önceki akımlardan ve onu takip eden Postmodern akımdan ayırmayı başaran Modern Sanat hakkında söylenecek tek şey, sanatçıların sanatlarının önemli olduğuna, özgür, bağımsız bir yaratıma (Maltaş, 2020) ve gerçek bir değere sahip olduğuna gerçekten inandıklarıydı.

### 1.2. Takı Sanatının Tarihsel Süreci

Takı evrensel bir süslenme biçimidir. Deniz kabukları, boncuk (Sevin, 2011), taş ve kemiklerden yapılan takılar tarih öncesi çağlardan günümüze ulaşmıştır. Tarih öncesi çağlardan itibaren tehlikelerden korunmak ya da bir statü veya rütbe işareti olarak takılmıştır. Antik dünyada metallerin işlenmesinin keşfi takı/mücevher sanatının gelişiminde önemli bir aşamayı oluşturmaktadır. Zamanla metal işleme teknikleri daha sofistike ve süslemeler daha karmaşık hale gelmiştir.

Tarihsel süreçte arkeolojik kazılar sonucunda elde edilen bilgilere göre takıların ilk kullanım amacının günlük ihtiyacı karşılamak için olduğu, daha sonraları ise takıları taktıklarında fiziksel ve ruhani olarak güç (Türe & Savaşçın, 2000) elde ettiklerini düşündükleri öngörülmektedir. Arkeolojik kazılardan çıkan takı örneklerine bakıldığında takılar sadece fiziksel ve ruhani olarak güç vermenin dışında, aynı zamanda aidiyet ve birlik olduklarını gösterebilecekleri topluluk sembolleri olarak kullanıldığı anlaşılmıştır. Tarihi süreç içerisinde kullanım amacı genişleyen büyüsel ve dinsel inançlar gibi manevi duygularla ortaya çıkan takı zanaatı, değerli taşların ve madenlerin kullanımı ile birlikte maddi olarak da önemli kullanım eşyaları haline gelmiş, zamanla süslenmek, güzel görünmek için bir araç olarak görülmüş ve kullanılmıştır (Görsel 2) (Genç, 2019).

TARİHSEL SÜREÇTE TAKININ KULLANIM AMAÇLARI



**Görsel 2.** Tarihsel Süreçte Takının Kullanım Amaçları

<https://dergipark.org.tr/tr/download/article-file/1417130>

Kalkolitik Dönemde (Türe, 2005) teknolojilerin gelişmesiyle ilerleyen yüzyıllarda (Demir Çağı) bazı malzemelerin ergitilmesi döküm ile şekillendirme yöntemini geliştirmiştir. Halef kültürü ile sürtme taş tekniği ortaya çıkmıştır. Akik, kuvars gibi sert süs taşlarından takılar yapılmıştır (Görsel 3). Altın, gümüş gibi madenlerin keşfiyle birlikte maden ve metal işlemeciliği gelişmiştir (Köroğlu, 2004).



**Görsel 3.** Geç Kalkolitik Çağ Kolyesi, M. Ö. 5000.

<https://kitclayton.com/a/blog/the-7000-year-old-necklace>

Sosyal ve bilimsel gelişmelere paralel takı ve üretimi de gelişme göstermektedir. Porselenin keşfinden sonra, yeşim taşının taklidini yapmak için “Seladon” sırları geliştirilmiştir (Çamaş, 2007), Hititlerde (Mandacı, 2016) malzeme olarak bronzdan takılar (Görsel 4), Demir Çağı'nın önemli medeniyetlerinden biri olarak Urartular altın, gümüş, bakır, demir ve tunç malzemelerden takılar üretmişlerdir (Görsel 5) (Sevin, 2011).



**Görsel 4.** Hitit Dönemi Takı Örneği.



**Görsel 5.** Urartu Dönemi Takı Örneği.

<https://arkeofili.com/corumda-bulunan-nadir-hitit-bilezigi-muzede-sergiye-alindi/>

<https://arkeofili.com/urartularin-muhtesem-mucevher-teknikleri-hala-kullaniliyor/>

Pers Uygarlığında takılar altın, cam, seramik boncuklardan (Görsel 6) (Türe, 2005), Mısır Uygarlığında ise takıların çoğu altından yapılmış olup, taçlardan kolyeye geniş bir yelpazede takı çeşidi üretilmiştir (Görsel 7) (Akyüz, 2019). Minos ve Miken uygarlıkları ise; ticaretle uğraştıklarından dolayı farklı tarzda takı örnekleri ile karşılaşmışlardır (Görsel 8-9) (Türe & Savaşçın, 2000).



**Görsel 6.** Pers Dönemi Takı Örneği.



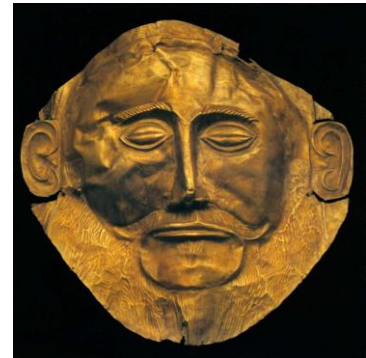
**Görsel 7.** Mısır Dönemi Takı Örneği.

[https://www.arkeolojisanat.com/shop/blog/tarihin-ilk-super-gucu-persler\\_3\\_968141.html](https://www.arkeolojisanat.com/shop/blog/tarihin-ilk-super-gucu-persler_3_968141.html)

<http://www.jewelry-history.com/2014/07/the-divine-colors-of-hathor.html>



**Görsel 8.** Minos Dönemi Takı Örneği.



**Görsel 9.** Miken Dönemi Takı Örneği.

<https://www.licensestorehouse.com/galleries/earrings?pn=26>

<https://www.istanbulsanatevi.com/sanat-terimleri-kavramlar/miken-resmi-nedir-ozellikleri-nelerdir/>

Yunan Uygarlığında takı uygulamalarında (Demirtaş, 1996) değerli madenlerin yanı sıra cam ve seramik malzemelerde kullanılmıştır (Görsel 10). Roma Sanatında (Tavukçu & Göral, 2020) takılar daha mütevazı biçimde tasarlanmış, gösteriştan uzak yapılmıştır (Görsel 11) (Türe & Savaşçın, 1986).



**Görsel 10.** Yunan Uygarlığı Takı Örneği.



**Görsel 11.** Roma Uygarlığı Takı Örneği.

<https://tektecilik.blogspot.com/2019/01/antik-yunan-takilari.html>

[https://www.arkeolojisanat.com/shop/blog/antik-roma-donemine-ait-10-mucevher\\_3\\_162948.html](https://www.arkeolojisanat.com/shop/blog/antik-roma-donemine-ait-10-mucevher_3_162948.html)

1200-1500 Orta Çağ Avrupa'sında takılan mücevherler (Görsel 12) orta çağ son derece hiyerarşik ve statü bilincine sahip bir toplumu yansıtıyordu. Kraliyet ailesi ve soylular altın, gümüş ve değerli taşlar takarken, toplumun alt kademeleri ise bakır ya da kalay gibi metallere yapılmış takılar takardı. 14. yüzyılın sonlarına kadar değerli taşlar genellikle kesilmek yerine parlatılırdı. Metal bir yüzey üzerine yüksek sıcaklıkta pişirilen taşlanmış camlar olarak tanımlanan emayeler, kuyumcuların mücevher tasarımlarını renklendirmelerini sağlamaktaydı (Kupstas, 2000).



**Görsel 12.** Kolye ucu, Yapımcısı bilinmiyor, yaklaşık 1450-1475, Victoria ve Albert Müzesi, Londra.

<https://collections.vam.ac.uk/item/O13450/pendant-cross-unknown/>

Rönesans mücevherleri çağın ihtişam tutkusunun göstergeleridir. Genellikle mücevherin her iki yüzünü de kaplayan mineler daha ayrıntılı ve renkli hale gelmişti ve kesim tekniklerindeki ilerlemeler taşların ışıltısını artırmaktaydı. Dinin günlük yaşamdaki muazzam önemi, dünyevi güç gibi göstergeler mücevherlerde de görülebiliyordu. Birçok görkemli parça siyasi gücün bir göstergesi olarak takılıyordu. Tasarımlar klasik dünyaya duyulan yeni ilgiyi yansıtıyor, mitolojik figürler ve sahneler popüler hale geliyordu. Antik mücevher oyma sanatı yeniden canlanmıştı ve portre kullanımı bir başka kültürel eğilimi, bireye dair artan sanatsal farkındalığı yansıtmaktaydı (Görsel 13) (Wardropper, 2000).



**Görsel 13.** Yüzük, Yapımcısı bilinmiyor, M.Ö. 2.-1. Yüzyıl, Victoria ve Albert Müzesi, Londra.

<https://www.thedailybeast.com/the-wild-history-of-poison-rings>

17. yüzyılın ortalarına gelindiğinde, modadaki değişiklikler yeni mücevher stillerini ortaya çıkarmıştır. Koyu renk kumaşlar özenli altın takılar gerektirirken, yeni yumuşak pastel tonlar değerli taşlar ve inciler için zarif bir fon oluşturmuştur. Genişleyen küresel ticaret, değerli taşları daha ulaşılabilir hale getirmiş, kesim tekniklerindeki gelişmeler değerli taşların ışıltısını artırmıştır. En etkileyici takı/mücevherler genellikle sert elbise kumaşlarına iğnelenmesi veya dikilmesi gereken büyük beden veya göğüs süsleri olarak şekillenmeye başlamıştı. Mücevherlerin kıvrımlı yaprak süslemeleri, fiyonk motifleri ve botanik süslemeler yeni bir coşku göstermekte, çarpıcı renk kombinasyonu bu tarihlerde emayelerde sıklıkla kullanılmaktaydı (Görsel 14).





**Görsel 14.** Safir Taş ve Fiyonklu Gerdanlık, Yaklaşık 1660 yılları, Victoria ve Albert Müzesi, Londra.

<https://www.vam.ac.uk/articles/a-history-of-jewellery>

17. yüzyılın sonu, çoklu fasetleriyle parlak kesimin gelişimine tanıklık etmişti. Elmaslar daha önce hiç olmadığı kadar parlak ve mücevher tasarımına hakim olmuştu. Taşın beyaz rengini arttırmak için sıklıkla gümüşe monte edilen muhteşem elmas mücevher setleri saray hayatının vazgeçilmeziydi. En büyükleri vücuda takılırken, daha küçük süsler bir kıyafetin üzerine serpiştirilebiliyordu. Yüksek içsel değeri nedeniyle, bu döneme ait çok az elmas mücevher günümüze ulaşmıştır. Sahipleri genellikle bunları satmış ya da mücevherleri daha moda tasarımlara göre yeniden düzenletmiştir (Almelek İşman, 2020).

Yaklaşık 1640'tan itibaren kısa, esnek, sivri uçlu hafif kılıçlar, sivil kıyafetlerle birlikte 'küçük kılıçlar' olarak kullanılmaya başlandı ve kendini savunmak için bir araç sunarken, iyi giyimli beyefendiler için statü anlamı taşımaktaydı. 18. yüzyılda küçük kılıçlar erkek mücevherleriydi. 1750'lere gelindiğinde, değerli taşlar ve ince işlemlerle süslü altın ve gümüş kabzaları, kılıç ustasından ziyade kuyumcu ve sarrafın ürünüydü. Genellikle seçkin askeri ve denizcilik hizmetleri için ödül olarak verilirlerdi (Görsel 15) (Pointon, 2007).





**Görsel 15.** Kılıç, James Morisset imzalı, 1798, Victoria ve Albert Müzesi, Londra.

<https://www.jolibeau.com/history-of-jewellery/>

19. yüzyıl büyük bir endüstriyel ve sosyal değişim dönemi idi, ancak mücevher tasarımında genellikle geçmişe odaklanılıyordu. Dönemin ilk on yıllarında, antik Yunan ve Roma'nın ihtişamını çağrıştıran klasik tarzlar popülerdi. Yeni arkeolojik keşifler tarafından eski eserlere olan ilgi teşvik ediliyordu. Kuyumcular eski teknikleri yeniden canlandırmaya çalışıyor, arkeolojik mücevherleri yeniden üretiyor ya da onların tarzında mücevherler yapıyorlardı. Diğer yandan Orta çağ ve Rönesans dönemlerinden esinlenen mücevherlere de ilgi vardı. Kuyumcuların aynı anda hem arkeolojik hem de tarihi tarzda çalışmaları dönemin eklektik doğasının göstergesidir (Mazet, 2019).

Açıkça tanınabilen çiçekler ve meyvelerle süslenmiş natüralist takılar da yine bu dönemin popüler çalışmalarıydı. Bu motifler 19. yüzyılın ilk yıllarında, botaniğe olan yaygın ilgi ve Wordsworth gibi Romantik şairlerin etkisiyle moda olmuştu. Çeşitli çiçek demetlerinden oluşan takı/mücevherlerin arkasında bir iğne vardı ve bir korse süsü olarak kullanılabilirdi. Elmas çiçeklerin bazıları yaylar üzerine yerleştirilmiştir, bu da takan kişi hareket ettikçe ışıltılarını önemli ölçüde arttırmaktaydı. Çiçek demetleri tek tek çıkarılarak saç süsü olarak da kullanılabilirdi. 1850'lere gelindiğinde narin tasarımlar yerini daha abartılı ve karmaşık çiçek ve yeşillik kompozisyonlarına bırakmıştı. Aynı zamanda çiçekler sevgi ve dostluğu ifade etmek için de kullanılıyordu. Doğadaki renkler renkli değerli taşlarla eşleştirilmişti. Daha önceki dönemlerin aksine, daha özenli mücevherler neredeyse sadece kadınlar tarafından takılıyordu (Görsel 16) (Flannery, 2007).



**Görsel 16.** Çiçek demeti formunda beden süsü, Yaklaşık 1850, Victoria ve Albert Müzesi, Londra.

<https://www.dailyartmagazine.com/natural-shine-nature-inspired-jewelry-from-victoria-and-albert-museum/>

19. yüzyılın son yıllarında gelişen Arts and Crafts (Tsoumas, 2013) hareketi, sanayileşmiş dünyadan duyulan derin bir rahatsızlığa dayanıyordu. Kuyumcular, artık uygun fiyatlı parçaların kaynağı olan makine güdümlü fabrika sistemini reddediyor ve bunun yerine tek tek mücevherleri el işçiliğiyle üretmeye odaklanıyordu. Arts and Crafts kuyumcuları büyük, yontulmuş taşlardan kaçınıyor, bunun yerine kabaşon taşların doğal güzelliğine güveniyorlardı. Belirli bir ana hat üzerinde taşların düzenli ve tekrarlardan oluşan tasarımları, genellikle sembolik bir anlamı olan kıvrımlı veya figüratif tasarımlarla (Görsel 17) yer değiştirmeye başlamıştı.



**Görsel 17.** Kolye-broş, C.R. Ashbee tarafından tasarlanmış ve Guild of Handicraft tarafından yapılmış, Yaklaşık 1900, Victoria ve Albert Müzesi, Londra.

<http://guity-novin.blogspot.com/2014/03/chapter-75-history-of-jewellery-design.html>

## 2. MATERYAL ve METOT

Araştırma materyali Art Nouveau sanat hareketinde takı çalışmalarında bulunan önemli beş sanatçı ve onların takı çalışmalarıdır.

Literatür tarama yöntemiyle elde edilen Art Nouveau takı çalışmaları betimsel analiz yöntemiyle incelenmiştir.

## 3. BULGULAR ve TARTIŞMA

### 3.1. Art Nouveau Sanat Hareketi

XIX. yüzyıl sanayi devriminin yarattığı bunalımlı çağda, toplumdaki bazı kesimlerin bu buhranlı sürece karşı çıkması ve maddeye de ruhsal birtakım duygular katmaya çalışmalarıyla ortaya çıkmıştır. Bu dönemde gelişen sanayi, beraberinde köyden kente göçü arttırmıştır. Artan göçle şehirlerde yaşanan kalabalık, yer bulamama ve şehirlilerle köylüler arasındaki kültürel çatışma; halkın, yaşama, çalışma, iletişim kurma ve düşünce tarzını da tümüyle değiştirmiştir. Avrupa ve Amerika'yı kısa bir sürede saran yeni yüzyılın modernleşme tutkusu kentleri ve tasarımları biçimlendirmiştir. Doğu Asya ve İslam sanatlarından ve doğadan aldığı etkilerle, karışık ve zengin eklektik stil, Avrupa'da kendi (Duru & Şaman, 2015) tarzını yaratmıştır (Görsel 18).



**Görsel 18.** Art Nouveau Mimarisi

<https://mimarobot.com/haber/wiki/art-nouveau/>

XX. Yüzyıl başlarına hakim olan bu sanat akımı, Orta Çağ German, Kelt ve İskandinav sanat çizgilerini alarak, XVIII. yüzyıl Avrupa'sına hakim Barok ve Rokoko'nun görüş ve ifadeleriyle birleşip yeni bir bakış açısı getirmiştir. Sanayileşmiş kentlerde, doğa özlemi ve o dönemde Darwin'in türlerin kökenini inceleme teorisi Art Nouveau sanat akımına da yansımıştır. Çıplak ve yarı çıplak kadın figürleri, kamçı uçları, saçlar, erotik hareketler kullanılan simgelerdendir. Doğadan alınan birçok tasvir vardır. Tavus kuşu, horoz, baykuş, kuğu, yarasa, Mısır sanatında

çokça kullanılan yılan, arı, çekirge formları, mine tekniğiyle renklendirilerek kullanılmıştır (Görsel 19) (Selz, 1960).



**Görsel 19.** Alfons Mucha'nın Art Nouveau akımına örnek çalışması

<https://www.artfulliving.com.tr/sanat/art-nouveau-akimi-ve-sanatci-alfons-mucha-i-25751>

1800'lerin sonu ve 1900'lerin başında Fransa'da ortaya çıkan Art Nouveau takılar, doğayı önemli bir ilham kaynağı olarak alan simetrik olmayan dalgalı çizgilere, incelen ve uzayan bitki saplarına, irili ufaklı bitkisel motiflere ve hayvan motiflerine sahiptir. Bu sanat anlayışının ortaya çıkmasının nedeni ise doğaya dönüş olup, doğayı ve doğanın kendine özgü estetiğini keşfedip yorumlayan çok önemli takı sanatçıların ve yaptıkları takı/mücevher çalışmaları günümüz mücevher sanatçılarına ilham kaynağı olmaya devam etmektedir (Görsel 20). Art Nouveau, Paris ve Brüksel sanatçılarından yoğun bir şekilde etkilense de diğer Avrupa ülkelerinin sanatçılarından da etkilenecek dünya çapında tanınır hale geldi. En tanınmış Art Nouveau takı/mücevher tasarımcılarından bazıları **Rene Lalique** ve **Louis Comfort Tiffany**, **Henri Vever**, **Georges Fouquet**, **Lucien Gaillard**'dır (Misiorowski & Dirlam, 1986).



**Görsel 20.** Art Nouveau takı çalışması

[https://commons.wikimedia.org/wiki/File:Collier\\_Noisettes\\_de\\_Ren%C3%A9\\_Lalique\\_\(exposition\\_Medusa,\\_Mus%C3%A9e\\_d'art\\_moderne\\_de\\_la\\_ville\\_de\\_Paris\)\\_37277275845.jpg](https://commons.wikimedia.org/wiki/File:Collier_Noisettes_de_Ren%C3%A9_Lalique_(exposition_Medusa,_Mus%C3%A9e_d'art_moderne_de_la_ville_de_Paris)_37277275845.jpg)

## **Rene Lalique**

Art Nouveau mücevherleri kalıcı etkisinin çoğunu Fransız sanatçı René Lalique'e borçludur. Lalique, göz alıcı tasarımları ve kusursuz işçiliğinin yanı sıra, alışılmamış malzemelerin kullanımına öncülük etmişti, incelikli renk şemaları sunmuş ve üzerinde çalıştığı her parçaya anlam aşılarmıştır. Mücevher yapımına derin ifadelerle sahip bir sanat formu olarak yaklaşmıştır. Mücevher tasarımcısı olarak yeteneklerini Cartier, Boucheron ve Vever'e aktarmış ve broşları ve tarakları, Lalique'in 1900 Dünya Fuarı'nda uluslararası alanda tanınmasını sağlamıştır (Philby, 1986).

Lalique, çalışmalarında yalnızca değerli taşlar ve metal kullanmak yerine emaye (mine), kalıplanmış cam, fildişi, kehribar ve boynuzu diğer malzemelerin yanına entegre etmiştir. Tasarımların maliyetten çok sanatsal değerine önem vermiş, benzersiz dokulardan ve farklı malzemelerle ışık ve renk etkileşiminden büyük ölçüde yararlanmıştır. Lalique'nin ana motifleri bitkiler, çiçekler, dalgalı saçlı kadınlar ve fantastik figürler olmuştur. Karmaşık tasarımlarla farklı ikonografiyi takı tasarımlarına taşımıştır (Görsel 21) (Koch & FitzGibbon, 1988).



**Görsel 21.** Rene Lalique tarafından üretilmiş takı çalışması

<https://radugam.com/art-nouveau-takilari-en-ilginc.html>

## **Henri Vever**

Henri Vever, kardeşi Paul ile 19. yüzyılın önde gelen takı/mücevher tasarım stüdyolarından biri olan Vever Mücevher Evi'ni kurdu. Vever Mücevher Evi'nin Art Nouveau dönemindeki mirasını sağlamaştıran Henri'nin mücevher tasarımcısı olarak yaptığı çalışmalardı.

Kaliteli işçiliği, mineleme uzmanlığı ve daha önce kullanılmamış malzemeleri kullanmasıyla mücevherde Art Nouveau'nun tanımlanmasına yardımcı oldu. Henri Vever'in eserleri geleneksel ince unsurlar ile yeni öğelerin bir kombinasyonuydu. Elmas, inci ve altını mine, boynuz, fildişi ve opallerle birlikte kullandı. Lalique'e kıyasla Vever, hem kullandığı



malzemelerde hem de tasarımlarında geleneklere daha fazla değer veriyordu. Yapraklar, kadınlar ve böcekler gibi doğa motiflerini kullanırken bile Vever, pratiklik ve klasik güzellik anlayışını korumuştur (Görsel 22) (Duru, & Şaman, 2015).



**Görsel 22.** Henri Vever takı çalışması

<https://blog.yazjewels.com/art-nouveau-jewellery-guide/>

### **Georges Fouquet**

Başarılı kuyumcu Alphonse Fouquet'nin oğlu olan Georges, Fouquet Mücevher Evi'nde babasının kanatları altında yeteneklerini ve sanatını geliştirdi. Georges bu deneyimini oğlu Jean'a aktaracak ve o da 20. yüzyılın başlarında takı/mücevherin modern geometrik stillerine katkıda bulunacaktı. Çek ressam Alphonse Mucha ile çalışmaya başladığında Georges Fouquet daha da ün kazandı. Fouquet, Lalique ve Vever gibi, yarı değerli ve değersiz öğelerle sanatsal bir yetenekle takı/mücevherler tasarladı. Mucha ile birlikte çalışırken renkli değerli taşların yanı sıra lake ve emaye de tercih ettiği malzemeler arasındaydı. Tasarımlarında giyilebilirliğe öncelik verdiği için çağdaşlarına kıyasla daha az metal kullanmıştır. Periler, bitkiler ve böceklerin baskın motifleri şaşırtıcı olmayan bir şekilde Fouquet'nin Art Nouveau mücevherlerinde de yer aldı (Görsel 23) (Misiowski & Dirlam, 1986).





**Görsel 23.** Georges Fouquet takı çalışması

<https://www.thefrenchjewelrypost.com/en/style/muchas-art-nouveau-jewelry/>

### **Louis Comfort Tiffany**

Mücevher tasarımında Art Nouveau daha çok Fransa'nın öncülüğünde Avrupa'da hissedilirken, Amerika bu akıma ünlü marka Tiffany & Co'nun Louis Comfort Tiffany'si ile damgasını vurdu. Baş harfleriyle anılan LCT, çığır açan cam çalışmalarıyla ünlüydü. LCT, babası ve şirketin kurucusu Charles Tiffany'nin ölümünden sonra 1902 yılında Tiffany & Co. için ilk tasarım direktörü oldu. Beşinci Cadde şubesinde Tiffany Artistik Mücevher departmanını kurdu. Bu departmanda LCT, kendine özgü tarzını geliştirdi ve belirgin bir şekilde Amerikan olan dikkat çekici Art Nouveau mücevher parçaları üretti. Dönemin genel estetiğini takip eden LCT, doğal dünyadan etkilenmiştir. Kelebekler, meyveler ve üzüm bağları LCT'nin çalışmaları için ilham kaynaklarından bazılarıydı. Emaye, siyah Opal, Altın ve Platin ile çarpıcı broşlar, kolyeler ve kolyeler tasarladı (Görsel 23) (Daniel, 1960).



**Görsel 23.** Louis Comfort Tiffany takı çalışması

<https://www.sothebys.com/en/slideshows/12-must-see-jewels-by-louis-comfort-tiffany?slide=group-of-gold-black-opal-enamel-and-coloured-stone-jewellery-tiffany-co-designed-by-louis-comfort-tiffany-circa-1905-1920-estimate-100-000-150-000>

## **Lucien Gaillard**

Mücevher yapımında aile geleneğini sürdüren Lucien Gaillard, kuyumcu bir aileden geliyordu. Büyükbabası Amédée Alexandre Gaillard Paris'teki atölyelerini kurmuş ve daha sonra bu atölye babası Ernest Gaillard tarafından devralınmıştır. Lucien'in babasının çırağı olarak edindiği deneyim, onu Art Nouveau akımının yükselişe geçtiği dönemde firmayı yönetmeye hazırladı. Lucien Gaillard Japon sanatına derin bir düşkünlük duyuyordu ve bu düşkünlük Japon tarzını temel alan mükemmel metal işlerine dönüştü. Yükselen güneşin ülkesine duyduğu hayranlık, Paris'teki atölyesinde çalışmak üzere Japon zanaatkarları denizin ötesine getirecek kadar ileri gitti. Gaillard'ın Art Nouveau mücevherlerinde altın, zümrüt, inci ve minenin yanı sıra fildişi, boynuz, lake ve bakır da kullanılmıştır (Görsel 24) (Misiorowski & Dirlam, 1986).



**Görsel 24.** Lucien Gaillard takı çalışması

<https://jewel-fashion.com/lucien-gaillard/>

## **4. SONUÇ ve ÖNERİLER**

Art Nouveau temsilcilerinin hemen hepsinin yeni olanın arayışı içinde oldukları görülmektedir. Art Nouveau sanatçısı özlemini duyduğu estetik hazzı, yer yer eski ve yeninin harmanlandığı hem geometrik hem doğal formlara getirilen yeni yorumlarda bulmuştur. Her ne kadar kendinden önceki üsluplarla hem benzerlikler hem de kültürel etkileşimler görülmüş olsa da sanatın pek çok dalında bu oluşum taklitçilikten ziyade sanatı yeniden yorumlamak olarak değerlendirmiştir. Uluslararası alanda aradığını bulan sanatçının egzotik üslupla eserine getirdiği özgün yorumu sayesinde geçmişten kaçarak kendi üslubunu oluşturmak istediği görülmüştür.

Sonuç olarak, Art Nouveau sanat akımına teorik olarak bakıldığında, eleştirdiği ortamın içinden doğarak kendine bir yer edinmeye çalıştığı görülmektedir. El emeğiyle sanatın birleştirilerek idealize edilmesi adına çıkılan yolda, yeni ufuklara bireyin özgürleşmesi neticesinde varılmıştır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Ayrıca Batı dışına uzanan Batılı sanatçının kazanımlarını, eleştirdiği dönemin sunduğu imkanlar neticesinde elde ettiği görülmektedir. Kentleşme sürecinde özgürlüğünü elde eden sanatçı, belli kalıplara oturtmak durumunda kaldığı sanatına yeni boyutlar kazandırarak, kendi düşünsel gelişim sürecine de egzotik çeşitlenmelerle ivme katmıştır.

### 5. Teşekkür ve Bilgilendirme

Çalışmada yazarlar eşit oranda katkıya sahip olup hiçbir çatışma ve uyuşmazlık bulunmamaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF MONUMENTAL MASJIDS BELONGING TO THE ANATOLIAN SELJUK PERIOD IN KONYA IN THE SCOPE OF ENERGY EFFICIENCY

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#### **ABSTRACT**

Monumental mosques and masjids have great importance in terms of religious and cultural architectural heritage. This heritage needs to be documented and protected. Konya has hosted many civilizations throughout its history and the city has preserved its importance for many years as the capital of the Anatolian Seljuk Civilization. In this respect, in this study, monumental masjids built in the Anatolian Seljuk Period in Konya are handled. This study is prepared within the scope of the Scientific Research Project. It is aimed to create and document the inventory of monumental masjids and to research the masjids in the scope of energy efficiency. The masjids' architectural design properties and construction techniques are explained and energy analyses are made by modeling them through the DesignBuilder simulation software. The relationship between architectural design properties and the energy demands of masjids is handled. It is aimed to show the importance of monumental religious buildings in terms of energy efficiency. Studies in this area are limited. In this respect, this study is pioneering and creates potential research scopes for future studies.

**Keywords:** Monumental masjids, Anatolian Seljuk Period, architectural heritage, energy efficiency



## **INTRODUCTION**

Konya has been one of the most important main centers of Turkish-Islamic culture and art in Anatolia throughout its history. The city has preserved its importance for many years as the capital of the Anatolian Seljuk Civilization and as it is one of the important state centers of the Ottoman Empire. It has been an architectural center throughout its history and has valuable elements of cultural and architectural heritage (Baykara, 2002). Mosques and masjids built during the Seljuk and Ottoman periods are important buildings that provide the formation of city morphology. Monumental mosques and masjids are valuable elements of religious and cultural architectural heritage. Creating an inventory of these buildings is important for the protection of cultural heritage. In this respect, in this study, monumental masjids built in the Anatolian Seljuk Period in Konya are handled.

Mosques and masjids represent a central area where people gather for daily and weekly prayers and are considered a place for the educational, cultural, and social activities of Muslims. They are characterized by their unique working hours. They are used simultaneously in a specific region and time zone. This characteristic property affects the energy demand of the masjid building during the heating and cooling periods, depending on the climate zones (Al-Homoud et al., 2005). Climate-related design properties of buildings affect the comfort conditions and thermal performance of the building (Abdou et al., 2005). Mosques and masjids' energy efficiency largely depends on the overall thermal performance of building components such as roofs, walls, and windows working together as a system (Al-Homoud et al., 2009). In a mosque with low thermal performance, more energy is consumed to provide comfort conditions. In addition, the comfort of the user in a religious building is important for a sense of sacred worship. In this respect, providing the comfort conditions in the interior space in an energy-efficient method is an important subject.

In the study conducted within the scope of thermal comfort and energy demands of mosques, indoor comfort conditions were analyzed for three mosque buildings located in the hot humid climate zone of Damman, Saudi Arabia. The relationship between these conditions and the consumed energy levels was investigated. It was determined that only one of the mosques had a thermal insulation layer in the envelope. It was reported that two uninsulated mosques had higher levels of energy consumption and dissatisfaction in terms of thermal comfort. In conclusion, the importance of integrating a thermal insulation layer was emphasized (Al-Homoud vd., 2009). In addition, various studies show that older buildings have lower energy



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

loads due to their compact urban layout and the use of materials with thermal mass convenient for climatic conditions (Azmi vd., 2021). This study, it is aimed to create and document the inventory of monumental masjids and to research the masjids in terms of energy efficiency. Studies in the literature about the basic design and energy performance of mosques are limited. In this respect, this study is pioneering and will light on future studies. In this respect, it is aimed to contribute to the studies within the scope of energy efficiency and masjids, to investigate the current energy needs of buildings, which are important elements of the monumental architectural heritage built centuries ago, and to show the importance of masjids in terms of energy efficiency.

### **MATERIALS and METHODS**

This study is prepared within the scope of the Scientific Research Project (BAP) and among the analyzed mosques and masjids, monumental masjids built in Konya during the Anatolian Seljuk Period are handled. These are the Hoca Hasan Masjid (13th century) and ve Hacı Hasan Masjid (15th century). Firstly, information about the mosques belonging to the Anatolian Seljuk Period period and Konya City are collected using the analyzing technique in the literature. The masjids are visualized with the drone and their features are documented with photographs. Drawings in the electronic environment are taken from the Konya Regional Directorate of Foundations and colored, and their current situation is based on on-site determinations and their relations with their immediate surroundings are processed on the drawings. The plan, section, facade, roof cover, and interior space elements are explained and design typologies are determined in the light of the information in the literature, drawings, and visuals. At the same time, the construction technique and material properties are explained. Masjids' architectural design properties were documented are modeled in the Design Builder simulation program. Design Builder is an EnergyPlus-based software tool developed to measure and analyze the performance of building design in terms of energy, carbon, lighting, and comfort (Zhang, 2014). Models specific to masjid structures that have characteristic features are developed in the DesignBuilder simulation program, taking into account the users, occupancy rate, and usage times. According to the simulation results, the heating-cooling and total energy loads of the masjids are analyzed. An evaluation is explained according to the findings.

## **FINDINGS and DISCUSSION**

In this section, the architectural design properties of the Hoca Hasan Masjid and ve Hacı Hasan Masjid built in the Anatolian Seljuk Period and their energy loads according to simulation results are explained.


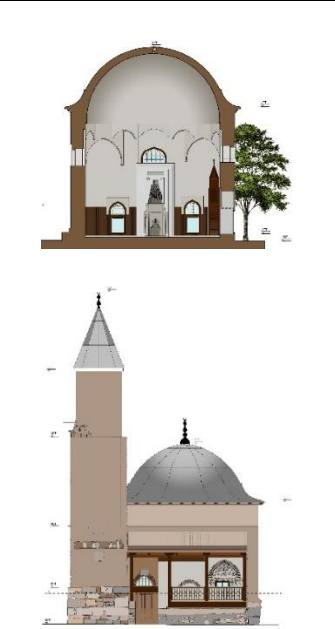
### **a. Anatolian Sejuk Masjids' Architectural Design Properties**

The construction of the Hoca Hasan Masjid dates back to the second half of the 13th century and the masjid was built using masonry technique. Hacı Hasan Masjid was built using masonry technique in the 15th century and was repaired in 1907 during the Ottoman Period (Konyalı, 2007). Photographs of Hoca Hasan and Hacı Hasan Masjids are shown in Figure 1. The architectural design properties of Hoca Hasan Masjid are shown in Table 1, and the architectural design properties of Hacı Hasan Masjid are shown in Table 2.





**Figure 1.** Hoca Hasan Masjid and Hacı Hasan Masjid (Photographs by the authors, 2019)

**Table 1.** Hoca Hasan Masjid's Architectural Design Properties

<b>Design Typology</b>				
	<b>Period</b>	13th Century, Anatolian Seljuk Period		
	<b>Building Form</b>	Square		
	<b>Top Cover</b>	Dome		
	<b>Plan Organization</b>	Two Spaces		
	<b>Building Order</b>	Detached Order		
	<b>Total Area of Mosque m<sup>2</sup></b>	94.17 m <sup>2</sup>		
<b>Construction Techniques and Material Properties</b>				
	<b>WALL</b>	Bond Technique	Masonry Wall	
		Material	Stone up to the mantel base level, and brick after this level.	
		Openings	Windows ratios are mixed.	
	<b>FLOORING</b>	Material	*	
	<b>TOP COVER</b>	Bond Technique	Dome in masonry technique	
		Material	Brick	
		Openings	There are no openings.	
		Size (Diameter/Thickness)	750/45	
	<b>MINARET</b>	Bond Technique	Masonry	
		Material	Stone and brick	

**Table 1.** Hacı Hasan Masjid’s Architectural Design Properties

<b>Design Typology</b>				
	<b>Period</b>	15th Century, Anatolian Seljuk Period		
	<b>Building Form</b>	Rectangle		
	<b>Top Cover</b>	Pitched Roof		
	<b>Plan Organization</b>	Three Spaces		
	<b>Building Order</b>	Detached Order		
	<b>Total Area of Mosque m<sup>2</sup></b>	330.31 m <sup>2</sup>		
<b>Construction Techniques and Material Properties</b>				
	<b>WALL</b>	Bond Technique	Masonry Wall	
		Material	Stone	
		Openings	Windows ratios are mixed.	
	<b>FLOORING</b>	Material	Wood flooring	
	<b>TOP COVER</b>	Bond Technique	Wooden construction pitched roof	
		Material	Brick (Roof tile)	
		Openings	There are no openings.	
		Size (Diameter/Thickness)	Pitched roof	
	<b>MINARET</b>	Bond Technique	Masonry	
		Material	The minaret pedestal and minaret balcony rails are stone, the minaret trunk is brick	

#### b. Energy Analysis of Anatolian Seljuk Masjids

In this section, the Hoca Hasan Masjid and Hacı Hasan Majjid belonging to the Anatolian Seljuk Civilization, are analyzed in terms of energy efficiency in light of the literature review and simulation results. Masjids are modeled using the DesignBuilder simulation program. Konya is located in the temperate-dry climate region of Türkiye. In terms of energy efficiency, the period when heating is required in temperate-dry climate regions is important. Design parameters affecting the energy performance of a building are handled as the location and orientation of the building, the building form, the distance between buildings, the optical and thermophysical properties of the building envelope, and the solar control and natural ventilation layout. It can





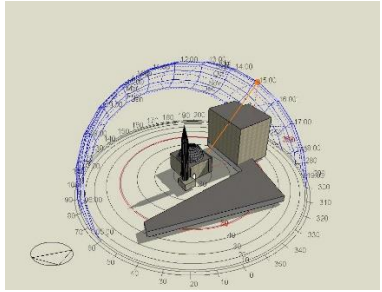
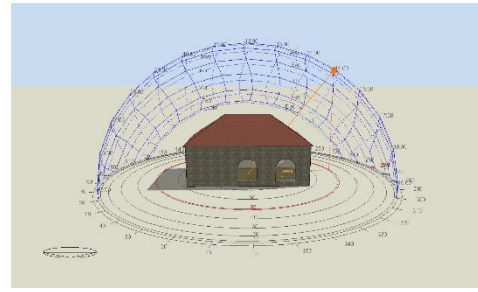
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

be said that energy-efficient design parameters are also valid for masjid buildings. However, masjids have characteristic design properties that affect the basic design such as qibla, qibla wall, mihrab, and minbar. In this respect, the orientation of masjid buildings is the direction of the qibla. The orientation of the Konya masjids (their qibla), which are handled within the scope of the study, is in the south direction.

Hoca Hasan Masjid and Hacı Hasan Masjid have detached order properties. Passively benefiting from or being protected from the effects of sun and wind changes depending on the settlement texture and distance between buildings. This should be considered as a factor that is important in terms of solar radiation gain and natural ventilation and therefore affects the energy load of buildings. In this respect, building order should be handled as a factor affecting the energy demand of masjid buildings. In terms of building form, the form of masjid buildings is square and rectangular, which should be in the temperate-dry climate zone. Other architectural design properties affecting the energy loads of Hoca Hasan Masjid and Hacı Hasan Masjid and the heating-cooling and total energy loads of the mosques per  $m^2$  are shown in Table 3 for comparative analysis. Building envelope optical and thermophysical properties are effective in determining the amount of heat transfer through the opaque and transparent components of the building envelope and indoor air temperature and building energy demand. In terms of the top cover, the Hoca Hasan Masjid has a dome and the Hacı Hasan Masjid has a pitched roof. In this respect, it can be said that the top cover is one of the factors affecting the differences between the energy loads of the masjids.

**Table 3.** Architectural Properties and Energy Loads of Hoca Hasan and Hacı Hasan Masjids

Masjid Name	Hoca Hasan Masjid 13th Century	Hacı Hasan Masjid 15th Century
Total Area of Masjid m <sup>2</sup>	94.17 m <sup>2</sup>	330.31 m <sup>2</sup>
Masjid height (h)	11.00 m	12.00 m
Wall Material	Brick	Stone
Wall Thickness	90 cm	90 cm
Top Cover Material	Brick	Brick
Top Cover Thickness	45 cm	Pitched Roof
Window-Wall Ratio (%)	South	2.27
	North	0.47
	East	0.82
	West	1.35
Cooling Load per m <sup>2</sup> kWh	6.08	10.37
Heating Load per m <sup>2</sup> kWh	97.15	140.21
Energy Consumed per m <sup>2</sup> (heating-cooling-lighting) kWh	110.04	157.39
Masjids' Energy Models		

In terms of building wall materials, Hoca Hasan Masjid's building materials are brick and the wall thickness is 90 cm. Hacı Hasan Masjid's building material is stone and the wall thickness is 90 cm. Stone and brick building materials have the qualification to contribute to the heating and cooling loads of buildings in terms of thermal performance. It should be noted that the thermal conductivity properties of the opaque and transparent components of the building envelope are important parameters that can affect the energy loads of the buildings. The thermal



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

conductivity of the wall varies depending on the building material properties and wall thickness. Period differences between the Hoca Hasan (13th Century) and Hacı Hasan (15th Century) Masjids, the type of stone and brick materials used, differences in wall thickness of masjids, and the type of glass used in the openings should be handled as factors affecting the thermal conductivity of the wall. It can be stated that the building materials used in the analyzed masjids have the qualification of reducing the energy load of the buildings. In this respect, masjids' envelope properties should be evaluated as the parameter that affects the energy needs of masjids.

As shown in Table 3, the opening ratios of the buildings are different depending on the directions. It should be noted that openings in the south direction provide direct solar radiation gain, but multi-directional openings, especially in the north direction, cause heat losses. In terms of openings depending on the directions, it is seen that the opening ratios of Hacı Hasan Masjid are higher than those of Hoca Hasan Masjid. In this respect, it can be said that the openings depending on the directions are the reasons for the differences between the energy loads of the masjids. Design properties such as building materials, wall thicknesses, top cover properties, directional openings, and thermal conductivity are the properties that make a difference between the energy loads of the mosques. In addition, building volume should be handled and evaluated as an important factor. The height of the Hoca Hasan Masjid is 11.00 m, and the height of the Hacı Hasan Masjid is 12.00 m. As a result, it can be said that more positive results are obtained in terms of energy efficiency for both masjids although the differences between the energy loads.

### **CONCLUSION and RECOMMENDATIONS**

In this study, monumental masjids built during the Anatolian Seljuk Period in the city of Konya, one of the most important main centers of Turkish-Islamic culture and art, are investigated in terms of energy efficiency. Hoca Hasan and Hacı Hasan Masjids belonging to the Anatolian Seljuk Civilization are handled. The architectural design properties of monumental masjids have been documented and the energy demands of the masjids are analyzed.

It can be said that masjid buildings, which are important elements of the monumental architectural heritage built in the Anatolian Seljuk period, are energy-efficient buildings in line with today's energy needs and traditional design properties and construction techniques. In addition to energy analysis, building volume is an important factor in monumental masjid buildings in terms of energy efficiency. In this respect, it has been determined that the



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

DesignBuilder simulation program, which calculates the energy load per m<sup>2</sup>, is inadequate for masjids where volume is an important factor. The volume-related analysis results are required. As a result, it can be said that monumental masjids are valuable and important buildings in terms of energy efficiency in line with the energy loads consumed per m<sup>2</sup>. Considering the limitations of studies on the energy demands and energy efficiency of monumental masjids, it is expected that this study will create potential research scopes for future research. In addition, documenting and protecting cultural and religious heritage and analyzing it in terms of energy efficiency has great importance in guiding mosques that will be designed as religious and cultural architectural elements with minimum energy requirements.

### **Information Note**

This study is reproduced from the Mimar Sinan Fine Arts University Scientific Research Project (BAP) titled “Research of the Monumental Architectural Heritage in Terms of Comfort Parameters and Energy Efficiency, Seljuk-Ottoman Period” coordinated by Assoc. Prof. Dr. Ümit ARPACIOĞLU.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A PROPOSAL FOR THE FUNCTION PLANNING PROCESS: AN EXAMPLE OF TRADITIONAL HOUSING IN SİLLE

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#### **ABSTRACT**

The management of numerous natural and human-induced risks that may have an impact on the architectural heritage should be taken into consideration as part of the recognition process of the structure, declares the ICOMOS Türkiye Architectural Heritage Preservation Declaration "2013". It is claimed that a fundamental strategy based on these studies should be created, and implementation should not begin until short and long-term planning has been done in the context of this strategy and relevant projects have been created. Different strategies that promote cultural tourism can be used to implement physical renewal projects in rural communities. However, in these projects, particularly in the residential structures in the group of second degree registered buildings, attention is given to facade works, and interior organization is insufficient as a result of inaccurate or incomplete functional setups. It is intended to propose a procedure in which alternatives are addressed for the functional layout of traditional homes within the context of this fundamental issue. The research is based on evaluating the applicability of the Multiple-Choice Method's function planning stage, which is based on physical remodeling projects made up of many scenarios.

**Keywords:** Cultural Tourism, Sustainability, Physical Renovation, Interior Space





## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

### **INTRODUCTION**

Implementation initiatives for physical renewal are being achieved in our own country, which is home to a massive portion of the world's cultural heritage, using a variety of techniques that encourage long-term cultural tourism in settlements with this potential. Due to the globalizing world's social, economic, and technological changes as well as people's varied demands and ambitions, the scope of tourism has changed (Soykan, 2003). This movement has been impacted by people's preferences shifting away from the typical activities and toward unusual and different attractions instead of choosing vacation styles that mix sea, sand, and sun. In response to this, special interest tourism, rural tourism, eco-tourism, and cultural tourism types have evolved in addition to traditional forms of tourism including recreation, entertainment, health, and sports. The main reason people travel, particularly in recent years, can be attributed to culture (Özdamar, 2011).

The host community should gain from tourism by having the chance to maintain and preserve its cultural traditions and history. Tourism should encourage them to follow this course. For the sake of both current and future generations, this relationship must be maintained sustainably (ICOMOS, 1999). A key idea in sustainability is high efficiency, which assures that any system with social, economic, and ecological continuity may continue to operate as usual without wasting resources or using them excessively (Atıl et al., 2005). The idea of "Sustainable Tourism" and its guiding principles have been created under the direction of the World Tourism Organization and the United Nations, just as they have in the agricultural sector and many other industries (Sarkım, 2008). The World Tourism Organization (WTO) defines sustainable tourism as resource management that serves the demands of present-day travelers as well as the nations that welcome them while also protecting and developing future prospects. Cultural integrity, the continuance of ecological processes, biological diversity, and the satisfaction of socioeconomic and aesthetic requirements are all made possible by this resource management. The fundamental concept behind sustainable tourism is to make sure that the environmental and cultural elements that are the foundation of the industry are utilized in a way that prevents long-term degradation or reduces any negative consequences (Eser et al. 2010). At this moment, there is a dynamic and ongoing need for sustainability in the link between cultural heritage resources or values and tourism. It is said that cultural heritage aids in the growth of tourism and that tourism generates funds for the preservation of cultural heritage. To put it another way,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

tourist attractions and cultural heritage serve as one another's resources (Endressen 1999; Özdoğan 2014, 50).

According to the ÇEKÜL (2012) guide published in 2012, Sustainable Culture Tourism necessitates meticulous planning and management, and in order to achieve this, the starting point must be clearly established. Furthermore, according to the International Cultural Tourism Regulation, tourism is increasingly seen as a positive force for the preservation of natural and cultural heritage, ensuring its long-term viability in terms of cultural and tourism development policies (ICOMOS, 1999). Civil architecture is the essential representation of a society's culture, according to the ICOMOS Traditional Architectural Heritage Charter from 1999. While it represents that culture's interaction with its region, it also reflects the world's cultural diversity. Architectural legacy, according to the 1975 Amsterdam Declaration, encompasses not just excellent single structures and their environs, but also all urban and rural regions with historical and cultural qualities. The concept of "Historical City," which has a prominent place in cultural tourism, refers to settlements with significant and magnificent monumental structures, which served as capitals for previous civilizations, which coexisted with several civilizations on top of each other, and that include historical protected areas as a significant part of the settlement fabric. "Historical Cities" are the historical tourism attraction hubs (Doğaner, 2013,147). With their historical and architectural structure, many monumental buildings in these cities are major tourism elements. Historical houses in a community, whether as single structures or on a street or neighborhood scale, are essential tourist attractions. Many communities in Turkey have retained historical houses, albeit on a modest scale. However, very few communities have been renovated to the level of buildings, streets, and neighborhoods and are now used for tourism. The villages that have totally preserved their historical residences are the most important in terms of tourism (Doğaner, 2013, 166). Safranbolu and Beypazarı are two prominent cases in this regard. Traditional Safranbolu dwellings are the most vital component of Safranbolu's cultural heritage treasures. Houses in Safranbolu from the 18th and 19th centuries. It is one of the instances that portray Turkish society's history, culture, economy, lifestyle, and technology (Özdemir, 2007). It was determined in 1985 to register 810 instances of civil architecture and 165 monuments inside the bounds of two urban protected areas in the Bağlar and Çarşı regions, and a conservation development plan was prepared in 1991 (Ergin et al., 2005). UNESCO listed their names on the World Heritage List in 1994, and the World Heritage Cities Organization named them one of the 20 best preserved cities in the world in



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

2003 (Göktaş Kaya, 2010). Since the mid-1990s, as the number of visitors has grown, old mansions and traditional commercial buildings have been restored, and new lodging, restaurants, and souvenir shops have opened. It is increasingly being used for tourism purposes (Ecemiş Kılıç & Türkoğlu, 2015). Many areas of land in Turkey will be exposed to historical tourism. Tourism is a significant economic resource that ensures the restoration of historical structures and their transfer to future centuries (Doğaner, 2003, 212).

Physical renewal projects in rural regions can be implemented using a variety of ways that assist cultural tourism. However, in many projects, particularly in residential structures of the second degree registered buildings group, facade works are prioritized, and internal organization is poor due to faulty or incomplete functional setups. Within the framework of this fundamental problem, it is intended to suggest a process for debating possibilities for the functional layout of traditional houses. The study is based on evaluating the applicability of the "Multiple Choice Method" function planning phase, which is based on physical remodeling projects with various scenarios.

### **MATERIALS and METHODS**








The Sille settlement, located eight kilometers northwest of Konya city center, has hosted many civilizations, particularly the Greek, Seljuk, and Ottoman, over its 5000-year history and is now a neighborhood of the Selçuklu district and an important tourism corridor for the city. Sille was founded in the northwestern portion of Konya province in the Central Anatolia Region, in the form of a valley between the Takkeli and Karabuğa Mountains. Sille is a settlement with cultural and ethnic diversity in its urban texture, with cultural treasures from the Seljuk and Ottoman periods including mosques, churches, monasteries, baths, bridges, fountains, traditional residences, and vineyard houses (Aklanoğlu, 2009). Today, two major streets run through Sille: "Hükümet" Street in the north and "Baraj" Street in the south, both of which begin on the Konya-Sille highway in the east of the settlement plan and continue to the west. Furthermore, "Karataş" street in the north and "Hacı Ali Ağa" street in the center are densely populated streets (Tapur, 2013). The traditional dwelling structure on Hacı Ali Ağa Street is investigated in this context. (Figure 1).



**Figure 1.** Hac1 Ali Aęa Street and View of Sille in 1925 (Ertaş, 2016; Aklanoęlu, 2009)

Sille was formerly a significant town, but since 1980 it has become a central district of Konya. Selçuklu, Meram, and Karatay districts were founded in 1989, following the establishment of Konya Metropolitan Municipality in 1984. Sille, on the other hand, is located inside the boundaries of the Selçuklu District. (Selçuklu Belediyesi, 2015).

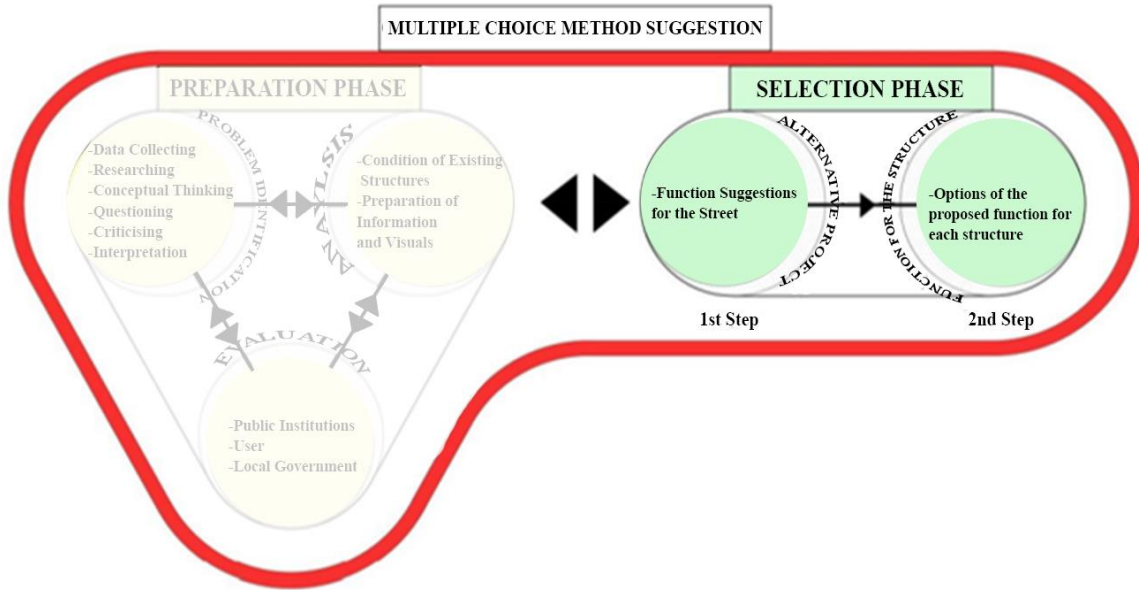
On a low and sloping area, Sille has narrow, stone-paved avenues and streets. Streets are occasionally designed with steps to allow for walking and climbing perpendicular to the slope. Traditional Sille houses feature flat roofs and no roofed ones, despite their cubic outward design. The houses were designed on a tiny scale, with functionality taking precedence above aesthetics. The number of storeys of a dwelling is strongly influenced by the building's placement on sloping land and its relationship to the street. The entrance to Sille houses, which are typically two stories tall, is made by a single door or two doors, depending on the topography of the ground (Aklanoęlu, 2009). The ground floor has infill due to the slope of the soil. While some houses use the ground and upper floors together, others have separate entrance doors for the lower and upper floors, depending on the land on which the house is built (Erdem et al., 2010). There are service volumes on the ground level such as a living room, pantry, kitchen, barn, hayloft, and feeding barn. The open space in the center of these spaces is known as the "taşlık" (Aklanoęlu, 2009). Some of the houses' basement floors hold service areas such as barns, laundry rooms, and warehouses. The first level is made up of sofas and rooms, which are the house's principal spaces, such as living rooms, guest rooms, and bedrooms. There is a second ground level in regions where the land slope is steep, which is mainly used from the lower street. Ground floors are commonly employed as shops in places where business activity occurs (Erdem et al., 2010). The Ahmet Oymak-owned building has three stories (+5, +8, and +11 elevations) plus a basement and is currently utilized as a cafe/restaurant. With the modifications to the inside, the plan scheme has changed (Figure 2).

<b>ID Information</b>	<b>Address</b>	Subaşı District Hacı Ali Ağa Street No:18						
	<b>Construction Date/Century</b>	End of 20th Century						
	<b>House Owner</b>	Ahmet Oyman						
<b>Settlement Features</b>	<b>User Status</b>	House Owner <input checked="" type="checkbox"/>	Tenant <input type="checkbox"/>	Empty <input type="checkbox"/>	Other <input type="checkbox"/>			
	<b>Site Plan</b>	<b>Street Type</b>		<b>House Location</b>				
		Straight <input type="checkbox"/>	Sloped <input checked="" type="checkbox"/>	With Stairs <input type="checkbox"/>	Slope + Stairs <input type="checkbox"/>	Seperated <input type="checkbox"/>	Adjacent <input checked="" type="checkbox"/>	Corner <input type="checkbox"/>
<b>Architectural Features</b>	<b>Used Function</b>	<b>Plan Scheme</b>			<b>Registration Status</b>			
	House <input type="checkbox"/>	With Inner Sofa <input checked="" type="checkbox"/>	With Central Sofa <input type="checkbox"/>	With Outer Sofa <input type="checkbox"/>		1st Group Registered Building <input type="checkbox"/>		
	Commerce <input checked="" type="checkbox"/>					2nd Group Registered Building <input checked="" type="checkbox"/>		
	House + Commerce <input type="checkbox"/>					Unregistered Building <input type="checkbox"/>		
<b>Photographs</b>	<b>Exterior</b>		<b>Interior</b>					
								
								

**Figure 2.** The Ahmet Oymak owned building (Taş, 2015).

This study focuses on the final stage of a model proposal called "Multiple Choice Method" based on the development of different scenarios (Figure 3).





**Figure 3.** Multiple Choice Method

This is the Function planning phase, which deals with alternative options following the preparation phase, which is based on expert groups determining a function proposal for residential buildings, taking into account architectural features, locations, and square meters of the buildings, and creating colored diagrams based on the function proposal, and reaching the projects with sketch studies. It can be categorized into two basic stages (Table 1).

**Tablo 1.** Function Planning process

<b>1. Creation of colored diagrams (sketching stage):</b>
Creating solution options for the proposed function
<b>2. Preparation of interior projects</b>
Preparation of access graphics that reveal the relationship between spaces due to changing functions with accepted planning
Creation of plan diagrams depending on the proposed function for each structure











## FINDINGS

According to the information obtained during the preparation phase, the building number 18 was used in its original housing function until 2015, but it has undergone a change in function as a result of the recent development of tourism and Konya Selçuklu Municipality works, such



as street improvements. Residents have converted the entire structure into a dining establishment (breakfast and restaurant). Residents made accommodations on a variety of elevations during the street improvement phase of this building after 2013. Some elements of the house are not included in the repair effort, according to the findings. However, changes have been made to the structure. As a result, a group of experts first recognized them and provided suggestions for their use. There were no possibilities generated in the research for this house, and the function was left constant.

The expert group accepted the function currently determined by the residents based on data gathered during the research preparation phase. Colored diagrams and access charts were constructed for this purpose using the legend shown below (Figure 4).

LEGEND						
		ROOM		RESTAURANT / CAFE		SALES UNIT
				EXHIBITION UNIT		WORKSHOP
				OFFICE		WET AREA
				CIRCULATION AREA		STORAGE

**Figure 4.** Colored Diagram Legend

Solution possibilities were established by drawing the proposed functions in light of the colored diagrams. Although designers employ symbolic representation methods such as numbers, language, and pictures on occasion, they prefer "analog" representations (formally similar to reality). Because they believe these correspond to formal, social, technical, contextual, and functional "reality."

As a result, the expert group put forward their ideas at the conceptual design stage by developing colored diagrams, and solutions based on the space layouts of the function decided for the building were made. Colored diagrams are divided into stages, and the space organization is determined by the most recently generated stain diagram (Figure 5).



Figure 5. Creation of Colored Diagrams

The colored diagrams inspired interior design initiatives. To meet this goal, access graphics were designed first, followed by plan diagrams. Access visuals have been produced to reveal the relationship between spaces and floors based on the newly proposed functions. As a result, the harmony between the newly proposed space organization and the structure (Figure 6) was demonstrated.

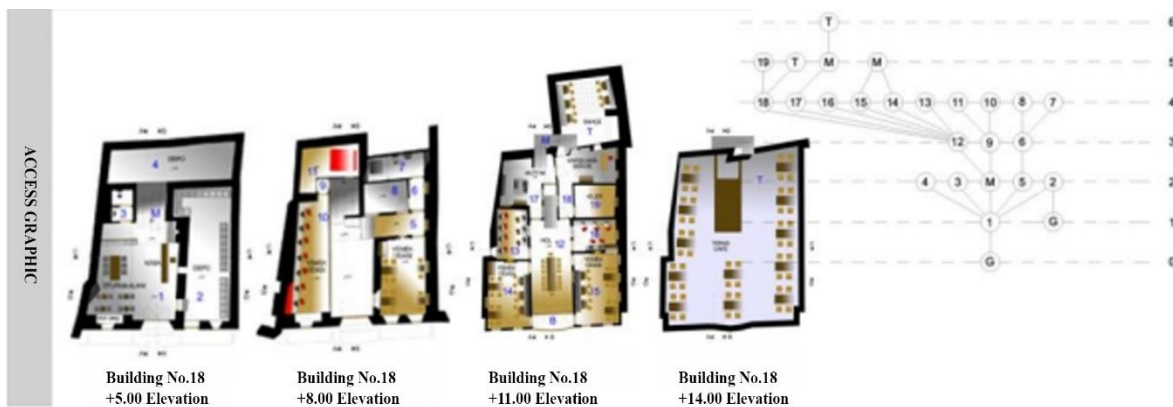


Figure 6. Preparation of interior projects

The process up to this point constitutes the majority of the research. Interior projects were developed based on colored diagrams and evolving space organizations at this stage, after all of the stages that would offer data for the design phase of the study were completed and the basic decisions for the settlement were made. At this point, emphasis was placed on the material legend established during the settlement preparation phase in both furniture and material selection.

The +8 level of building number 18 has been converted into a space. This area was deemed positive by the expert group, and the project was designed appropriately (Figure 7).

**PLAN SCHEME AND SECTIONS OF BUILDING NO.18**



**Figure 7.** Drawings of Building No.18

**CONCLUSION**

All of the data acquired as a result of the expert group's research on the usage of dwellings for tourism purposes constitute the phases of the multiple-choice approach in the study. Before creating choices for Hacı Ali Ağa Street, a preparation step was completed. At this point, the



identification of cultural assets for Sille, as well as the identity cards revealing the changes that the buildings on Hacı Ali Ağa Street have undergone from the past to the present and their current situation, were ready for the team of internal and external expert groups to evaluate the multiple-choice method.

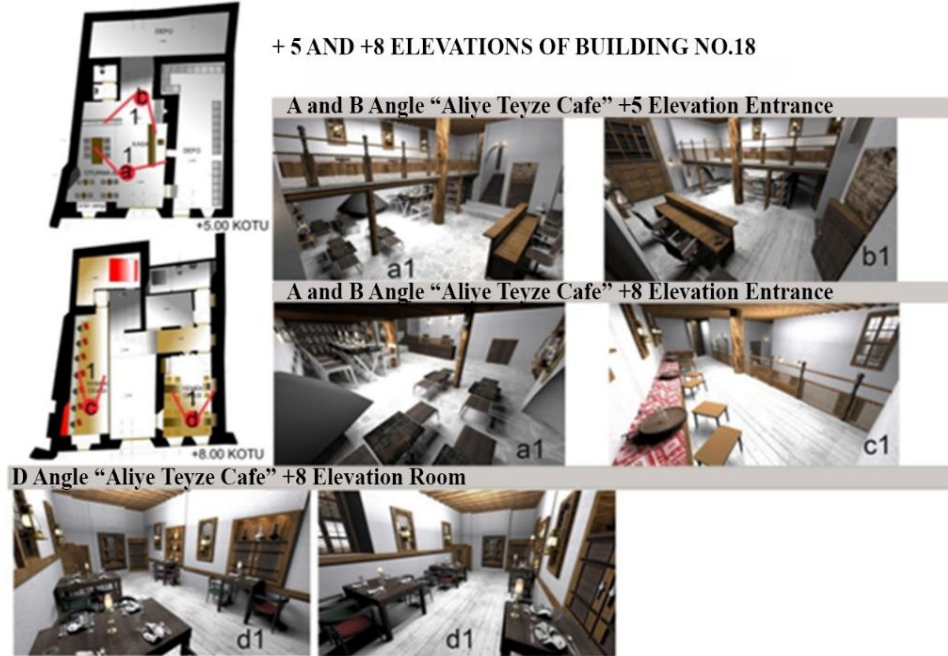
Later, during the option generation phase, function options were offered in accordance with the new conserved zoning plan, and a project proposal (interior-architecture) for building number 18 was created for implementation. Primarily, the function planning process was expressed in Hacı Ali Ağa Street (Figure 8), based on the approved restoration projects.



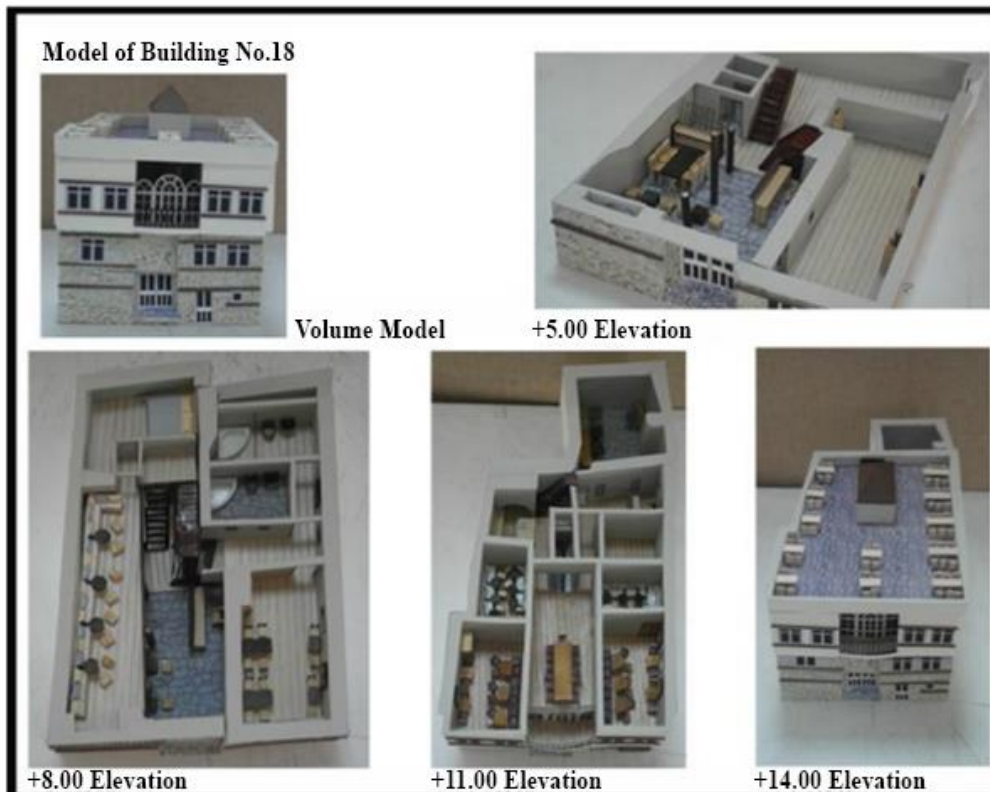
**Figure 8.** Hacı Ali Ağa Street Function Planning

After 1980, the walls, ceiling, and roof on the facade of house No. 18 were removed, and new walls were constructed to the back. Between 1923 and 1980, interior doors, windows, and walls

were added, and the design scheme was altered. With the reductions and balcony additions in the building, the façade arrangement has changed (Figure 9).



**3D DRAWINGS OF BUILDING NO.18 (ALİYE TEYZE CAFE) +5 AND +8 ELEVATIONS**



**Figure 9. Drawings and Model of Building No.18**



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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In this regard, the project for the interior of the building, which is currently being used as a cafe, has been finished.

### **Thanks and Information Note**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BIBLIOMETRIC ANALYSIS OF POSTGRADUATE THESIS ON PROTECTED AREAS IN TURKEY (1987-2023)

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#### ABSTRACT

Bibliometric analysis refers to the study of the characteristics of any subject in line with the determined criteria. In addition to revealing the academic course and development of the disciplines working on the issue from past to present, it is an essential guide in presenting advisory results for the research planned to be carried out on this subject. This study aims to conduct a bibliometric analysis of the postgraduate theses written on protected areas in Turkey and registered in the National Thesis Centre of the Council of Higher Education (NTC). Microsoft Excel, IBM SPSS Statistic 22 and MAXQDA 2020 qualitative data analysis programs were used to record, digitise and visualise the qualitative data obtained through document analysis. Content analysis of the documents was carried out. Within the scope of the study, bibliometric characteristics of 350 graduate theses published between 1987 and 2023 were examined and analysed in terms of various parameters (year of publication, supervisor title, university, institute, permission status, number of pages, primary discipline, thesis content, language, thesis type, subject, index, etc.). As a result of the study, it was determined that postgraduate studies on protected areas were carried out in a total of 75 different universities. 77% of the studies were prepared at the Institute of Natural and Applied Sciences. It was found that the theses were intensively concentrated in the main branches of biology, forest engineering and landscape architecture. In addition, it was revealed that the studies generally focused on the main topics of protected areas, such as flora, fauna, management economy, tourism and recreation, and politics.

**Keywords:** Protected area, Postgraduate thesis, Bibliometric analysis



**TÜRKİYE’DE KORUNAN ALANLARLA İLGİLİ HAZIRLANAN LİSANSÜSTÜ  
TEZLERİN BİBLİYOMETRİK ANALİZİ (1987-2023)**

**ÖZET**

Bibliyometrik analiz, belirlenen kriterler doğrultusunda herhangi bir konunun özelliklerinin analiz edilmesini ifade etmektedir. Konu üzerine çalışan disiplinlerin geçmişten günümüze akademik seyri ve gelişimini ortaya koymanın yanı sıra gelecekte bu konuda yapılması planlanan araştırmalar için tavsiye edici sonuçlar ortaya koyması açısından önemli bir rehber niteliğindedir. Bu çalışmada; Türkiye’de korunan alanlar üzerine yazılmış ve Yükseköğretim Kurulu (YÖK) Ulusal Tez Merkezi’nde kayıtlı lisansüstü tezlerin bibliyometrik analizinin gerçekleştirilmesi amaçlanmıştır. Doküman incelemesi yoluyla elde edilen nitel verilerin kayıt altına alınması, sayısallaştırılması ile görselleştirilmesinde Microsoft excel, IBM SPSS Statistic 22 ile MAXQDA 2020 nitel veri analiz programları kullanılmış ve dokümanların içerik analizleri gerçekleştirilmiştir. Çalışma kapsamında 1987-2023 yılları arasında yayınlanmış olan 350 adet lisansüstü tezin çeşitli parametreler (yayımlandığı yıl, danışman ünvanı, üniversite, enstitü, izin durumu, sayfa sayısı, ana bilim dalı, tezin içeriği, dili, tez türü, konusu, dizin vb) açısından bibliyometrik özellikleri incelenip analiz edilmiştir. Yapılan çalışma sonucunda; korunan alanlar üzerine toplam 75 farklı üniversitede lisansüstü çalışmaların yürütüldüğü belirlenmiştir. Çalışmaların %77’si Fen Bilimleri Enstitüsü’nde hazırlanmıştır. Tezlerin daha çok biyoloji, orman mühendisliği ve peyzaj mimarlığı ana bilim dallarında yoğunlaştığı bulunmuştur. Ayrıca çalışmalarda genel olarak korunan alanların flora, fauna, yönetim-ekonomi, turizm ve rekreasyon, politika gibi belli başlı konu başlıkları üzerinde yoğunlaştığı ortaya konmuştur.

**Anahtar Kelimeler:** Korunan alan, Lisansüstü tezler, Bibliyometrik analiz



## 1. GİRİŞ

Bibliyometrik analiz, belirlenen kriterler doğrultusunda herhangi bir konunun özelliklerinin analiz edilmesini ifade etmektedir. Bibliyometrik çalışmalar konu üzerine çalışan disiplinlerin geçmişten günümüze akademik seyri ve gelişimini ortaya koymanın yanı sıra gelecekte bu konuda yapılması planlanan araştırmalar için tavsiye edici sonuçlar ortaya koyması açısından önemli bir rehber niteliğindedir (Ak, 2021).

Herhangi bir araştırma alanı için belirli zaman aralıklarıyla kategorizasyon yapılmadığında, o alandaki mevcut bilgi birikiminin bir yığına dönüşeceği düşünülmektedir. Bu bağlamda makro odaklı bir şekilde genel olarak çalışma alanının yapısını, dinamiklerini ve geçirdiği evrimi ortaya çıkarmayı amaçlayan bibliyometrik analiz çalışmaları son zamanda büyük önem kazanmıştır (Öztürk ve Güler, 2021).

Korunan alan, “*Biyolojik çeşitliliğin, doğal ve bununla ilişkili kültürel kaynakların korunması ve devamlılığının sağlanması amacıyla ilgili mevzuata göre yönetilen; milli parklar, tabiat parkları, tabiat anıtları, tabiatı koruma alanları, doğal sit alanları, sulak alanlar, özel çevre koruma bölgeleri ve benzeri koruma statüsü bulunan kara, su ya da deniz alanlarını ifade eder.*” şeklindeki tanımla mevzuatta yer almıştır<sup>26</sup>. Başka bir tanımda ise korunan alan “*Ekosistem hizmetlerinin ve kültürel değerlerin, tabiatla birlikte uzun vadeli korunması ve devamlılığın sağlanması maksadıyla mevzuatla tanımlanan ve yönetilen coğrafi bir alandır.*” şeklinde ifade edilmiştir.<sup>27</sup>

Korunan alanların ulusal ve uluslararası düzeydeki yeri ve önemi dikkate alındığında doğal, tarihi, kültürel ve ekonomik anlamda birçok faydalar sağladığı bilinmektedir. Literatürde korunan alanları esas alan akademik çalışmaların sayısı günden güne artmaktadır (Yılmaz vd., 2009; Güneş, 2011; Görmüş, 2012; Coşgun, 2019; Öztürk vd., 2019; Yıldız ve Atmış, 2019; Ateş ve Coşgun, 2019; Atmış vd., 2020; Mansuroğlu ve Dağ, 2020; Aşıkkutlu vd., 2022; Şimşek ve Ünal, 2022; Sağlam Fide, 2023; Yıldız vd., 2023). Lisansüstü tez çalışmalarından elde edilen veriler çeşitli bilimsel çalışmalara dönüştürülerek alan yazına sunulmaktadır. Bu anlamda lisansüstü tezler bilimsel çalışmaların önemli bir basamağını oluşturmaktadır. Ancak literatürde korunan alanlar üzerine gerçekleştirilen lisansüstü tez çalışmalarını ele alarak mevcut durumunu ortaya koyan herhangi bir bibliyometrik analiz çalışmasına rastlanılmamıştır.

<sup>26</sup> T.C. Cumhurbaşkanlığı Mevzuat Bilgi Sistemi, Korunan Alanların Tespit, Tescil ve Onayına İlişkin Usul ve Esaslara Dair Yönetmelik, Resmî Gazete Tarihi: 19.07.2012 Resmî Gazete Sayısı: 28358 <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=23605&MevzuatTur=7&MevzuatTertip=5>, (Erişim tarihi: 01.10.2023)

<sup>27</sup> T.C. Tarım ve Orman Bakanlığı, Doğa Koruma ve Milli Parklar Genel Müdürlüğü, Kütüphane, Temel kavramlar, <https://www.tarimorman.gov.tr/DKMP/Menu/34/Temel-Kavramlar>, (Erişim tarihi: 01.10.2023)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bu nedenle bu çalışmada korunan alanlar üzerine hazırlanmış lisansüstü tezlerin bibliyometrik analiz yöntemi kullanılarak incelenmesi amaçlanmıştır. Bu çalışmanın literatürde yer alan ilgili boşluğu doldurması ve literatüre katkı sağlaması beklenmektedir.

Çalışmada; Türkiye’de korunan alanlar üzerine yazılmış ve Yükseköğretim Kurulu (YÖK) Ulusal Tez Merkezi (UTM)’nde kayıtlı yüksek lisans ve doktora tezlerinin belirlenen parametreler dahilinde bibliyometrik analizinin gerçekleştirilmesi amaçlanmıştır.

### 2. MATERYAL ve YÖNTEM

Bu çalışma, “Türkiye’de YÖK UTM’de korunan alanlar üzerine hazırlanan lisansüstü tezlerde yönelim nedir?” sorusuna yanıt bulmak için yapılmıştır. Türkiye’de korunan alanlara yönelik hazırlanan ve son çalışma tarihi olarak belirlenen 22.09.2023’e kadar yapılmış tüm lisansüstü tezlerin bibliyometrik analizleri gerçekleştirilmiştir. Bu veriler 10.09.2023 - 22.09.2023 tarihleri arasında YÖK UTM’de yazarlar tarafından çalışma amacına uygun olarak seçilen bazı anahtar kelimeler kullanılarak elde edilmiştir. Anahtar kelime grupları “korunan alan”, “milli park”, “tabiat parkı”, “tabiatı koruma alanı”, “tabiat anıtı” şeklinde belirlenmiş ve başlıklarında bu kelime gruplarını içeren lisansüstü tezler çalışma kapsamına dahil edilmiştir.

Bir durum çalışması deseni şeklinde gerçekleştirilen bu çalışmanın örnekleme yöntemi olarak amaçlı örnekleme yöntemi seçilmiştir. Bu yöntemde araştırmacılar örnekleme sayısını ve seçimini tamamen kendi kararlarına göre belirlemekte ve zengin bilgiye sahip olduğu düşünülen durumların derinlemesine çalışılmasına imkan veren örnekleri seçmektedir (Yıldırım ve Şimşek, 2021; Güçlü, 2021). Örneklemin belirlenmesinde ise amaçlı örnekleme yöntemlerinden “ölçüt örnekleme tekniği” kullanılmıştır. Sözü edilen ölçüt veya ölçütler araştırmacı(lar) tarafından oluşturulabilir veya daha önceden hazırlanmış bir ölçüt listesi kullanılabilir (Yıldırım ve Şimşek, 2021). Örneklemin belirlenmesinde dikkat edilen temel ölçüt ise son erişim tarihi 22 Eylül 2023 olan, YÖK UTM web sayfasında korunan alanlar üzerine hazırlanmış olan 350 adet lisansüstü tez olmasıdır.

Her bilimsel çalışmada olabileceği gibi bu çalışmanın da birtakım kısıtları ve sayıtları bulunmaktadır. Araştırma veri toplama aracı olarak “<https://tez.yok.gov.tr/>” adresinden ulaşılan YÖK UTM resmî sitesi ile sınırlandırılmıştır. Araştırmaya, YÖKTEZ veri tabanına kayıtlı tezler dahil edildiğinden, tamamlanmış ama henüz daha veri tabanına girişi gerçekleştirilememiş lisansüstü tezler, çalışma kapsamı dışında yer almıştır. Ayrıca YÖK’ün veri tabanındaki tez künyelerinde bulunan bilgilerin hatasız ve güncel olduğu, tez tarama motorunda yer alan ilgili tezlerin kategori haline getirilmesinde hatalı olmadığı varsayılmıştır.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Çalışma; Tarım ve Orman Bakanlığı bünyesindeki Doğa Koruma ve Milli Parklar Genel Müdürlüğü yönetiminde olan ve 2873 sayılı Milli Parklar Kanunu kapsamında yönetilen korunan alanları kapsamaktadır.

Çalışma amacına uygun olarak anahtar kelimelerle gerçekleştirilen taramalar sonucu ilk tezin 1987 yılında yazılmış olduğu ortaya çıkmıştır. 1987-2023 yılları arasında korunan alanlarla ilgili 350 adet lisansüstü tez yayınlandığı ortaya konmuştur. Söz konusu bu tezlerin tamamı, çalışma kapsamında hazırlanan parametrelere göre incelenmiş ve bibliyometrik analizleri gerçekleştirilmiştir.

Çalışmanın amacı doğrultusunda ve çalışma kapsamına dahil edilen tezlerin sınıflandırılması hususunda ortaya koyulan parametreleri belirleyebilmek için daha önceden yapılmış olan bibliyometrik alan çalışmalarından (Gül ve Gül, 2018; Özispa ve Akdaş, 2019; Köşker, 2020; Aslan, 2021) yararlanılmıştır. Bu çalışmada aşağıdaki sorulara yanıtlar aranmıştır:

- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin türü nedir?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin erişim durumları nasıldır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin yıllara göre dağılımı nasıldır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin danışman ünvan durumu nedir?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin yazar cinsiyetlerine göre dağılımı ne şekilde gerçekleşmiştir?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin üniversitelere dağılımı nasıldır?
- Korunan alanlar üzerine hazırlanan tezlerin enstitülere göre dağılımları nasıldır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezler hangi dillerde yayımlanmıştır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin sayfaları hangi aralıklarda dağılmıştır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin ilişkili olduğu mesleki disiplin konularının dağılımı ne şekildedir?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin dizinde yer verdikleri kelimeler nelerdir?
- Korunan alanlar üzerine hazırlanan lisansüstü tezler hangi ana bilim dallarında yer almaktadır?
- Korunan alanlar üzerine hazırlanan lisansüstü tezlerin içerikleri nelerdir?

Bu çalışmada kullanılan yöntem, ikincil veriler olan YÖK veri tabanından elde edilen lisansüstü tezlerden yararlanılan bir belge (doküman) incelemesi olup bibliyometrik analiz



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

tekniki ile gerçekleştirilmiştir. Çalışma, bu yönüyle etik kurulu onayı gerektirmemektedir. Yazılı ve görsel materyaller, gözlem ve görüşme yöntemlerinin olanaklı olmadığı durumlarda veya bu yöntemler kullanılarak elde edilen verileri desteklemek için doküman analizi tekniği kullanılabilir (Baş ve Akturan, 2017). Doküman standardize edilmiş (belirli formatlarda oluşturuldukları sürece) ifade edilmektedir. Kütüphaneler, arşivler ve elektronik tabanlı kaynaklar gibi çeşitli kaynaklardan dokümanlar toplanabilmektedir. Doküman analizi ise araştırılması hedeflenen olgu veya olgular hakkında bilgi içeren yazılı materyallerin analizini kapsamaktadır (Sönmez ve Alacapınar, 2019; Yıldırım ve Şimşek, 2021).

Elde edilen dokümanlardaki verilerin değerlendirilmesinde “içerik analizi” tekniği kullanılmıştır. Nitel araştırmalarda kod ve tema isimleri, genellikle doğrudan veriden üretilir ancak bazı durumlarda araştırmacıların önceden geliştirdikleri kod şemaları da kullanılmaktadır. İçerik analizi ayrıca bir metnin içeriğinin nicel veya nitel bir yaklaşım ile hassas bir şekilde seçilerek analiz edilmesi olarak da tanımlanmıştır. Güçlü (2021), içerik analizinin aşamalarını, araştırma probleminin tanımlanması ve araştırma sorusunun belirlenmesi, verilerin içerik analizi için hazırlanması, araştırma örnekleminin belirlenmesi, analiz biriminin belirlenmesi, analizde kullanılacak kodların karşılaştırılması, analiz için kategorilerin oluşturulması, veri analizinin gerçekleştirilmesi ve sonuçların rapor edilmesi şeklinde ifade etmektedir.

Çalışmada, bibliyometrik analiz sonucu elde edilen veriler analiz edilerek çözümlenmiş, sıklık (f) ve yüzde (%) değerleri tablo haline getirilip yorumlanmıştır. Ayrıca konu ve dizinde yer alan kelimelerden kodlar üretilerek “Kod Kelime Bulutları” oluşturulmuş ve tezler içerik açısından değerlendirilerek ana bilim dalları bazında tez içerikleri “Tek-Vaka Modeli (Kod Hiyerarşisi)” MAXMaps ile görselleştirilmiştir.

Araştırmanın örnekleme doğru seçildiğinden ve incelenecek değişkenler konusunda alan yazında yapılan çalışmalardan yararlandığından dolayı araştırmanın geçerlik koşullarını taşıyan bir araştırma olduğu düşünülmektedir. Araştırmada güvenilirliği sağlamak amacıyla tezler her iki araştırmacı tarafından ve iki farklı zaman diliminde ayrı ayrı taranmıştır. İlk tarama 10.09.2023 ve ikinci tarama 23.09.2023 tarihinde gerçekleştirilmiştir. Araştırmada ilgili adreste sürekli güncellemeler ve yeni tez ekleme işlemleri olduğundan sağlıklı veri toplama işlemi yapılabilmesi için tarama işlemine 10.09.2023 tarihinde başlanmış, tarama 23.09.2023 tarihinde sona erdirilmiş ve bu tarihler arasında iki ayrı zaman zarfında taramalar gerçekleştirilmiştir. İki tarama sonucunda da çok benzer sonuçlara ulaşılmıştır ve bu süre zarfında yapılan

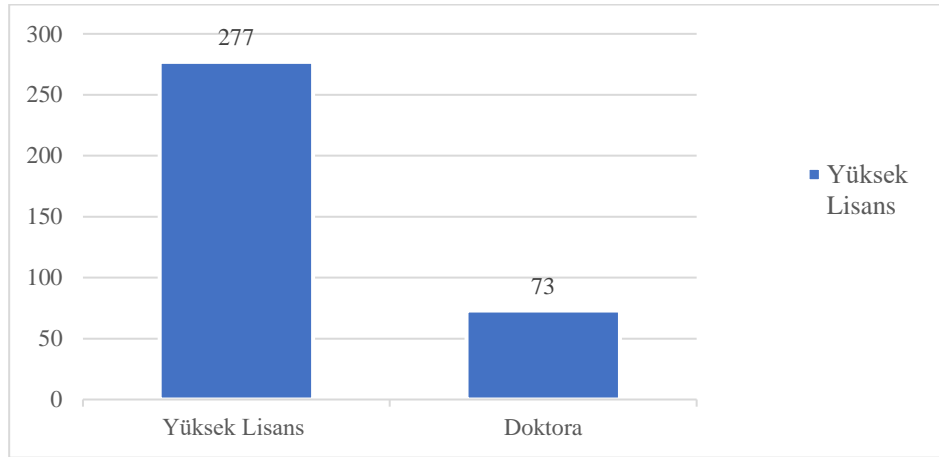
güncellemeler gerekli kontroller yapılarak veri dosyasına aktarılmıştır. Araştırmada, güvenilirliğin sağlanması için, değişkenler ve kategoriler açıkça belirtilmiştir. Ayrıca araştırmacılar tarafından ayrı ayrı Excel dosyalarına yüklenmiş ve karşılaştırmalarla verilerin nihai halini alması sağlanmıştır. Bu nedenlerden dolayı da araştırmanın güvenilirlik koşullarını taşıdığı düşünülmektedir.

### 3. BULGULAR ve TARTIŞMA

Bu bölümde lisansüstü tezlerin; yayınlandığı yıl, hazırlandığı üniversite, tezin türü, hazırlandığı enstitü, danışman ünvanı, tezlerin sayfa sayısı, tezlere erişim durumu, tezin yazıldığı dil, tez yazarının cinsiyeti, tezlerin hazırlandıkları ana bilim dalları, tezlerin ilişkili olduğu mesleki disiplin konuları, tezlerde yer alan dizin bilgileri, tez içerikleri vb bilgilerine yer verilmiştir.

#### 3.1. Lisansüstü Tezlerin Türlerine Göre Dağılımı

Korunan alanlar üzerine yazılan 350 adet lisansüstü tez çalışmasının tez türlerine göre dağılımlarına Şekil 1’de yer verilmiştir.



Şekil 1. Lisansüstü tezlerin türleri açısından dağılımı

Korunan alanlarla ilgili hazırlanan toplam 350 adet tezin 277 (%79,1)’sinin yüksek lisans tezi olduğu, 73 (%20,9)’ünün de doktora tezi olduğu tespit edilmiştir. Yüksek lisans türündeki tez sayısının doktora tezlerine oranla nicelik olarak daha fazla olduğu dikkati çekmektedir (Şekil 1). Çalışma bulguları literatürdeki bibliyometrik çalışmaların çoğunda (Güdü Demirebulat ve Tetik Dinç, 2016; Gül ve Gül, 2018; Köşker, 2020; Taşkın, 2020) ortaya çıkan sonuçları destekler niteliktedir. Ayrıca Dağ (2019) da orman mühendisliği ve bu ana bilim dalı dışında hazırlanan tezlerin tür bakımından dağılımında yüksek lisans tezlerinin doktora tezlerinden nicelik olarak daha fazla olduğunu bulmuştur.

#### 3.2. Lisansüstü Tezlerin Erişim Durumu

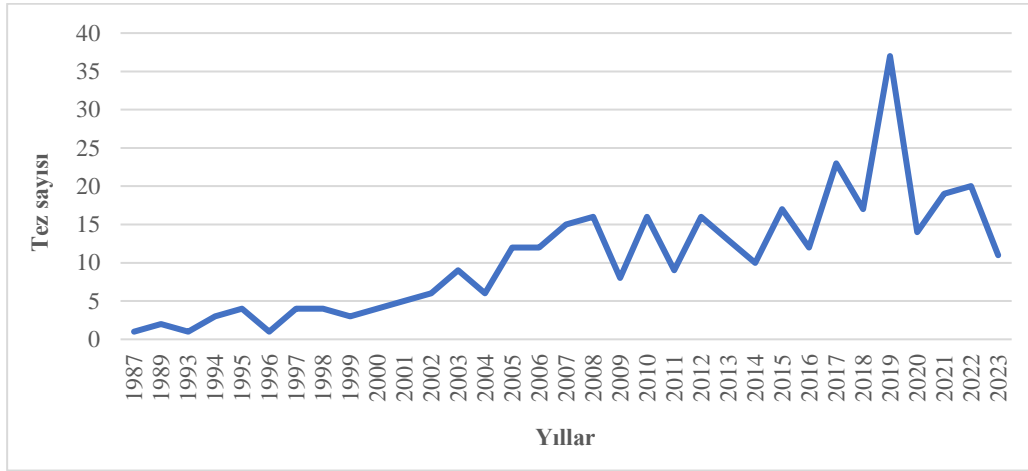
Lisansüstü tezlerin izin durumlarına Tablo 1’de yer verilmiştir. Tezlerin %90,9’unun erişim izni bulunduğu ve sadece %9,1’inin erişime açık olmadığı görülmüştür. Tez türüne göre erişim durumları incelendiğinde de benzer oranlar bulunmuştur (Tablo 1).

**Tablo 1.** Lisansüstü tezlere erişim izni durumu

Erişim izni	Yüksek lisans		Doktora	
	f	%	f	%
Erişim izni olan	251	90,6	67	91,8
Erişim izni olmayan	26	9,4	6	8,2
<b>Toplam</b>	<b>277</b>	<b>100,0</b>	<b>73</b>	<b>100,0</b>

### 3.3. Lisansüstü Tezlerin Yayınlandıkları Yıllar İtibariyle Dağılımı

Lisansüstü tezlerin yayınlandıkları yıllar bazındaki durumu Şekil 2’de yer almaktadır. Çalışma kapsamında çerçevesi çizilen korunan alanlara yönelik hazırlanan YÖK UTM’de kayıtlı ilk tezin 1987’de hazırlandığı görülmektedir. Yayımlanan tezlerin yayımlandığı yıllara göre dağılımı incelendiğinde; %10,6 oranıyla (37 adet) en fazla tez 2019 yılında hazırlanmıştır (Şekil 2). Söz konusu yılda hazırlanan tezlerin niceliksel olarak fazla olduğu birçok çalışmayla da (Özispa ve Akdaş, 2019; Köşker, 2020; Aslan, 2021) ortaya konmuştur.



Şekil 2. Lisansüstü tezlerin yıllara göre dağılımı (1987-2023)

### 3.4. Lisansüstü Tezlerin Danışman Ünvanlarına Göre Dağılımı

Tablo 2’de lisansüstü tezlere danışmanlık yapan akademisyenlerin ünvanlarına yer verilmiştir.

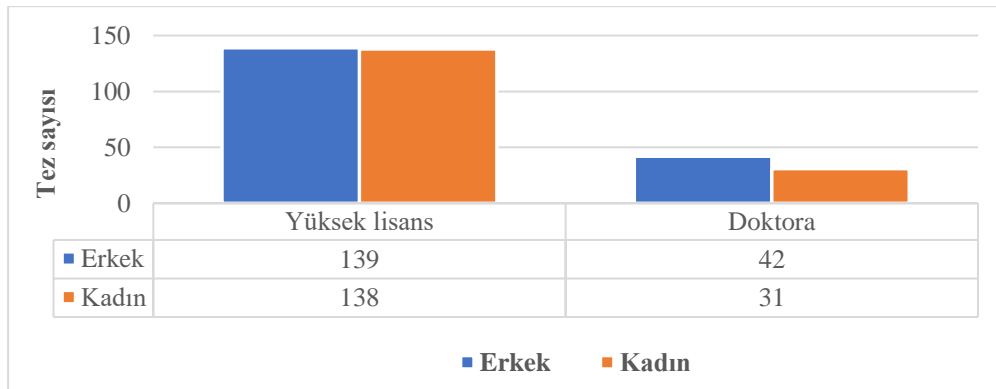
**Tablo 2.** Lisansüstü tezlere danışmanlık yapan akademisyenlerin ünvanları

Ünvanlar	Yüksek lisans		Doktora	
	f	%	f	%
Prof. Dr.	117	42,2	53	72,6
Doç. Dr.	89	32,1	18	24,7
Dr. Öğr. Üyesi	71	25,6	2	2,7

Tablo 2’de görüldüğü gibi yüksek lisans tezlerinin %42,2’sine ve doktora tezlerinin de %72,6’sına Prof. Dr. ünvanlı akademisyenler danışmanlık yapmıştır. Lisansüstü tezlerin neredeyse yarısına Prof. Dr. (%48,6), %30,6’sına Doç. Dr. ve %20,9’una Dr. Öğr. Üyesi ünvanlı akademisyenlerin danışmanlık yaptığı görülmektedir (Çizelge 2). Doktora tezlerine danışmanlık yapan Dr. Öğr. Üyesi ünvanlı akademisyenlerin oranının çok düşük düzeyde olduğu (%2,7) dikkati çekmektedir. Ayrıca 8’i Prof. Dr. ve 5’i de Dr. Öğr. Üyesi olmak üzere 13 tez de iki danışmanlı olarak hazırlanmıştır (Tablo 2).

### 3.5. Tez Yazarlarının Cinsiyete Göre Dağılımı

1987-2023 yılları arasında yayımlanan 350 tezin cinsiyete göre dağılım oranı incelendiğinde yayımlanan tezlerin %51,7’sinin erkekler ve %48,3’ünün kadınlar tarafından gerçekleştirildiği görülmektedir (Şekil 3). Yüksek lisans tez yazarlarının 138’i kadın iken 139’u erkeklerden oluşmaktadır. Doktora tezlerinin ise %57,5’i erkekler ve %42,5’i ise kadınlar tarafından hazırlanmıştır. Sonuçlar cinsiyet kapsamında erkeklerin daha fazla bu alanda çalışma yaptıklarını ortaya koymaktadır. Kadın araştırmacıların gerçekleştirecekleri daha çok çalışma ile literatür daha fazla zenginleşecektir.



Şekil 3. Tez yazarlarının cinsiyete göre dağılımı

### 3.6. Lisansüstü Tezlerin Hazırlandıkları Üniversitelere Göre Dağılımı

Korunan alanlarla ilgili hazırlanan toplam 350 lisansüstü tezin üniversiteler bazındaki dağılımları Tablo 3’te sunulmuştur.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 3.** Lisansüstü tezlerin hazırlandıkları üniversiteler

Üniversite adı	f	%	Üniversite adı	f	%
Ankara Ü.	40	11,4	Çankırı Karatekin Ü.	7	2,0
Karadeniz Teknik Ü.	29	8,3	Bartın Ü	6	1,7
Süleyman Demirel Ü.	29	8,3	Düzce Ü.	6	1,7
Balıkesir Ü.	14	4,0	Hacettepe Ü.	6	1,7
Gazi Ü.	14	4,0	Kahramanmaraş Sütçü İmam Ü.	6	1,7
Çanakkale Onsekiz Mart Ü.	14	4,0	Orta Doğu Teknik Ü.	6	1,7
Kastamonu	12	3,4	Pamukkale Ü.	6	1,7
Akdeniz Ü.	10	2,9	Afyon Kocatepe Ü.	5	1,4
Atatürk Ü.	10	2,9	Erciyes Ü.	5	1,4
İstanbul Ü.	10	2,9	İstanbul Teknik Ü.	5	1,4
Çukurova Ü.	9	2,6	Zonguldak Karaelmas Ü.	5	1,4
Artvin Çoruh Ü.	8	2,3	Diğer üniversiteler	80	22,9
Ege Ü.	8	2,3	<b>Toplam</b>	<b>350</b>	<b>100,0</b>

Türkiye’de toplam 208 üniversite<sup>28</sup> bulunmakta olup bu üniversitelerin %37’sinde korunan alanlar üzerine lisansüstü tez hazırlandığı görülmektedir. Üniversitelere göre hazırlanan lisansüstü tez sıralamasında; Ankara Üniversitesi (%11,4) birinci sırada, Karadeniz Teknik Üniversitesi (%8,3) ile Süleyman Demirel Üniversitesi (%8,3) ikinci sırada ve Balıkesir Üniversitesi (%4,0), Gazi Üniversitesi (%4,0), Çanakkale Onsekiz Mart Üniversitesi (%4,0) üçüncü sırada yer alarak alanyazına daha fazla katkı sağlayan üniversiteler oldukları görülmektedir (Tablo 3). Literatürde (Güdü Demirbulat ve Tetik Dinç, 2016; Gül ve Gül, 2018) bazı alanda hazırlanan tezlerin belirli üniversitelerde yoğunlaştığı ortaya konulmuştur.

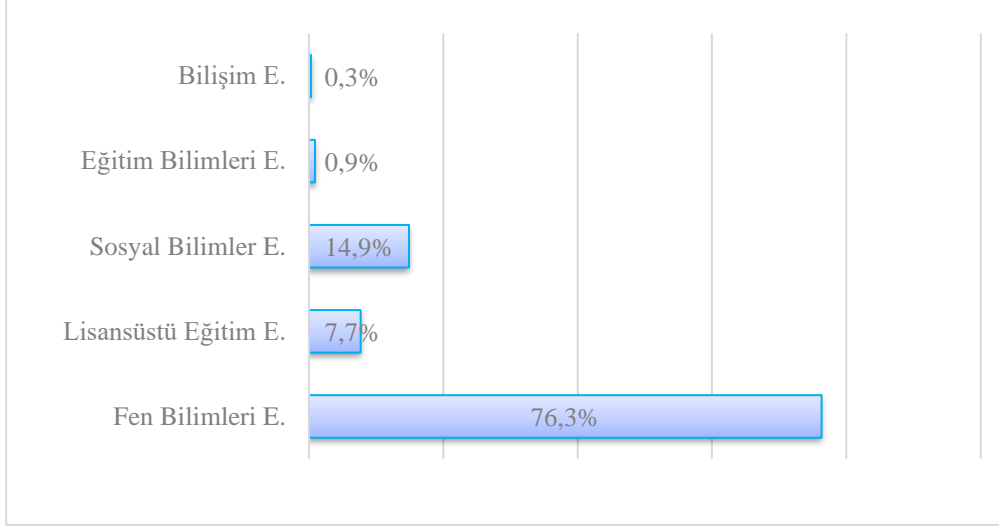
### 3.7. Lisansüstü Tezlerin Hazırlandıkları Enstitülere Göre Dağılımı

Şekil 4’te yer alan verilere göre, korunan alanlarla ilgili lisansüstü tezlerin beş farklı enstitü bünyesinde hazırlandığı ortaya konmuştur. Tezlerin hazırlandığı enstitülerin dağılımında ilk sırada %76,3 ile Fen bilimleri enstitüsü gelmekte olup neredeyse dörtte üçünün bu enstitü bünyesinde hazırlandığı görülmektedir. Bu sonuç en fazla tez üreten ana bilim dallarının fen

<sup>28</sup> Yükseköğretim Kurulu (YÖK), Tüm Üniversite Listesi, <https://www.yok.gov.tr/universiteler/izleme-ve-degerlendirme-raporlari> (Erişim tarihi: 11.10.2023).



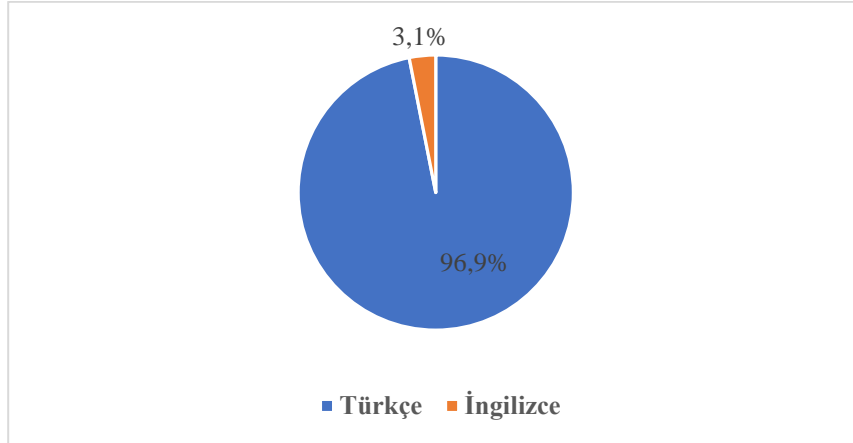
alanı ağırlıklı olan biyoloji, orman mühendisliği vb ana bilim dalları bünyesinde hazırlanması ile ilişkilidir.



Şekil 4. Tezlerin hazırlandıkları enstitülere göre dağılımı (1987-2023)

### 3.8. Lisansüstü Tezlerin Yazım Dillerine Göre Dağılımı

Şekil 5'te lisansüstü tezlerin yazım dillerine göre dağılımı görülmektedir. Korunan alanlar konusunda hazırlanan lisansüstü tezler 339 tez Türkçe, 11 tez ise İngilizce olmak üzere sadece iki dilde hazırlanmıştır. Hazırlanan tezlerin büyük çoğunluğunun Türkçe dilinde yazıldığı ortaya çıkmıştır.



Şekil 5. Tezlerin yazıldıkları dillere göre dağılımı (1987-2023)

### 3.9. Lisansüstü Tezlerin Sayfa Sayılarına Göre Dağılımı

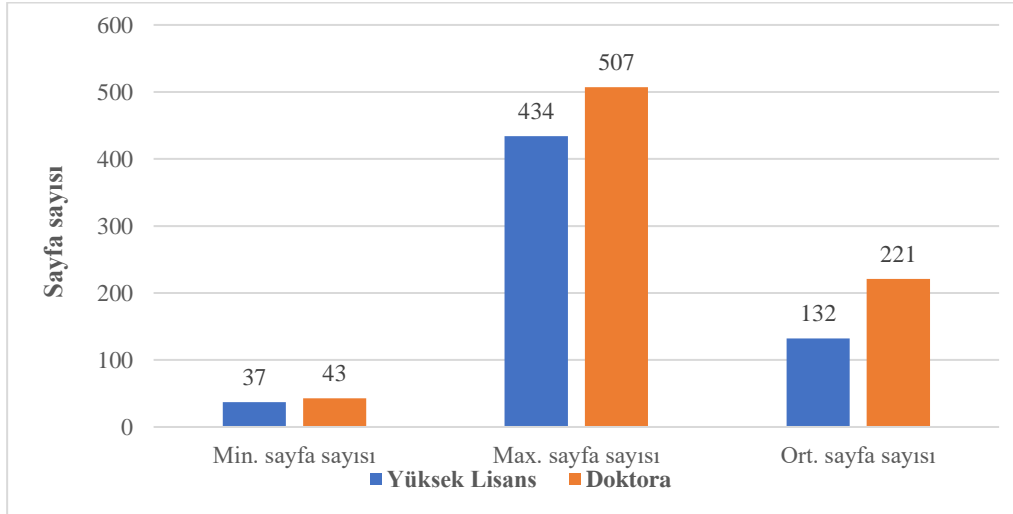
Tablo 4'te tezlerin yüksek lisans ve doktora tez türü itibariyle sayfa sayıları sunulmuştur. Literatürdeki diğer bibliyometrik çalışmalara paralel şekilde yüksek lisans ve doktora tezlerindeki sayfa sayılarında farklılıklar söz konusu olduğu bulunmuştur. Doktora tezlerinin

%9,4'ünün 201 ve üzeri sayfa aralığında yer aldığı, yüksek lisans tezlerinin ise %28,3'ünün 101-150 sayfa aralığında yoğunlaştığı ortaya çıkmıştır.

Tablo 4. Lisansüstü tezlerin sayfa sayısı aralıklarının dağılımı

Lisansüstü tez türü	0-50 sayfa		51-100 sayfa		101-150 sayfa		151-200		201 ve üzeri sayfa	
	f	%	f	%	f	%	f	%	f	%
<b>Yüksek lisans</b>	9	2,6	86	24,6	99	28,3	45	12,9	38	10,9
<b>Doktora</b>	1	0,3	4	1,1	10	2,9	25	7,1	33	9,4
<b>Toplam</b>	10	2,9	90	25,7	109	31,1	70	20,0	71	20,3

Şekil 6'da Lisansüstü tezlerin en az, en fazla ve ortalama sayfa sayılarına yer verilmiştir. Korunan alanlar üzerine yazılan lisansüstü tezlerin hizmet ettiği sayfa sayıları sunulmuştur.



Şekil 6. Lisansüstü tezlerin min.(minimum), max. (maksimum) ve ort. (ortalama) sayfa sayıları

Şekil 6'ya göre yüksek lisans tezlerinin en az 37 sayfa, en fazla 434 sayfa hazırlanmış olduğu ortaya konmuş ve ortalama 132 sayfa olarak hazırlandıkları bulunmuştur. Doktora tezleri ise en az 43 sayfa, en fazla 507 sayfa olarak hazırlanmış olup; ort. sayfa sayısı ise 221 sayfa olarak belirlenmiştir (Şekil 6).

### 3.10. Lisansüstü Tezlerin İlişkili Olduğu Mesleki Disiplin Konularının Dağılımı

Korunan alanlarla ilgili hazırlanan lisansüstü tezlerinin yer aldığı mesleki disiplin konularına Tablo 5'te yer verilmiştir. Birinci konuda 350, ikinci konuda 80 ve üçüncü konuda da 12 adet olmak üzere toplamda 442 adet mesleki disiplin konusuna yer verilmiştir. Birinci konuda sırasıyla "Biyoloji (%23,7)", "Ormancılık ve orman mühendisliği (%21,4)" ve "Peyzaj mimarlığı (%20,9)" meslek disiplinlerine yer verildiği ortaya konmuştur (Tablo 5).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 5.** Lisansüstü tezlerin ilişkili olduğu mesleki disiplin konularının dağılımı

Konu Adı	Konu 1		Konu 2		Konu 3		Toplam	
	f	%	f	%	f	%	f	%
Arkeoloji	1	0,3	0	0,0	0	0,0	1	0,2
Bilim ve teknoloji	2	0,6	0	0,0	0	0,0	2	0,5
Biyoloji	83	23,7	0	0,0	0	0,0	83	18,8
Botanik	14	4,0	18	22,5	0	0,0	32	7,2
Coğrafya	25	7,1	1	1,3	0	0,0	26	5,9
Çevre mühendisliği	2	0,6	3	3,8	2	16,7	7	1,6
Eğitim ve öğretim	5	1,4	4	5,0	0	0,0	9	2,0
Ekonometri	1	0,3	0	0,0	0	0,0	1	0,2
Ekonomi	1	0,3	1	1,3	0	0,0	2	0,5
Elektrik ve elektronik mühendisliği	1	0,3	0	0,0	0	0,0	1	0,2
Fizik ve fizik mühendisliği	1	0,3	0	0,0	0	0,0	1	0,2
Genetik	0	0,0	1	1,3	0	0,0	1	0,2
İnşaat mühendisliği	1	0,3	0	0,0	0	0,0	1	0,2
İşletme	0	0,0	5	6,3	1	8,3	6	1,4
Jeodezi ve fotogrametri	3	0,9	1	1,3	0	0,0	4	0,9
Jeoloji mühendisliği	1	0,3	0	0,0	0	0,0	1	0,2
Kamu yönetimi	6	1,7	0	0,0	0	0,0	6	1,4
Kimya	1	0,3	1	1,3	0	0,0	2	0,5
Mikrobiyoloji	1	0,3	2	2,5	0	0,0	3	0,7
Mimarlık	1	0,3	0	0,0	1	8,3	2	0,5
Mühendislik bilimleri	0	0,0	1	1,3	0	0,0	1	0,2
Ormancılık ve orman mühendisliği	75	21,4	8	10,0	1	8,3	84	19,0
Peyzaj mimarlığı	73	20,9	3	3,8	0	0,0	76	17,2
Siyasal bilimler	0	0,0	1	1,3	0	0,0	1	0,2
Sosyal bilimler	1	0,3	0	0,0	0	0,0	1	0,2
Sosyoloji	1	0,3	1	1,3	0	0,0	2	0,5
Spor	4	1,1	0	0,0	1	8,3	5	1,1
Şehircilik ve bölge planlama	9	2,6	1	1,3	2	16,7	12	2,7
Tarih	0	0,0	1	1,3	0	0,0	1	0,2
Trafik	1	0,3	0	0,0	0	0,0	1	0,2
Turizm	20	5,7	11	13,8	1	8,3	32	7,2
Ulaşım	0	0,0	1	1,3	0	0,0	1	0,2
Uluslararası ilişkiler	0	0,0	1	1,3	0	0,0	1	0,2
Veteriner hekimliği	0	0,0	1	1,3	0	0,0	1	0,2
Ziraat	4	1,1	2	2,5	1	8,3	7	1,6
Zooloji	12	3,4	11	13,8	2	16,7	25	5,7
<b>Toplam</b>	<b>350</b>	<b>100,0</b>	<b>80</b>	<b>100,0</b>	<b>12</b>	<b>100,0</b>	<b>442</b>	<b>100,0</b>

Şekil 7’de lisansüstü tezlerin mesleki disiplin konuları kelime bulutuna yer verilmiştir. Korunan alanlar konusunda hazırlanan lisansüstü tezlerin mesleki disiplinler bakımından kod bulutu sonuçlarına toplamda 36 farklı kod üretildiği bulunmuştur. Sık kodlanan ifadelerin fon

büyüklüğü artmıştır. Kod bulutuna göre en sık tekrarlanan kodlar; Ormancılık ve Orman Mühendisliği (84), Biyoloji (83), Peyzaj Mimarlığı (76), Botanik (32), Turizm (32), Coğrafya (26), Zooloji (25) şeklinde belirlenmiştir. Görüldüğü üzere çalışma kapsamında incelenen 350 tezde toplam 442 adet mesleki disiplin konusuna yer verilmiştir (Şekil 7). Çalışma bulgularına benzer şekilde Dağ (2019) da orman mühendisliği çalışmalarının peyzaj mimarlığı, biyoloji gibi mesleki disiplin kollarıyla yakın çalışmalar içerisinde olduklarının altını çizmiştir.



Şekil 7. Lisansüstü tezlerin mesleki disiplinlere göre oluşturulmuş “Kod Bulutu”

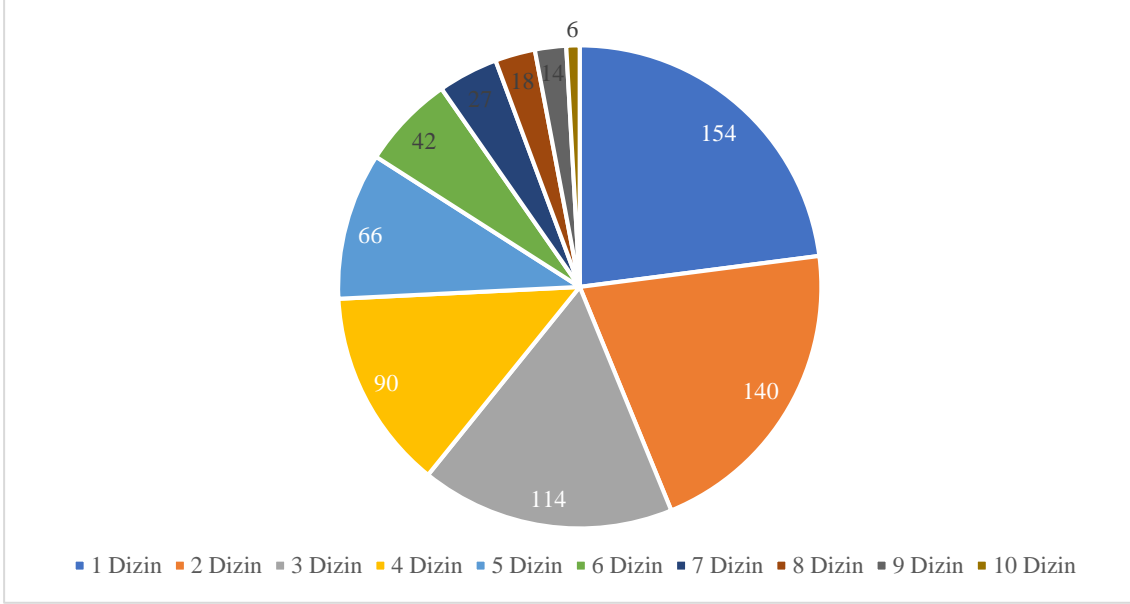
### 3.11. Lisansüstü Tezlerin Dizinde Yer Verdikleri Kelimelerin Bulguları

Lisansüstü tezlerin dizinde yer verdikleri ifadelerin kelime bulutu oluşturulurken metin içerisindeki tekrarlanma sayısı dikkate alınmıştır. Korunan alanlar konusunda hazırlanan 350 lisansüstü teze ait “Tez bilgisi detayları” incelendiğinde 154 tezin künye bilgilerinde “Dizin” yer almış olup, 196 tezde boş bırakıldığı görülmüştür. Şekil 8’de dizin bilgilerine yer veren tezlerin “Dizin Kelime Bulutu” yer almaktadır. Dizin kelime bulutunda en fazla kullanılan dizinlerin frekansları incelendiğinde; park (127), milli (110), koruma (45), turizm (34), doğa (24) şeklinde dizin kelime bulutu sözcük frekansında yer aldığı görülmektedir (Şekil 8).



Şekil 8. Dizin bilgilerine yer veren tezlerin “Dizin Kelime Bulutu”

Korunan alanlar konusunda hazırlanan lisansüstü tezlerde en az 1 dizin yer alırken en fazla 10 dizine yer verildiği ve tezlerde toplam 671 adet dizin kullanıldığı ortaya çıkmıştır. Dizinlerin %23'ünün birinci sıradaki, %21'inin ikinci sıradaki ve %17'sinin de üçüncü sıradaki dizinde yer aldığı görülmüştür (Şekil 9).



Şekil 9. Lisansüstü tezlerin kullandıkları dizin sayılarına göre dağılımları

Tablo 6'da lisansüstü tezlerde yer verilen dizin sayısı dağılımları sunulmuştur. Tezlerin dizininde en fazla “milli parklar” kavramına yer verildiği görülmüştür. Dizin bilgileri bulunan tezlere bakıldığında; %11,2'si milli parklar, %2,5'i doğa koruma, %2,4'ü flora, %2,4'ü rekreasyon, %1,8'i turizm ve %1,5'i koruma alanları kelimesine dizinde yer vermiştir (Tablo 6).

Tablo 6. Lisansüstü tezlerde dizinde en fazla kullanılan kelime(ler)

Dizin adı	f	Dizin adı	f
Milli parklar	75	Destinasyon	8
Doğa koruma	17	Ekoturizm	8
Flora	16	Rekreasyonel aktiviteler	7
Rekreasyon	16	Ziyaretçiler	7
Turizm	12	İlgaz dağı milli parkı	6
Koruma alanları	10	Koruma	6
Ekoloji	9	Kuşlar	6
Parklar	9	Diğer	459
<b>Genel toplam</b>			<b>671</b>



### 3.12. Lisansüstü Tezlerin Hazırlandıkları Ana Bilim Dalları

Lisansüstü tezlerin hazırlandıkları ana bilim dalları Tablo 7’de sunulmuştur. Çalışma kapsamında incelenen 350 tezin 75 farklı üniversite bünyesindeki 47 ana bilim dalında hazırlandıkları ortaya konmuştur.

**Tablo 7.** Lisansüstü tezlerin hazırlandıkları ana bilim dalları

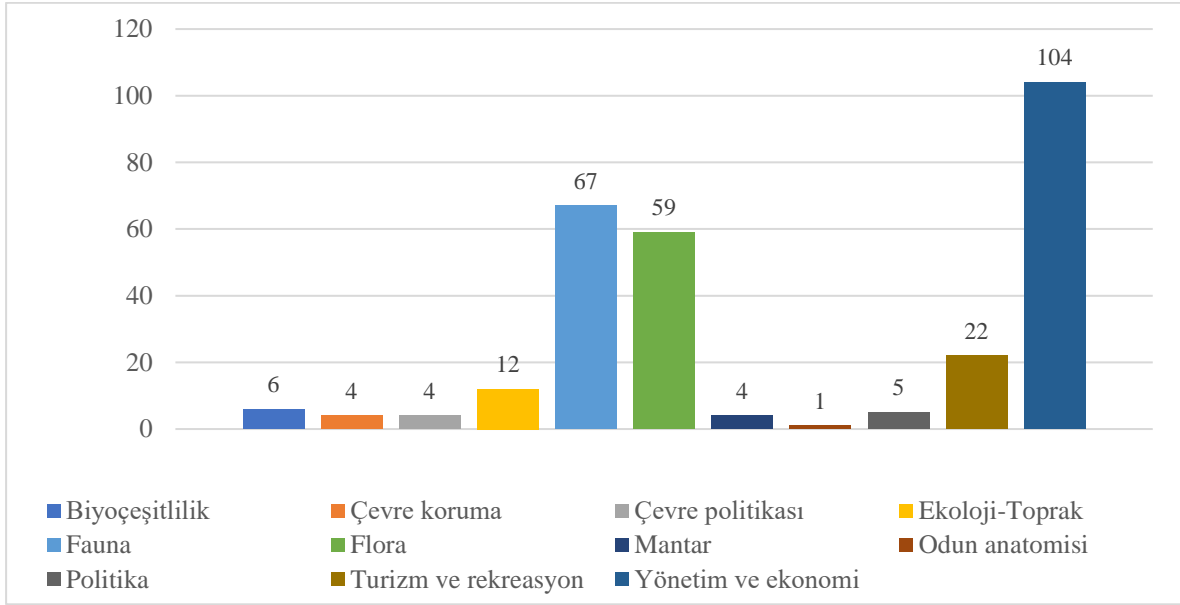
Ana bilim dalı adı	f	%
Biyoloji	94	26,9
Orman mühendisliği	80	22,9
Peyzaj mimarlığı	70	20,0
Coğrafya	16	4,5
Şehir ve bölge planlama	10	2,9
Turizm işletmeciliği	9	2,5
Diğer	71	20,3
<b>Toplam</b>	<b>350</b>	<b>100</b>

Tablo 7’de 47 farklı ana bilim dalında hazırlanan tezlerin %69,8’i gibi ağırlıklı oranda “Biyoloji (%26,9), orman mühendisliği (%22,9) ve peyzaj mimarlığı (%20)” üç ana bilim dalında yoğunlaştığı görülmüştür. Azalan sıralamayla sonraki ana bilim dallarını %10’luk oranla coğrafya, şehir ve bölge planlama ile turizm işletmeciliği oluşturmuştur (Tablo 7).

### 3.13. Lisansüstü Tezlerin İçeriklerine Ait Değerlendirmeler

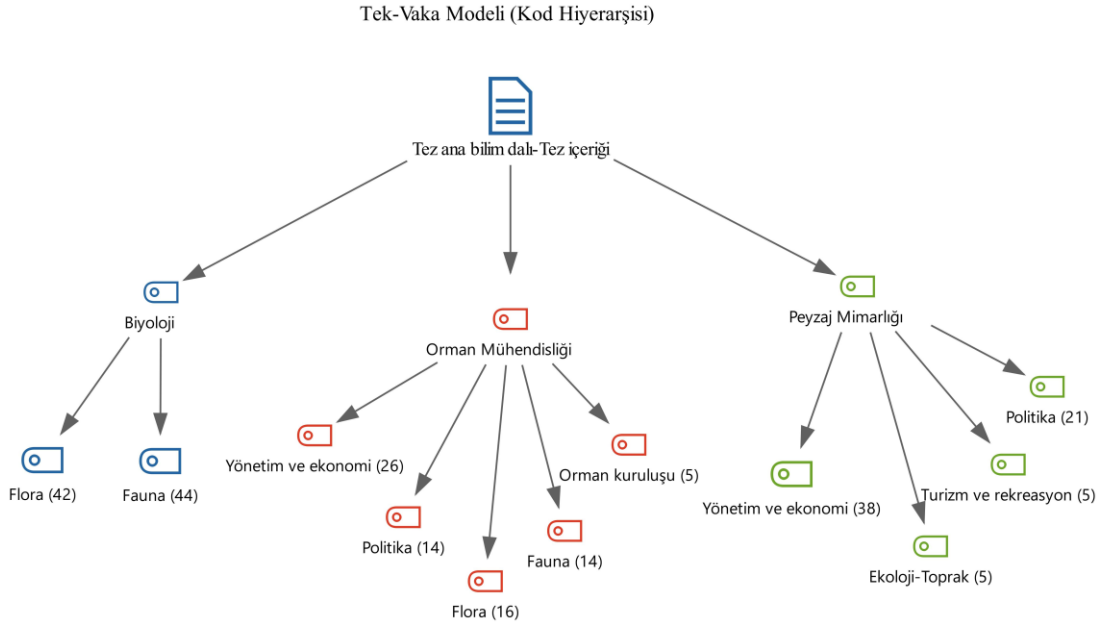
Lisansüstü tezlerin içeriklerine ait değerlendirmelere Şekil 10’da yer verilmiştir. Tezlerin 11 farklı içerikte sınıflandırıldığı bulunmuştur. Tez içeriklerinin azalan sıralamayla; “yönetim ve ekonomi (%29,7)”, “fauna (%19,1)”, “politika (%17,7)” ve “flora (%16,9)” ağırlıklı olarak hazırlandıkları ortaya konmuştur (Şekil 10).





Şekil 10. Lisansüstü tezlerin içeriklerine ait dağılımlar

Lisansüstü tezlerin ana bilim dalı bazında tez içeriklerine ait “Tek-Vaka Modeli (Kod Hiyerarşisi)” Şekil 11’de sunulmuştur. Böylece ağırlıklı olarak biyoloji, orman mühendisliği ve peyzaj mimarlığı ana bilim dalları bünyesinde hazırlanan tezlerin içeriklerinin bu üç ana bilim dalında dağılımının ne şekilde yer aldığı ortaya konmaya çalışılmıştır. En sık 5 kod ve üzerine şekilde yer verilmiştir.



Şekil 11. Tez içeriklerinin ana bilim dalı bazında “Tek-Vaka Modeli (Kod Hiyerarşisi)”

Şekil 11’e göre biyoloji ana bilim dalında hazırlanan tezlerin içerikleri korunan alanların florası ve faunası üzerindeki çalışmalardan oluşmaktadır. Orman mühendisliği ana bilim dalında



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

hazırlanan tezler azalan sıralamayla korunan alanların yönetimi ve ekonomisi, florası, faunası, korunan alan politikaları, orman kuruluşu çalışmaları üzerine gerçekleştirilmiştir. Peyzaj mimarlığı ana bilim dalında hazırlanan tezlerin içerikleri ise korunan alanların yönetimi ve ekonomisi ağırlıklı çalışmalardan oluşmakla birlikte korunan alanlar politikası, korunan alanların ekolojisi-toprak çalışmaları ile korunan alanlarda gerçekleştirilen turizm ve rekreasyon etkinliklerini araştıran çalışmalar şeklinde yürütüldüğü ortaya konmuştur (Şekil 11).

### 4. SONUÇ ve ÖNERİLER

Bu çalışmada, Türkiye’de korunan alanlar üzerine hazırlanan, son erişim tarihi 22.09.2023 olarak belirlenen, tez başlığında belirlenen anahtar kelimeleri içeren YÖK UTM’de kayıtlı 350 adet lisansüstü tezin bibliyometrik analizi gerçekleştirilmiştir. Böylece çalışma sonucunda korunan alanlara yönelik hazırlanan lisansüstü tezler konusunda bir kesit sunularak tezlerin genel eğilimi belirlenmiş ve çalışma sınırlılıkları dahilinde mevcut durum ortaya konmuştur. alan yazına katkıda bulunulmuştur. Araştırma bulguları korunan alanlar üzerine çalışma yapmayı planlayan araştırmacılara yol göstermesinin yanı sıra mesleki disiplin konuları arasındaki ilişkiyi ortaya koyması bakımından da önemli bir rehber niteliğindedir. Çalışma ile aşağıdaki sonuçlara ulaşılmıştır:

- Korunan alanlara yönelik hazırlanan 350 adet lisansüstü tezin 277’si yüksek lisans ve 73’ü de doktora düzeyinde hazırlanmıştır. Korunan alanlara yönelik doktora düzeyinde daha az araştırma yapıldığı bulunmuş, doktora düzeyinde yeterince literatürün zenginleşemediğini ortaya koyan bu sonuç ileriki süreçlerde daha fazla doktora düzeyinde çalışma yapılması gerekliliğini ortaya koymuştur.
- Tezlerin neredeyse tamamının (%90,9) erişime açık olduğu belirlenmiştir. Bu sonucun tezlerin daha fazla kişinin faydalanmasına hizmet etmesi açısından önemli olduğu düşünülmektedir.
- Araştırma kısıtları kapsamında ulaşılan bulgular sonucunda çalışma konusuyla ilgili hazırlanan ilk tezin 1987 tarihinde tamamlanarak bilime sunulduğu bulunmuştur. Literatüre paralel bir şekilde korunan alanlar üzerine yazılan tezlerin nicelik olarak en fazla 2019 yılında hazırlandığı ortaya konmuştur. Tezlerin yıllar bazında dalgalı bir eğiliminin olduğu, artışların olduğu yıllar olabildiği gibi sık sık azalmaların da görüldüğü bulunmuştur. Özellikle korunan alanların faydaları da dikkate alındığında yıllar bazında düzenli çalışmaların yapılmasının gerekli olduğu dikkati çekmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Hem yüksek lisans hem de doktora tezlerinde Prof. Dr. ünvanlı akademisyenlerin daha fazla oranda danışmanlık yaptığı görülmektedir. Doktora tezlerine danışmanlık yapan Dr. Öğr. Üyesi ünvanlı akademisyenlerin sayısının ise yok denecek kadar azdır.
- Lisansüstü tezlerin kadınlar ve erkekler tarafından eşit oranda yazıldığı bulunmuştur. Bu da hem kadın hem de erkek araştırmacılar tarafından korunan alanlara yönelik bir çalışma isteği, ilgisi olduğunu göstermektedir.
- Korunan alanlara yönelik en fazla tezin hazırlandığı ilk üç üniversite sırasıyla Ankara Ü., Karadeniz Teknik Ü. ve Süleyman Demirel Ü. şeklindedir.
- Tezlerin hazırlandığı enstitü bakımından ilk sırada %76,3 oranıyla Fen bilimleri enstitüsü gelmektedir. Lisansüstü tezlerin %96,7'si Türkçe dilinde hazırlanmış olup çok azı İngilizce dilinde yazılmıştır. Yabancı dilde yazılan tezlerin sayısının artırılması yurtdışı literatürde de yer alma açısından önemli görülmekte ve bu sayının artırılmasında fayda olduğu düşünülmektedir.
- Lisansüstü tezlerin %31,1'inin 101-150 sayfa aralığında yazıldığı bulunmuştur. Tez türü açısından değerlendirildiğinde; yüksek lisans tezleri 101-150 sayfa aralığında yoğunlaşmış olup, doktora tezlerinin ağırlıklı olarak 201 ve üzeri sayfa aralığında yazıldığı tespit edilmiştir.
- Lisansüstü tezlerde toplam 442 adet mesleki disiplin konusuna yer verildiği görülmüş olup azalan sıralamayla ormancılık ve orman mühendisliği, peyzaj mimarlığı ve biyoloji mesleki disiplin konularıyla ilişkili tezler hazırlanmıştır. Birinci konuda en fazla biyoloji (83), ormancılık ve orman mühendisliği (75), peyzaj mimarlığı (73); ikinci konuda botanik (18), turizm (11), zooloji (11), ormancılık ve orman mühendisliği (8); üçüncü konuda ise çevre mühendisliği (2), şehircilik ve bölge planlaması (2), zooloji (2) mesleki disiplinlere yer verilmiştir. Korunan alanlar üzerine farklı mesleki disiplinlerde tezlerin hazırlandığı dikkati çekmektedir. Bu sonuç korunan alanların farklı çalışma alanlarına yönelik bilimsel araştırmalar gerçekleştirileceği yönünde bir eğilimi olacağını göstermektedir.
- Korunan alanlar konusunda hazırlanan lisansüstü tezlerde en az 1 dizin yer alırken en fazla 10 dizine yer verildiği ve tezlerde toplam 671 adet dizin kullanıldığı ortaya çıkmıştır. Dizinlerin %23'ünün birinci sıradaki, %21'inin ikinci sıradaki ve %17'sinin de üçüncü sıradaki dizinde yer aldığı görülmüştür. Dizin bilgileri bulunan tezler (154) değerlendirildiğinde; %11,2'sinin milli parklar, %2,5'inin doğa koruma, %2,4'ünün



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

flora, %2,4'ünün rekreasyon, %1,8'inin turizm ve %1,5'inin koruma alanları kelimesine yer verdikleri görülmektedir.

- Ana bilim dalı açısından bakıldığında lisansüstü tezlerde en fazla tezin biyoloji, orman mühendisliği ve peyzaj mimarlığı ana bilim dalında hazırlandığı belirlenmiştir. Ana bilim dalları bazında
- Tezlerin genel yapı itibariyle içerikleri değerlendirildiğinde; azalan oranla “yönetim ve ekonomi”, “fauna”, “politika” ve “flora” üzerine çalışmalara yoğunlaşıldığı ortaya konmuştur.
- Biyoloji ana bilim dalında hazırlanan tezlerin içerikleri korunan alanların florası ve faunası üzerindeki çalışmalardan oluşmuş; Orman mühendisliği ana bilim dalında hazırlanan tezler azalan sıralamayla korunan alanların yönetimi ve ekonomisi, florası, faunası, korunan alan politikaları, orman kuruluşu çalışmaları üzerine gerçekleştirilmiş ve Peyzaj mimarlığı ana bilim dalında hazırlanan tezlerin içerikleri ise korunan alanların yönetimi ve ekonomisini araştıran çalışmalar ağırlıklı yürütüldüğü sonucuna ulaşılmıştır.

Sonuç olarak bu çalışmayla Korunan alanlar üzerine yapılan çalışmalara daha fazla ağırlık verilmeli ve öğrenciler bu alandaki çalışmalar için teşvik edilmelidir. Gelecekte korunan alanlara yönelik gerçekleştirilecek bibliyometrik analiz çalışmalarında, bu araştırma sınırlılıklarında çalışmaya dahil edilemeyen diğer korunan alanlar üzerinde yapılmasında fayda olduğu düşünülmektedir. Aynı zamanda korunan alanlar üzerine yazılmış makalelerin ve bildirilerin de farklı parametreler dahilinde bibliyometrik açıdan irdelenmesi araştırma konusunun eğilimi ve değişimi açısından kıyaslama yapılmasına olanak sağlayacaktır.



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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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**EXAMINATION OF GREEN CHEMISTRY TECHNOLOGIES IN THE  
CHARACTERIZATION OF PROTEIN-BASED DRUGS**

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**ABSTRACT**

Protein-based biopharmaceuticals are crucial drug molecules extensively used in treating numerous significant diseases owing to their therapeutic effects. The development and utilization of such biopharmaceuticals necessitate a detailed molecular-level characterization. Characterization processes are critical before these drugs are introduced for human use. Therefore, from a green chemistry perspective, it is imperative to scrutinize the analytical methods employed in drug characterization. The analytical techniques used in drug characterization must align with the principles of green chemistry for environmental sustainability and human health. In this context, reducing harmful chemicals and solvents or opting for alternatives is integral to an environmentally friendly approach. Particularly in the characterization processes conducted at the glycomic level, it has been observed that using agents and solvents with low toxicity does not adversely affect the obtained results. Furthermore, in analyzing complex processes such as glycan analysis, the efficiency of labeling agents must be considered. In mass spectrometric analyses, selecting the appropriate labeling agent can enhance the accuracy and sensitivity of results. This ensures that the analytical methods used in drug characterization yield precise and reliable outcomes. In conclusion, environmentally friendly and sustainable analytical methods prove highly effective in achieving the required efficiency in drug characterization. From the perspective of green chemistry, minimizing the environmental impact of analytical methods used in drug development processes can contribute to a more sustainable drug development process in terms of environmental preservation and human health.

**Keywords:** Protein-based biopharmaceuticals, glycomics, green chemistry, sustainable drug characterization



## **1. INTRODUCTION**

Protein-based biopharmaceuticals, commonly known as biologics, mark an innovative frontier within the realm of healthcare (Nelson et al., 2000). These intricate, large-molecule medicines are crafted through the utilization of living organisms, primarily cells, to produce therapeutic proteins that possess the precision and complexity required to combat a diverse spectrum of medical ailments. Unlike conventional small-molecule drugs, biologics excel in pinpointing specific disease mechanisms, yielding exceptional effectiveness while minimizing adverse effects (Bayer, 2019). Consequently, they have transformed the treatment landscape for numerous diseases, instilling fresh optimism in patients grappling with conditions that were once deemed untreatable.

The characterization of monoclonal antibodies stands as a pivotal process, assuring the quality, safety, and effectiveness of these potent agents employed in therapeutics and diagnostics (Alhazmi & Albratty, 2023). Monoclonal antibodies, renowned for their remarkable specificity and adaptability, have become indispensable tools in contemporary medicine and biotechnology. To fully exploit their potential, it becomes imperative to employ rigorous characterization methods, which furnish comprehensive insights into their structure, functionality, and behaviour (Fekete, Gassner, Rudaz, Schappler, & Guillaume, 2013). These methods have undergone significant refinement over the years, granting researchers and manufacturers the capacity to scrutinize monoclonal antibodies with an unprecedented level of precision.

In the field of biotechnology and biopharmaceutics, glycan analysis is crucial for various purposes. Most biopharmaceuticals are glycoproteins, and the glycan portion often exerts an influence on biological activity. As a result, the characterization of glycosylation in biopharmaceuticals is mandatory since glycans are considered critical quality attributes (Reusch et al., 2015). For example, the absence of fucose in the N-glycans of a therapeutic antibody can lead to a significant increase in antibody-dependent cell-mediated cytotoxicity (Chung et al., 2012). Therefore, the availability of highly efficient methods is of great importance in terms of column selection and process development. Moreover, the glycans on therapeutic glycoproteins often have an impact on safety, immunogenicity, and pharmacokinetic/pharmacodynamic (PK/PD) behavior. Recently, there has been an increasing interest in the proteoform-specific pharmacokinetic analysis of biopharmaceuticals to assess the specific profiles of different glycoforms. These analyses often face various challenges due to the complexity of biological



matrices and target molecules. Additionally, there is often very limited material available (Falck et al., 2021).

The characterization of glycosylation in monoclonal antibodies using eco-friendly methods becomes both a practical and ethical imperative. These techniques not only provide crucial insights into the glycan structures and their effects on antibody functionality but also align with global efforts to reduce the environmental footprint of scientific research and pharmaceutical production. In this study, various eco-friendly approaches have been introduced regarding glycosylation for the characterization of protein biopharmaceuticals.

## **2. Typical Approaches for Analyzing Glycans**

The majority of biopharmaceuticals take the form of glycoproteins, and typically, the glycan component exerts a significant influence on their biological activity. This underscores the critical role that glycan attributes play, making the characterization of glycosylation in biopharmaceuticals an imperative task. To illustrate, the presence or absence of fucose in the N-glycans of a therapeutic antibody can cause a substantial alteration in antibody-dependent cell-mediated cytotoxicity, exemplifying the crucial nature of glycan analysis (Chung et al., 2012). For this reason, the availability of highly effective methods for selecting columns and process development is of paramount importance. Furthermore, the glycan profiles on therapeutic glycoproteins often have direct implications for safety, immunogenicity, and the pharmacokinetic/pharmacodynamic (PK/PD) behaviour of these biopharmaceuticals (Reusch et al., 2015). This necessitates a thorough understanding of glycosylation, as it is intricately linked to the overall quality and performance of these critical therapeutic agents.

The process of glycan analysis typically involves five essential steps (H. Mehmet Kayili, Atakay, Hayatu, & Salih, 2022):

1. **Sample Preparation:** To begin, glycan components are enzymatically liberated from the monoclonal antibody (mAb) using enzymes such as PNGase F.
2. **Labelling:** The released glycans are frequently tagged with fluorescent markers or other chemical labels, enabling subsequent detection.
3. **Purification:** The labelled N-glycans are purified, extracting them from the complex mixture in which they reside.
4. **Separation:** Techniques like high-performance liquid chromatography (HPLC) or capillary electrophoresis (CE) are applied to separate and quantify the labelled glycans effectively.



5. Analysis: The separated glycans are then subjected to a comprehensive examination to determine their structures and relative abundances.

### **3. Environmental Challenges in Glycan Analysis of Protein-based Drugs**

- I. The utilization of a range of chemicals, including enzymes for glycan release, fluorescent labels for detection, and solvents for chromatography, can lead to the generation of substantial chemical waste. The responsible disposal and treatment of these byproducts are imperative to mitigate potential environmental contamination.
- II. The analysis often necessitates the use of organic solvents, which can have adverse environmental repercussions. The entire lifecycle of these solvents, from production to disposal and emissions, can contribute to both air and water pollution.
- III. The handling and storage of hazardous chemicals integral to glycan analysis must strictly adhere to safety protocols to avert potential accidents or spills that could inflict harm on the environment.
- IV. Many analytical techniques for glycan analysis, such as mass spectrometry and high-performance liquid chromatography, rely on sophisticated instruments with substantial energy requirements. This elevated energy consumption can result in a heightened carbon footprint, particularly if the tools lack energy-efficient designs.

### **4. Solution Proposals for the Glycan-Based Characterization of Monoclonal Antibodies**

To address the environmental challenges inherent in N-glycan characterization for monoclonal antibodies (mAbs), it is imperative to pursue and embrace eco-conscious analytical methods that reduce the reliance on hazardous chemicals and minimize waste generation. Furthermore, exploring alternative, environmentally friendly approaches to labelling and detection is essential, with a focus on reducing the use of toxic reagents. By doing so, we can significantly mitigate the ecological impact of glycan analysis in the field of mAbs.

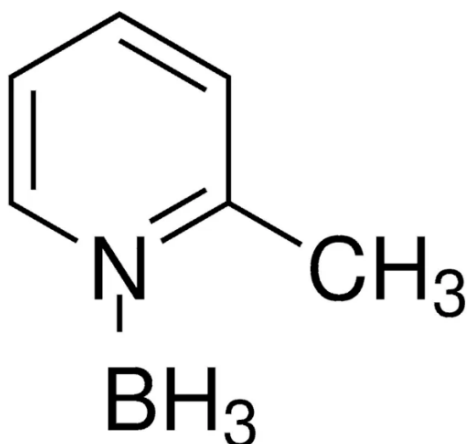
One approach involves the substitution of hazardous chemicals with greener alternatives, thereby curbing chemical waste and reducing potential harm to the environment. Additionally, the optimization of processes to require fewer or less harmful chemicals can significantly contribute to a more sustainable approach. Furthermore, the development and adoption of innovative, low-impact labelling and detection techniques are pivotal. For instance, the use of non-toxic or biodegradable labelling agents and detection methods that require fewer resources can be explored.

Moreover, a comprehensive assessment of energy-efficient instrumentation and practices can help lessen the carbon footprint associated with glycan analysis. This, in turn, supports the broader goal of minimizing the environmental footprint of biopharmaceutical research and development. Overall, a commitment to eco-friendly practices in glycan analysis for mAbs is not only environmentally responsible but also a step toward a more sustainable and ethical approach to scientific research.

**a. An alternative Non-toxic Reducing Agent for Glycan Labeling**

In the conventional labelling process, a chemical reagent known as  $\text{NaCNBH}_4$  has been traditionally employed to reduce *N*-glycans. However, an environmentally preferable alternative exists in the form of 2-Picoline-borane, which is non-toxic and can serve as an efficient reducing agent (Figure 1). This substitution not only addresses safety concerns associated with the use of toxic reagents but also maintains the efficacy of the reduction process, thereby promoting a greener and more sustainable approach to glycan analysis.

The adoption of 2-Picoline-borane as a non-toxic reducing agent aligns with the overarching objective of reducing the environmental impact of laboratory practices (Ruhaak, Steenvoorden, Koeleman, Deelder, & Wuhler, 2010). It eliminates the risks associated with toxic reagents, safeguarding the well-being of laboratory personnel and minimizing potential harm to the environment. Additionally, the high efficiency of 2-Picoline-borane ensures that glycan reduction remains robust and effective, making it a responsible and practical choice for eco-conscious glycan analysis. This shift toward non-toxic alternatives underscores the laboratory's commitment to safer and more sustainable scientific research, contributing to a greener future in the field of biopharmaceuticals.



**Figure 1.** Chemical structure of 2-picoline borane.





### **b. Microscale Techniques for Waste Minimization**

Implementing waste minimization strategies, such as employing microscale techniques and ensuring proper waste segregation and labelling, is of paramount importance in the characterization of protein-based drugs. The significance of these strategies can be summarized in the following key points:

- Protein-based drug characterization often involves the use of various reagents and chemicals, generating substantial amounts of waste. Adopting waste minimization techniques is crucial for reducing the environmental impact of pharmaceutical research and production. It aligns with broader sustainability goals and contributes to a more responsible approach to drug development.
- Proper waste segregation and recycling can lead to cost savings in waste disposal. Additionally, microscale techniques, which reduce the volume of waste generated, can lower overall laboratory costs. This cost-effectiveness can be a significant advantage for pharmaceutical companies, especially in a competitive industry.
- Safe handling, labelling, and disposal of chemical waste are crucial for maintaining a safe laboratory environment. Minimizing waste reduces the risks associated with handling hazardous materials, promoting the health and safety of laboratory personnel.
- By minimizing waste, pharmaceutical research facilities can conserve valuable resources. This not only includes the chemicals themselves but also the energy and materials used in waste treatment and disposal. Resource conservation is an integral part of sustainable practices.

#### **i. Eco-Friendly *N*-glycan Purification Approach**

The utilization of cotton fibres for glycan purification offers the advantage of employing a microscale technique, allowing for precise and efficient purification of even small quantities of glycans (Selman, Hemayatkar, Deelder, & Wuhrer, 2011). One notable benefit is the significantly reduced solvent requirement, which not only conserves valuable chemicals but also aligns with eco-conscious practices by reducing solvent-related waste. Cotton fibres are inherently eco-friendly and require no chemical preparation, offering a sustainable alternative for glycan purification while minimizing the use of synthetic materials and associated environmental impact. Cotton fibres demonstrate a high level of efficiency in the purification process, ensuring that impurities are effectively removed, resulting in pure glycans ready for analysis or use in biopharmaceutical research (Figure 2).

Incorporating cotton fibres into glycan purification processes provides an environmentally responsible, resource-efficient, and practical approach for the scientific community.



**Figure 2.** A cotton-containing pipette tip for N-glycan purification.

**ii. 96-well Plates for the Purification of N-glycans**

96-well plates offer the simultaneous examination of numerous samples with smaller sample and reagent volumes, thereby curbing chemical and material consumption. They cut down on chemical waste when implementing microscale techniques within these plates, making them a green choice that aligns with eco-friendly principles and minimizes environmental waste disposal impact. These plates are particularly advantageous for high-throughput N-glycan analysis, allowing researchers to efficiently assess multiple samples, thereby saving both time and resources without compromising analytical precision (Zhang et al., 2020). Researchers can opt for eco-friendly solvents like water-based or less harmful organic solvents when using 96-well plates for N-glycan analysis. The environmental footprint of these plates can be further diminished by choosing recyclable or sustainable materials for their production and disposal. Additionally, the simultaneous analysis of multiple samples within a single plate reduces the need for energy-intensive equipment, resulting in decreased energy consumption. To further reduce the reliance on toxic reagents,

consider incorporating eco-friendly labeling and detection methods alongside 96-well plates (Figure 3).



**Figure 3.** A 96-well plate platform for N-glycan purification.

### **iii. Integrated Approaches for N-glycan Analysis**

Incorporating all sample preparation stages into a single-stage tip amalgamates the process, resulting in a decreased consumption of chemicals and reagents. This consolidation helps mitigate the environmental implications associated with the production, transport, and disposal of these substances. The streamlined approach, coupled with the omission of specific sorbents like C18 or strong-cation exchange at the glycopeptide level, leads to a reduction in waste generation. This waste reduction aligns with eco-friendly principles, as it lessens the requirement for waste disposal and the associated environmental hazards.

This method substantially trims down the time needed for N-glycan profiling, condensing the process from a 2-day endeavour to roughly 2.5 hours (Hacı Mehmet Kayili, Ragoubi, & Salih, 2022). The shortened analysis duration can contribute to energy conservation and a decrease in resource consumption, rendering the process more environmentally efficient.

The integrated stage-tip technique enables the concurrent profiling of multiple samples, which increases throughput while upholding analytical precision. This can result in long-term savings of resources. Through the optimization and simplification of the N-glycosylation profiling procedure, this method promotes more sustainable laboratory practices, adhering to the tenets of green chemistry by diminishing the environmental impact of analytical methods. The reduced analysis time and simplified workflow also



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

enhance energy efficiency by reducing the need for extensive instrument operation and laboratory equipment utilization. The integration of sample preparation steps within a single-stage tip promotes resource efficiency by minimizing the demand for multiple consumables and reagents.

### 5. CONCLUSION

The incorporation of non-toxic materials in N-glycan labelling methods enhances the eco-friendliness of this particular step. Microscale techniques, such as the cotton-HILIC approach, offer a more sustainable, cost-effective, and environmentally friendly manner for purifying N-glycans. Additionally, these techniques often require smaller sample volumes, reducing the overall consumption of resources and samples. Utilizing 96 well plate platforms during the purification step not only enhances the eco-friendliness but also facilitates high-throughput processing. This scalability is particularly advantageous when handling large sample sets. The integration of all stages into a miniaturized stage tip enables a more efficient, cost-effective, and eco-friendly approach to N-glycan analysis. This level of automation and integration enhances the overall reliability and reproducibility of the investigation, making it a valuable tool for research and diagnostics.

### 6. Acknowledgement

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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#### ÖZET

Aydınlanma düşüncesi ve sanayi devrimi, fikri dönüşüm ve bilimsel alandaki gelişmeler, toplumda yeni bir düşünce yapısı oluşturmuş ve birçok alana getirdiği yeni anlayış ve yaşam zihniyeti sonucunda, önceleri bitmeyecek kaynaklara sahip olan bir doğa kavrayışına dönüşmüştür. Bütün bu gelişmeler, insanların doğal dünyayı yalnızca bir kaynak olarak görmeye başlamasına ve ondan kopmasına neden olurken, diğer yandan da çevresel sorunlar ekolojik dengenin bozulması gibi olumsuz sonuçları da beraberinde getirmiştir. Sanayi devriminden günümüze dek devam eden, sanayileşme, tarım arazisi açmak, ilaçlama, madencilik faaliyetleri, ormanların, sulak alanların, çayırların ve diğer doğal yaşam alanlarının tahribi veya dönüştürülmesi ve küresel ısınma, bitkiler üzerinde olumsuz etkiler yaratmıştır. Bitkiler, ekolojiye birçok önemli katkı sağlar ve ekosistemlerin sürdürülebilirliği açısından büyük öneme sahiptir. Bundan dolayı bitkilerin azalması ya da tamamen yok olması ekolojik dengenin de bozulmasıyla aynı anlamı taşır. Bu dönemde doğanın tahribatı, sanatçıları da derinden etkilemiş ve önceleri sadece sanatın ilham kaynağı ve nesnesi olarak görülen doğa, artık 1960'lardan itibaren çevresel yıkımı farklı disiplinlerden birçok sanatçı sanatın malzemesi olarak kullanmıştır. Bu süreçte değişen ve gelişen çevre algısı çevre sorunlarını kapsayan kaygılara doğru evrilerek ekolojik sanat oluşumunu beraberinde getirmiştir. O dönemde ve günümüzde birçok ekolojik sanatçı farklı yaklaşımlarla tahrip olmuş doğanın onarılmasına, sürdürülebilirliğine katkı sunan çalışmalar gerçekleştirmektedirler. Bu anlamda, Josept Beuys'un "700 Meşe ve Bazalt" projesi, Agnes Denes'in birçok bitki çeşidini barındıran "Yaşayan Piramidi" doğal yaşam döngüsüne sahip olarak da değerlendirilen heykeli. Mel Chin'in Kirliliği temizlemek için kullandığı bitkiler, Jacke Brookner'in suyu temizlemek için kullandığı bitki ve yosunlar, vb. sanatçılar da bitkileri ele alan çalışmalar gerçekleştirmektedirler. Sanatçıların bu uygulamaların amacı toplumu doğaya karşı bilinçlendirmek, tahrip olmuş alanları onarmak, geri kazanmak ve çevre konusunda daha kalıcı çözümler üreterek dünyanın ekolojik ve çevresel bütünselliğinin korunmasının etkisi artırmaktır.

**Anahtar Kelimeler:** Sanat, Ekoloji, Bitki, Ekosistem, Sürdürülebilirlik



## **PLANTS AS SUBJECT MATERIALS IN CONTEMPORARY ART**

### **ABSTRACT**

Enlightenment thought and the industrial revolution, intellectual transformation and developments in the scientific field have created a new thought structure in society, and as a result of the new understanding and life mentality it has brought to many areas, it has transformed into a perception of nature that previously had endless resources. While all these developments have caused people to begin to see the natural world only as a resource and become disconnected from it, environmental problems have also brought about negative consequences such as deterioration of ecological balance. Industrialization, opening of agricultural land, pesticides, mining activities, destruction or transformation of forests, wetlands, meadows and other natural habitats, and global warming, which have continued since the industrial revolution, have had negative effects on plants. Plants make many important contributions to ecology and are of great importance for the sustainability of ecosystems. Therefore, the decrease or complete disappearance of plants has the same meaning as the disruption of ecological balance. During this period, the destruction of nature deeply affected the artists, and although nature was previously seen only as the source of inspiration and object of art, since the 1960s, many artists from different disciplines have used environmental destruction as the material of art. In this process, the changing and developing perception of the environment evolved towards concerns covering environmental problems and brought about the formation of ecological art. At that time and today, many ecological artists carry out works that contribute to the repair and sustainability of destroyed nature with different approaches. In this sense, Joseph Beuys's "700 Oaks and Basalt" project is Agnes Denes's "Living Pyramid" sculpture, which contains many types of plants and is also considered to have a natural life cycle. The plants that Mel Chin uses to clean dirty soil, the plants and algae that Jacke Brookner uses to clean water, etc. Artists also create works dealing with plants. The aim of these practices of the artists is to raise public awareness about nature, to repair and reclaim damaged areas, and to increase the impact of protecting the ecological and environmental integrity of the world by producing more permanent solutions for the environment.

**Keywords:** Art, Ecology, Plant, Ecosystem, Sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

İnsanlık tarihi boyunca, insanlar doğasıyla derin bir ilişki içinde yaşamışlardır. Ancak endüstriyel devrimle birlikte, insanların doğaya olan etkileri hızla artmış ve sorunlar giderek büyümüştür. İnsan-doğa ilişkisi, insanların doğal dünya ile nasıl iletişimde buldukları bu genişlemenin önemli bir konusudur. Tarih boyunca insanlar doğanın bir parçası olarak yaşamışlar ve doğadan gelen kaynaklarla hayatlarını sürdürmüşlerdir. Ancak modern endüstriyel toplumun yükselişiyle birlikte, doğaya olan etkileri hızlanmıştır.

Bu etkilerin başında Aydınlanma düşüncesi ve sanayi devrimi, fikri dönüşüm ve bilimsel alandaki gelişmeler gelir ve toplumda yeni bir düşünce yapısı oluşturarak, birçok alana yeni yaşam anlayışı getirmiştir. Oluşan bu yeni anlayış, önceleri bitmeyecek kaynaklara sahip olan bir doğa kavrayışına dönüşmüştür. Bütün bu gelişmeler, insanların doğal dünyayı yalnızca kullanılacak bir kaynak olarak görmeye başlamasına ve ondan kopmasına neden olurken, diğer yandan da çevresel sorunların belirmesi ve ekolojik dengenin bozulması gibi olumsuz sonuçları da beraberinde getirmiştir.

Bütün bu gelişmeler sonucunda, 1960'ların ve 1970'lerin başlarında, doğanın korunmasına ilişkin büyük bir toplumsal bilinç artışı başlamıştır. Bu dönemde doğanın tahribatına ve çevrenin kirletilmesine karşı sanatçılar da tepki vermişlerdir. Daha önceleri sanatçılar, doğadan ilham alarak eserler oluşturmuşlardır. Doğanın formları, renkleri, desenleri ve döngüleri, sanatın temel bir ilhamına bağlıdır. Sanatçılar, manzara resimleri, çiçek motifleri, deniz ve gökyüzü temaları gibi doğadan esinlenerek birçok sanat eseri üretmişlerdir. Dolayısıyla, sadece sanatın ilham kaynağı ve nesnesi olarak görülen doğa, artık 1960'lardan itibaren çevresel yıkımı farklı disiplinlerden birçok sanatçı sanatın malzemesi olarak kullanmıştır. Bu süreçte değişen ve gelişen çevre algısı çevre sorunlarını kapsayan kaygılara doğru evrilerek ekolojik sanat oluşumunu beraberinde getirmiştir. Bu sanat, sadece çevre sorunlarına dikkat çekmekle birlikte aynı zamanda doğanın kendisiyle iş birliği yaparak yeni sanatsal ifadeler yaratmayı hedefler.

Sanayi devriminden günümüze dek devam eden, sanayileşme, tarım arazisi açmak, ilaçlama, madencilik faaliyetleri, ormanların, sulak alanların, çayırların ve diğer doğal yaşam alanlarının tahribi veya dönüştürülmesi ve küresel ısınma, ekosistemin önemli bir parçası olan bitkiler üzerinde olumsuz etkiler yaratmıştır. Bitkiler, bu ekolojik sistemin önemli bir parçası haline gelmiştir. Bitkiler, doğanın bir parçası olarak hem estetik hem de sembolik değerler taşırlar. Bitkiler, ekolojiye birçok önemli katkı sağlar ve ekosistemlerin sürdürülebilirliği



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

açısından büyük öneme sahiptir. Bundan dolayı bitkilerin azalması ya da tamamen yok olması ekolojik dengenin de bozulmasıyla aynı anlamı taşır. O dönemde ve günümüzde birçok ekolojik sanatçı farklı yaklaşımlarla tahrip olmuş doğanın onarılmasına, sürdürülebilirliğine katkı sunan çalışmalar gerçekleştirmektedirler

Sonuç olarak, çağdaş sanatın doğa ve ekoloji ile ilişkisi, zaman içinde önemli bir evrim geçirmiştir. Doğa ve çevre, sanatın temel bir ilişkisi haline gelmiş ve bu ilişkinin çeşitli çeşitleri dağıtılmıştır. Bu evrim, ilişkilerle ilgili dikkat çekme, aktivizmi teşvik etme ve izleyicileri doğa ve ekolojiye karşı daha duyarlı hale getirme, çağdaş sanatın güçlü bir araç olarak işlevsellik görmeye devam etmektedir.

### ÇALIŞMANIN AMACI

İnsanın rahatı için geliştirdiği teknolojiler doğaya önemli ölçüde zarar vermiştir. Sanayileşme ve teknik gelişmelerin çevresel etkileri; havanın, suyun ve toprağın kirlenmesine neden olurken, biyolojik çeşitliliğin azalmasının, zararlı kimyasalların; soyu tükenen canlıların, ozon tabakasının zarar görmesinin; küresel ısınmanın ve iklim değişikliği gibi ekolojik dengede bozulmalara neden olan küresel çapta olumsuz etkilere ulaştığı anlaşılmıştır. Sanatçılar da bu çevresel bozulmalara kayıtsız kalmayarak bizzat doğa malzemelerini kullanarak doğanın bozulmasına karşı tavır almışlardır. Bu çalışmada sanatçıların doğayı iyileştirme ve sürdürülebilirliğine katkı sunan bitkilerle yaptıkları çalışmalar değerlendirilmiştir.

### MATARYAL ve YÖNTEM

Yaşadığımız yeryüzünde insanın bitmek bilmeyen para kazanma hırsı ekolojik bozulmaların etkileri oldukça görünür hale gelmiştir. Sanat, doğanın güzelliklerini, karmaşıklığını ve kırılmasını ifade etmek için güçlü bir araçtır. Sanatçılar, doğanın çeşitliliği, manzaranın büyüleyici güzelliği ve ekolojik dengeyi çeşitli sanat disiplinleri aracılığıyla tasvir edebilirler. Ayrıca sanat, sorunlara dikkat çekme ve insanları bu sorunlar hakkında destekleme teşvik etme potansiyeline sahiptir. Sanatın ekoloji ile etkileşimi, yalnızca doğanın ve çevrenin ifadesi ile sınırlı değildir; Aynı zamanda insan bilincinin görünümüne de katkısı bulunur. Sanat, insanların doğal dünyayla olan ilişkilerini yeniden düşünmelerini, ilgilerini anlamalarını ve bu dünyayı koruma konusunda daha fazla sorumluluk hissetmelerini teşvik eder. İnsanlar, sanat yoluyla doğanın güzelliklerini ve kırılmasını keşfederek, doğa ile daha derin bir bağ kurma yoluyla oluşurlar.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sanatçıların bu uygulamaların amacı toplumu doğaya karşı bilinçlendirmek, tahrip olmuş alanları onarmak, geri kazanmak ve çevre konusunda daha kalıcı çözümler üreterek dünyanın ekolojik ve çevresel bütünselliğinin korunmasının etkisi artırmaktır. Bu çerçevede belli başlı sanatçıların bitkileri konu alan çalışmaları değerlendirilmiştir.

### BULGULAR

Sanayi devrimi ile birlikte teknolojik ilerlemeler, sanayinin büyümesine yol açmış ve bu da hızlı kentleşmeye olanak sağlamıştır. Kentleşme süreci, yeni bir toplumun oluşmasına neden olmuş ve bu yeni sanayi toplumunun öne çıkardığı yaşam tarzı, hızlı üretim ve tüketimdeki artış gibi unsurlarla birlikte, doğal kaynakların bilinçsizce sömürülmesi ve insanın doğaya olan baskısını artırmıştır. Sonuç olarak, doğanın dengesi bozulmuş ve çevresel sorunlar kendini göstermeye başlamıştır. *Doğanın potansiyel değişikliklerine etki eden insan bu bozulma günlük tüketimi mükemmel yaşama geçişi olarak değerlendirip bozunma süresi boyunca olaylar meydana gelir. Aşırılığın yaşam tarzı olduğu çağımızda aşırı atık/çöp bizi geçmişteki bozulmaya karşı gelen bir tehlike haline dönmüştür* (Taşar, Bulat, 2021:494). Bu gelişmeler, ekolojik sorunların ortaya çıkmasına neden olmuş ve doğanın dengesizliği ile başa çıkmak için çözüm arayışları hız kazanmıştır.

Sanat da bu anlamda üzerine düşen görevi alarak insan doğa ilişkisini yeniden sağlamak ve doğanın yapı bozumuna kayıtsız kalmayarak sanatın konusu olarak işlemiştir. Sanat, doğanın güzelliklerini, karmaşıklığını ve kırılğanlığını ifade etmek için güçlü bir araçtır. Sanatçılar, doğanın çeşitliliği, manzaranın büyüleyici güzelliği ve ekolojik dengeyi çeşitli sanat disiplinleri aracılığıyla tasvir edebilirler. Ayrıca sanat, sorunlara dikkat çekme ve insanları bu sorunlar hakkında destekleme teşvik etme potansiyeline sahiptir. Sanatın ekoloji ile etkileşimi, yalnızca doğanın ve çevrenin ifadesi ile sınırlı değildir; Aynı zamanda insan bilincinin görünümüne de katkısı bulunur. Sanat, insanların doğal dünyayla olan ilişkilerini yeniden düşünmelerini, ilgilerini anlamalarını ve bu dünyayı koruma konusunda daha fazla sorumluluk hissetmelerini teşvik eder. İnsanlar, sanat yoluyla doğanın güzelliklerini ve kırılğanlığını keşfederek, doğa ile daha derin bir bağ kurma yoluyla oluşurlar.

Sanatçı form üretirken doğada ve çevresinde gördüğü nesnelere etkilenbilir fakat onu taklit etmeyi tercih etmez. Onu bir sanat nesnesine dönüştürmek için çalışır. Sanatçı zihninde canlandırdığı doğadan bir biçimi kendi iç dünyasında yeniden yorumlayarak şekillendirebilir. Bu onun uslubu olarak ortaya çıkar (Kaya, Bulat,2022:144).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Çevreyi ve sanatı algılamak için, sadece bakmak ve okumak yeterli değildir. Algılama süreci ezberlenmiş kavram ve öğrenilmiş yeteneklerden çok, bir oluşumu tüm saflığı içinde deneyerek deneyim sahibi olmaktan geçer. Algılama ise, çevredeki nesnel dünyaya ya da bir sanat eserine ön yargısız, tüm enerjimizle bakmak, onunla bütünleşerek genişlemek, oluşmak, bir anlamın ötekine yol açtığını, yeni fikirlerin eski fikirlerin yerini aldığını fark ederek bilinçlenme sürecidir (Bulat, M., & Aydın, B., S. B.,2019:479).

20. yüzyılın ikinci yarısından itibaren, Land Art, Yeryüzü Sanatı, Çevresel Sanat, Ekolojik Sanat gibi alternatif mekan arayışlarına yönelen ve çeşitli başlıklar altında tanımlanan sanatsal hareketler, doğaya karşı yeni bir duyarlılık getirmiştir. Bu hareketlere dahil olan sanatçılar, mevcut doğal süreç ve aktiviteleri ekolojik çevresel bağlamlara oturarak, doğayı sadece görüntüsü ya da malzemesi olarak değil, çevre duyarlılığını arttırmaya yönelik bir ilişkiler bütünü olarak sunmuşlardır. 1960'larda bu hareketlerin başlamasıyla, çağdaş sanat ve doğa ilişkisi bugün ekolojik bir anlayış doğrultusunda gelişmiştir. 1960'lar ve 70'lerin Arazi Sanatı veya Yeryüzü Sanatı çalışmaları Ekolojik Sanat'ın başlangıcını oluşturmuştur. Ancak bu dönemdeki çalışmalar genellikle çevre koruma veya yerel ekolojilere duyarlılık yerine sanatçıların egosunu ön plana çıkarmıştır. Sanatçılar, doğayı bir ortam veya mekan olarak kullanmış, biyo-bölgesel duyarlılık yaratma fikrinden uzak durmuşlardır. Bu durum, sanatın çevresel etkisi ve sanatçının bu etkiye karşı sorumluluğunu önemli hale getirir (Özer,2023, tez)

Bu dönemde sanatçılar, doğanın kendine ait malzemelerini kullanarak doğa içinde eserler üretmeye başlamışlar ve bu da doğa ile insan arasındaki ilişkinin sanat üzerinden yeniden şekillenmesine olanak sağlamıştır. Bu yaklaşım, ekolojik sanatın doğayı iyileştirici ve koruyucu bir bakış açısıyla ele almasını sağlamış, hem sanat eserlerinin çevresel etkilerini azaltmış hem de insan-doğa ilişkisine yeni bir boyut kazandırmıştır. Bu dönemde ekolojik sanat hem sanatsal bir ifade biçimi hem de çevresel aktivizmin bir parçası olarak ön plana çıkmıştır(Özer,2023)

Çağdaş sanat uygulamaları yakın tarihin fikirlerine ve düşünme biçimlerine karşılık gelmektedir. Bu sanatsal uygulamalar ve yaklaşımlar, tarihsel olarak dönemin özelliklerini yansıtmaktadırlar. Geleneksel anlayıştan ve disiplinler arası bir üretim sürecinin önünü açan çağdaş sanatla birlikte anlam, form, malzeme ve sunum tercihleri de değişmiştir(Daşkesen,2021:1286).

Çağdaş sanatın doğa ve ekoloji ile ilişkisi, günümüzde odak olarak aktivizm ve toplumsal sürekli yaratma amacını daha da ön plana çıkarmaktadır. Sanatçılar, sürdürülebilirlik, doğa koruma ve ekolojik katılımcıları bilinçlendirmek ve harekete geçirmek için projeler





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

üretmektedirler. Bu yaratım, doğa ve ekolojiyle ilgili çağdaş sanatın vazgeçilmez bir parçası haline geldiğini göstermektedir.

Bu anlamda hızlı sanayileşme ve kentleşme dönemi olan 21. yüzyılda, fosil yakıt ve toprak örtüsündeki değişiklikler sera etkisini hızlandırmıştır. Küresel iklim değişikliği tehlikeli bir şekilde ilerlemekte ve bir milyondan fazla türün yok olma tehlikesiyle karşı karşıya kalmasına neden olmuştur. Eş zamanlı olarak, Dünya yüzeyinin insan eliyle değiştirilmesi, türlerin yaşam alanlarında hızlı bir azalmaya yol açmıştır. İstatistiklere göre, küresel arazinin yaklaşık %17'si büyük ölçüde kentsel ve tarım arazisine dönüştürülmüş, %56'sı hafifçe kırsal ve banliyö alanlarına dönüştürülmüş ve yalnızca %26'sı bozulmamış geniş alanlı vahşi alanlar olarak kalmıştır. Üç arazi türü arasında, yoğun biçimde değiştirilmiş kentsel ve tarımsal alanlar genellikle biyolojik çeşitlilik kaybının sıcak noktaları olarak kabul edilir. Kentsel ve tarımsal alanlar tür değişimini engelleyerek ciddi izolasyona yol açmaktadır (Luo,Zhu, Wu, Zhang& Diğerleri, 2022).

Sanayi devriminden günümüze dek devam eden sürekli ekonomik gelişmenin bir sonucu olarak insanlar hala şehirlere göç etmekte ve bu da dünya çapında kentsel alanların hızla genişlemesine yol açmaktadır. Şehirlerin düzensiz genişlemesi, tarım arazisi açmak, ilaçlama, madencilik faaliyetleri, ormanların, sulak alanların, çayırın ve diğer doğal yaşam alanlarının tahribi veya dönüştürülmesi genellikle ekolojik arazilerin ağır kaybına yol açmakta, bu da doğal yaşam alanlarının sürekli kaybına ve parçalanmasına neden olmaktadır. Bu olumsuzluklar, ekosistemin önemli bir parçası olan bitkiler üzerinde olumsuz etkiler yaratmıştır. Bitkiler, doğanın bir parçası olarak hem estetik hem de sembolik değerler taşırlar ve ekolojik sistemin önemli bir parçasıdır. Bu nedenle ekolojiye birçok önemli katkı sağlayan ve ekosistemlerin sürdürülebilirliği açısından büyük öneme sahip olan bitkilerin azalması ya da tamamen yok olması ekolojik dengenin de bozulmasıyla aynı anlamı taşır.

Sanatçılar, doğanın korunmasına ve sürdürülebilir bir şekilde katkıda bulunmak için sanatlarını genişleterek birleştirerek yeni bir insan-doğa ilişkisinin inşasını geliştirerek bitkilerin ekosistemdeki önemini vurgulayan, Josept Beuys'un "700 Meşe ve Bazalt" projesi, Agnes Denes'in birçok bitki çeşidini barındıran "Yaşayan Piramidi" doğal yaşam döngüsüne sahip olarak da değerlendirilen heykeli . Mel Chin'in Kirli toprağı temizlemek için kullandığı bitkiler, Jacke Brookner'in suyu temizlemek için kullandığı bitki ve yosunlar, vb. sanatçıların bitkileri ele alan çalışmaları değerlendirilecektir.

Çevreci kimliğini “herkes sanatçıdır” düşüncesi ve sanatın toplumu iyileştireceği inancı ile birleştiren Beuys, “7000 Meşe” projesini oluşturur. Beuys’un Amacı küresel ısınma, doğanın bozulması gibi çevre sorunlarına dikkat çekmek ve önlem alınmasında sanatın önemli rol oynayacağını göstermektir (Huntürk, 2016:235).

Joseph Beuys'un sanat anlayışını, ekoloji ile sanatın ve toplumsal eylemin birleştiği bir perspektifi yansıtır. "7000 Meşe" projesi (Görsel 1), Beuys'un sanatının sadece izleyici ile eser arasındaki etkileşimden ibaret olmadığını, aynı zamanda toplumsal ve ekolojik bir dönüşüm aracı olabileceğini vurgular. Beuys'un bu yaklaşımı, sanatın sadece estetik bir deneyimin dağılımını geçebileceğini ve toplumun ve doğanın yenilenebilirliğine katkıda bulunabileceğini ifade eder (Bilir,

*Beuys, Ağacın başlı başına bir zaman kavramı olan yenilenme unsuru olduğunu düşünüyorum. Meşenin özellikle masif öz odunu olan yavaş büyüyen bir ağaç olması nedeniyle böyledir. Her zaman bu gezegenin bir sembolü, bir heykel biçimi olmuştur, (Joseph Beuys) (www.art-quotes.com).*

Beuys'un amacı, doğayı yeniden ağaçlandırmakla kalmamış, aynı zamanda bu kentsel bir eylem ve dönüşümün aracılaştırılmasını hedeflenmiştir. Projeyi izleyenler, ağaçların dikilmesi ve kalıcı olarak gözlemlenmeleridir. Bu proje, izleyicinin pasif bir birikiminin değişimini taşımış ve doğanın yeniden inşası ile toplumsal tanıtımı teşvik etmeyi amaçlamıştır.



**Görsel 1.** Joseph Beuys, 7000 Meşe ve Bazalt. 1982

7000 Meşe ve Bazalt projesi, Beuys'un sanatının toplumun ve çevre üzerinde dönüştürülebilir bir yaşamın sahip olabileceği yansımaları somutlaştırmıştır. Bu çalışma, ekolojik sanat ve sosyal heykellerini bir araya getirerek sanatın sadece galerilerde sergilenen

eserlerden kavramdan ibaret değildir, aynı zamanda toplumun ve doğal olarak yenilenebilirliğine katkıda bulunabileceğini gösteren bir örnektir.

Mel Chin'in, ekoloji alanında gerçekleştirdiği önemli projelerinden olan, "Toprak Canlandırma Alanı" (Revival Field) adlı projesini (Görsel 2) bir botanikçi gibi hareket ederek, toprağın ağır metaller ve toksik maddelerle kirlenmesi sorununu ele almıştır. Chin, toprağın zehirli atıklardan temizlenmesi için en etkili yolun ne olduğunu araştırmış ve bu süreçte topraktaki zehirleri absorbe edebilen bitkilerin önemini keşfetmiştir (Güven Ak, 2014:256). Chin, proje kapsamında, kirlenmiş toprakları temizlemek amacıyla bu bitkilerin ekimini gerçekleştirmiştir. Hiperakümülatörler olarak bilinen bitkiler, kadmiyum, çinko ve nikel gibi ağır metal toksinlerini topraktan, kök sistemleriyle emerek, gövde ve yapraklarında depolar. Bu bitkilerle, topraktaki ağır metalleri geri kazanma ve geri dönüştürme işlemi, yeşil iyileştirme olarak bilinir. Mel Chin bu yolla toprağa tekrar hayat vermek, yeniden canlandırıp yeşermesini sağlamak ister(Özer,2023:125-126).



**Görsel 2.** Mel Chin, Revial Field (Canlandırma Alanı), Minnesota, 1990

Mel Chin'in bu projesi, doğanın yeniden canlandırılması ve toprak kirlili sorunlarının çözümüne sanatsal bir bakış açısı getirerek, sanatın çevresel sorunların çözümünde etkili bir araç olabileceğini göstermektedir. Bu proje aynı zamanda insanların çevre sorunlarına duyarlılığını artırmak amacıyla önemli rol oynamıştır.

Brookner'in biyoheykel kavramını tanımlayan "Prima Lingua," adlı çalışması( Görsel 3), biyolojik malzemeler veya canlı organizmaların kullanıldığı bir heykel türüdür ve genellikle çevre ile etkileşime girme, değiştirme veya ekolojik süreçlere katılma amacı taşır. Bu proje, insan dili şeklinde bir volkanik taş üzerine oluşturulmuş bir ekosistem içerir. Ekosistem, kirli suyu temizleyen bitkileri ve mikroorganizmaları içerir, bu sayede su ve hava temizlenir ve atıklar besin maddelerine dönüşür. Bu heykelde bulunan yaşayan organizmalar, çevreyi

temizleyen ve sağlıklı hale getiren aktif araçlar haline gelirler."Prima Lingua" projesi, biyoheykelin çevresel etkileşim ve dönüşüm potansiyelini vurgular. Aynı zamanda, doğayı sanatın bir parçası olarak kullanmanın örneğini sunar. Bu tür çalışmalar, ekolojik sanatın ve çevre bilincinin artmasına katkıda bulunur ve sanatın çevre sorunlarına katkı sağlayabileceğini gösterir( Özer,2023:128).



**Görsel 3.** Jacke Brokner, Prima Lingua, 1996-2001

Agnes Denes, tüm eserlerinde olduğu gibi, Yaşayan Piramit'in de katılımcı yönüyle, yerel ve küresel çevremizi koruma konusunda etik bir sorumluluk duygusu uyandırmayı amaçlar. Sakıp Sabancı Müzesi bahçesinde oluşturulan eser doğal yaşam döngüsüne sahip bir heykel olarak da değerlendirilir. Sergi sonrasında Denes'in doğaya duyarlı yaklaşımını sürdürmek amacıyla izleyicileri bitkileri sahiplenmeye davet etmiştir Anıt, dağılıp yok olmak yerine, onu paylaşacak topluluğun sahiplendiği küçük parçalar üzerinden yaşamaya devam edecek. Denes'in Manifestosu ise, bu eserin oluşturulması için bir araya gelen mikro topluluğu ve Yaşayan Piramit'i hatırlatmaya devam edecek (Sakipsabancimuzesi).



**Görsel 5.** Agnes Denes, Yaşayan Piramit, Sakıp Sabancı Müzesi, İstanbul,2022-2023



Dani Karavan ise, bir kentin yeniden yapılanma sürecinde gerçekleştirdiği projesiyle, mekanın sergilenmesinde etkili bir rol üstlenen önemli bir sanatçıdır. Karavan, "Cergy-Pontoise'i Yvelines Vadisi'ne doğru bir kapı yapmak istiyorum" ifadesiyle, kentin dokusunu doğayla buluşturarak izleyiciyi sanat aracılığıyla doğaya ulaştırmayı amaçladığını açıkça belirtir (Görsel 6). Karavan, mekanın tarihsel, fiziksel, mimari ve doğaya ait verilerini yapıtına dahil ederek, kentliyi yaşadığı çevreyle ve doğayla bütünleştirmektedir (Şengülalp,Ergin Doğruer,2017:1354).



**Görsel 6.** Cergy Pontoise ve Çevresi'nin Doksan Metrekarelik Proje Maketi,1980



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ECOLOGY & ECONOMY CONFLICT IN THE CONTEXT OF SUSTAINABILITY

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#### ABSTRACT

The etymological origin of ecology is formed from the Ancient Greek roots "oikos-oikos" (home, close environment) and "lógos - λόγος" (word, discourse, word, understanding, expression, reasoning, logic). In other words, it means understanding and exploring the place where one lives (home). The etymological origin of economy is a compound of the same words "oikos-oiko" and "nomós-voμός" (management, to organize) in Ancient Greek. In other words, it is defined as "the management or regulation of the home or environment". Ultimately, the concepts of ecology and economy can be summarized as understanding and managing the living environment. It is possible to perceive the two concepts as part of a whole and a continuation of each other in terms of etymology. The common point of both economy and ecology can be expressed as the environment (living spaces) and human beings. Today, however, the two concepts have become contradictory and conflicting concepts due to the attribution of different meanings, contents, and perceptions in discourse and action. It is seen that the responsibility for this confusion lies not with ecology but with the perspective and paradigms on the phenomenon of economy. The global system is being shaped and evolved in line with the rules and interests of the global capital power that forms and manages the cornerstones of the economic system. At the last point, despite the complex problems experienced in the global economy, such as the blockage of production and consumption processes, deterioration of income distribution, excessive depletion of natural systems and resources, food crisis, climate change, etc., global collapse and chaos continue under the mask of sustainable development or economic growth. The vast majority of humanity suffers and continues to be exploited as a result of the exploitation of nature in line with their interests by the minority holding global economic power, seeing every way and method as permissible to gain rent, and gaining more profit and power. The capital-oriented economy, which has lost its naturalness, serves the monopolies in the minority more than people and adds strength to their power. The upsetting of ecological and economic balances in the world makes it necessary to address environmental, political,



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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cultural, and economic problems in a unity and continuity that affects each other. If there is a unique harmony and order among all living things in ecology, there should be a unique harmony and order among people in the economy and it should be implemented within the framework of ethical rules. Economy should always be guided by ecology. Because nature is the basis of ecology and human beings are the basis of the economy. Therefore, there is a need to explore and relate the economy of ecology and the ecology of economy, which are the safeguards of the natural system and life. This study aims to discuss the contradiction between economy and ecology in the discourse and action dimensions of the relationship between economy and ecology from a broad perspective and to foresee concrete actions.

**Keywords:** Ecology, Economy, Sustainability, Green Economy, Ecological Economy, Economic Ecology.



## **1. INTRODUCTION**

Man is a part of nature in which he lives with his physical existence and he needs nature to sustain this existence. The mutual interaction with nature during the satisfaction of these needs is in a sense an ecological dialogue (Bell, 2004:30). In this context, as a result of the obligatory relationship and interaction, human beings have destroyed, exploited, changed, shaped, and turned nature into an artificial space as a unilateral commodity in line with their own needs and demands. Mankind's tendency to dominate nature and consume at the maximum level has also led to irreversible negative effects (Gül & Kurdođlu, 2021). Economic activities and processes are long-term and complex processes that require the use of human and natural resources. Although the impact of economic activities on nature and the importance and relationship of nature/environment for the economy have always attracted attention, many topics such as the content, conceptualization, analysis, and harmonization of this relationship are still being discussed.

When the relations between ecology and economy are analyzed, it is seen that both have common basic concepts and principles. Ecology is the science that deals with the interrelationships that determine the regional distribution and quantity of organisms (Marshall, 1999: 175). Ecology, together with the concept of adaptation, is a concept linked to demography, development, behavior, and the spatial and temporal location of the organism (Ellen, 2016: 341). Economics, on the other hand, is generally recognized as the branch of science that investigates how scarce resources should be used to meet unlimited human needs. Between the 14th and 16th centuries, capital accumulation and activities based on slave labor in agriculture and colonialism in trade started in the early capitalist period. Subsequently, the growing capital accumulation led to the increase in financial movements and the formation of financial institutions such as banks and stock exchanges in countries such as England, Italy, and France as of the second half of the 16th century. Subsequently, financial capital accumulation based on speculation formed the basis of capitalism (Sée, 2004). Especially with the Industrial Revolution of the 19th century, capitalism became increasingly widespread and globalized. Within the capitalist view of society, the role of ecological assets or natural resources has been reduced to an instrumental value to meet a series of economic needs of people and as a source of production input for industry, and has become a "commodity" that can be bought and sold in the market (Barry, 1999, 214). The human-nature/environment relationship that has lasted for



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

centuries has led to the destruction of the environment over time, and as a result, it has become unable to meet the needs of people and has revealed global problems (Ulucak & Erdem, 2012). The capitalist mode of production treats ecological assets as an input of production and an element of consumption, rather than as parts of a system that supports life. For this reason, a wasteful economy that produces for consumption rather than for need is recognized as the real cause of environmental problems (Birdiřli, 2014).

Today, it is seen that certain power centers, global actors, or states, formed under the paradigm of modernism and globalization, act based on controlling, changing, and managing production-consumption relations with nature and other people in line with their interests. This situation is thought to lead to irresponsible use of natural resources, injustices, and inequalities (Gül & Kurdođlu, 2021).

Today, the harmony or disharmony of the relationships between natural systems and the multifaceted economic activities of humans determine and affect the future of both spheres of existence. Sustainability, which is the balance between meeting the needs of mankind today while ensuring that future generations can meet their own needs, is at the center of the conflict between ecology and economy.

This conflict arises from the frequent clash of interests in economic growth and environmental protection. It has become imperative for a more sustainable future to establish the right balance between these two basic concepts of sustainability in the dimension of discourse and action and to apply them in an ethical framework. For this, it requires a holistic association and discussion of phenomena such as epistemological, ethical, ecological, psychological, and ontological.

The aim of this study is to discuss the contradiction between economy and ecology in the discourse and action dimensions of the relationship between economy and ecology from a broad perspective and to foresee concrete actions.

### **2. Conceptual Framework of Ecology and Economy**

Conceptually, the words ecology and economy go back to Greek. The term ecology was derived by Haeckel in 1889 from the terms "oikos" (house, household, space) and "logos" (science). The etymological root of ecology is formed from the Ancient Greek roots "oikos-oikos" (house, close environment) and "logos - logos" (word, discourse, word, understanding, expression, reasoning, logic). In other words, it means understanding and exploring the place where one lives (home). The concept of the ecosystem was used by Elton in 1927 (Kıřlalođlu & Berkes, 1999: 36).



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

The etymological origin of economics is a compound of the Ancient Greek words "oikos-oiko" (house, household, space) and "nomós-voμός" (management, administration, order, law) and is adapted from the word "oikonomia". In other words, it is defined as "the management or organization of the house".

As a result, both concepts are based on a common ground. Ecology includes the relationship and interaction between humans and all living and non-living things, starting from the living environment. The economy, on the other hand, includes the production and consumption activities and management of all people from the household scale to the global scale. Ecology represents the whole with intensive relationships and interactions within subsystems. While the relationship density within subsystems is high, the relationship density between subsystems is lower. Living and non-living beings in the ecosystem are in a relationship of dependence. In this relationship, the food chain is fundamental for the maintenance of life. A problem that will arise in a part of this whole will also create problems for other living species in the subsystem. The extinction of a single species may not spread to the whole living world. However, it has primary important effects on other species that depend on that species for food (Lewontin, 2007: 129).

The totality of beings we call nature is a set of systems with very complex inputs and outputs designed in perfect balance and harmony with its producer, consumer, and decomposer components (Metin & Gül, 2020; Gül & Türker, 2014).

Ecology is the branch of science that deals with the mutual relations and interaction of all living and non-living beings and components within this system. Although today's modern economy is said to have started in the 16th century, the acquaintance of human beings with economic issues in civilization dates back to 8000 BC. Mankind, who had previously subsisted on hunting and gathering, transitioned to a settled society based on agriculture with the Agricultural Revolution that emerged in this period. Since this transition, human beings, even in primitive tribal life, have struggled to provide various goods to meet their basic needs and have created an exchange system. To meet the needs of primitive tribal life, human beings have tried to provide various goods they need, depending on a form of exchange in which goods are exchanged for goods, which we call the barter economy (Gür, 2013).

In the classical economics period starting with Adam Smith, the link between ecology and economy was not established and no contribution was made to this relationship. Although land



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

was considered a separate factor of production after labor and capital, ecological problems were ignored at that time (Gomez-Baggethun et al., 2010).

The economy is the complex process of how human societies produce, distribute, and consume resources to meet their needs. Economics is the branch of science that investigates how scarce resources should be used to meet unlimited human needs. Economics involves a range of factors such as production, trade, employment, inflation, growth, income distribution, and unemployment, and often interacts with social, political, and cultural dynamics. According to Adam Smith (1723-1790), who is regarded as the Father of Economics and Capitalism, economic life is individualistic and this individualism stems from the natural nature of human beings. Self-interest is the driving force for economic life. The person tries to reach the most satisfaction with the least effort (Paratici 2023). Economics: (economy science) is a discipline that studies economic activities. Economics studies the production, distribution, and consumption of resources and investigates issues such as economic decisions, businesses, markets, and the economic behavior of society. Economics develops economic theories and analyses economic problems.

There are fundamental differences between the concepts of ecology and economy (Table 1).





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 1.** Main topics in economy and ecology

Ecology (Nature)	Economy (Market)
It is a natural design phenomenon	It is a human design phenomenon.
Nature is a whole (Holistic approach).	The economic structure is a whole. However, the fragmentary approach is dominant
Nature is limited. It has a limited carrying capacity	Resources are scarce. However, maximum production and consumption are targeted. Carrying capacity is exceeded.
Nature has self-control (cybernetics is a theory that suggests that complex systems control themselves).	The free market creates and monitors itself (Market Cybernetics). However, in practice, supervision may involve a biased and inadequate approach. Fluctuations in the balance of supply and demand are possible.
In ecological systems, there is a relationship and interaction between all components. There is an interdependent situation	The economy system is mostly independent of each other, although there are relationships and interactions.
There is diversity and richness in ecology	The economic market is a system of many buyers and sellers. However, the minority with monetary power dominates the majority. This limits diversity and wealth.
Everything in nature is cyclical, that is, it transforms and contributes to the system. There is no purposeless component	Economy is based on income/expenditure, production/consumption, relations, and a priori and posteriori links. In practice, however, the process is linear rather than cyclical.
Everything in the system has material value as well as values that cannot be measured in money	Everything has a material cost.
Nature has found the most appropriate (optimal) solution. Intervention outside the system damages nature (backfire).	The maximum solution is produced for the dominant capital forces in the market. Any intervention in the market outside the system creates a crisis (backlash).
Nature finds its balance	The market comes to equilibrium spontaneously. It is regulated by the power that holds the capital power.
Competition between species is in favor of the ecosystem.	Competition between firms is in the interest of the market.
Each individual in nature has the potential to protect and sustain his/her organism (individual), species, and the ecosystem in which he/she lives	In a man-made economy, every entrepreneur thinks of himself/herself first and does not aim to protect other investors and ensure continuity.
Ecology is flexible and can maintain its functionality and improve negativities	The economy is not flexible and does not develop holistic mechanisms that can improve itself.
Since the ecological system is complex, it is much more difficult to understand and perceive	Since economic systems are human products, they are easier to understand and perceive.
The processes within the ecological system tend to change slowly and mitigating their effects	Economic systems can show rapid and different variations.



### **3. Sustainability**

Sustainability is an approach that includes the protection of natural resources and the environment and their utilization for future generations. Its main purpose is to ensure the rational and balanced use of natural and cultural resources to meet the needs of existing people within the framework of environmental, social, and economic principles. Sustainability generally focuses on three basic principles (Bostan & Gül, 2017; Gül & Kurdođlu, 2021).

- **Environmental Sustainability:** Environmental sustainability focuses on environmental factors such as the conservation of natural resources, protection of biodiversity, and reduction of environmental pollution. This principle aims to utilize ecosystems and natural resources sustainably.
- **Social Sustainability:** Social sustainability aims to preserve social and cultural values while promoting the well-being, justice, and equality of communities and people. This principle aims to improve the quality of life in societies and protect human rights.
- **Economic Sustainability:** Economic sustainability aims to utilize resources sustainably while promoting economic growth, job opportunities, and prosperity. This principle emphasizes the continuation of economic activities without harming future generations.

The balance between these fundamental principles is the key to sustainable development. When one principle prevails over others, sustainability can be threatened. For example, economic growth leading to excessive environmental damage or increasing social inequalities may jeopardize environmental and social sustainability.

The concept of sustainability has come to the agenda in international conventions and has been included in the legislation of many countries. Some International Conventions in which the concept of sustainability is included; Brundtland Report published by the World Commission on Environment and Development in 1987, Agenda 21 (1992 Rio de Janeiro), United Nations Sustainable Development Goals (2015), United Nations Global Compact (UN Global Compact), Rio+20 Declaration (2012), United Nations Conference on Financing for Sustainable Development (Addis Ababa Programme of Action) (2015), Convention on Biological Diversity (1992), Convention on the Law of the Sea (UNCLOS), EU Green Deal (Greenddeal) Agreement (2019), United Nations Framework Convention on Climate Partnership (UNFCCC), etc.



#### **4. Economic Systems and Applications:**

The historical process of economic systems in the world until today can be summarised as follows;

- Stone Age Economy (2.5 million - 10,000 years ago BC): (hunting, gathering, and simple agricultural activities, etc.)
- Ancient Economies (3000 BC - 500 AD): (Settlements, agriculture and trade, etc.)
- Feudalism in the Middle Ages (500 - 1500 AD): Divisions between landowners (nobles) and peasants in Europe, economies based on agriculture and limited trade)
- Renaissance and Commercial Revolution (15th Century - 18th Century): (Art, science, and trade in Europe, discoveries and establishment of overseas colonies, international expansion of trade and laying the foundations of capitalism, etc.).
- Industrial Revolution (18th Century - 19th Century): (Development of industrial capitalism, machine-based mass production from handmade production, urbanization, the emergence of the working class and new economic relations, etc.).
- 20th Century and After World Wars, major economic transformations, Keynesian economic policies and welfare states, ideological struggles between capitalism and communism, neoliberal economic policies in the 1980s, free market economy, etc.).
- 21st century: 2008 global economic crisis, technological advances, digitalization, globalization, environmental problems, climate change, carbon emissions and sustainability, green economy, etc.)

#### **5. Global Economic Models and New Approaches**

The economic market in the world today has a complex economic system and different countries adopt and apply different economic models.

- Capitalism (private ownership, free market, high-profit target, competition, monopolization, etc.)
- Socialism: (Public ownership, planned economy by the state, social equality in the distribution of income and wealth, etc.)
- Mixed Economy Systems: Combination of free market + state, state intervention in social welfare, encouragement of private sector and competition, combination of freedom and social objectives, targeting market freedom and social objectives, etc.)
- Other economic theories: Sharing Economy, Co-operative Economy, Green economy, etc).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Green Economy:** The green economy has emerged from the sustainable development approach. It considers fairness and equity, where sustainable economic development is achieved in combination with reducing environmental risks and ecological constraints without degrading the environment. Transition to a low-carbon economy, widespread use of renewable energy resources, efficient use of existing natural assets, and inclusiveness form the basis of the green economy (Enerjisa, 2022). It is an approach that aims to use natural resources sustainably, reduce environmental impacts, and increase social welfare.

The main features of the green economy;

- Environmental Sustainability:
- Clean and Renewable Energy,
- Circular Economy:
- Green Technology and Innovation,
- Social Welfare,
- Healthy and Clean Food
- Policy and Regulations
- Localization
- Equality and Justice
- Environmental Protection
- Productivity
- Inclusion and participation
- Green Investments
- Energy Transformation etc.

**Ecological Economy:** It has been developing as a modern movement since the late 1980s and various perspectives have been developed, recognizing that the modern environmental crisis is integrally linked to the way the economy functions (Spash, 1999; Lele, 1991). Ecological economy argues that environmental/ecological resources should be protected 'for their own sake', irrespective of individual welfare, because ecology is also part of the whole ecosystem and deserves an equal right to its survival (Daly & Townsend, 1993).

It is an economic model that rethinks and develops traditional economic approaches with a focus on environmental sustainability and the conservation of natural resources. This approach aims for more than just material growth and profit-making in the economy. The ecological economy offers an economic approach that takes into account longer-term and environmental



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

impacts compared to the traditional economy. This approach aims to harmonize people's economic activities with environmental sustainability.

Principles of ecological economy;

- Sustainability,
- Ecological Footprint,
- Circular Economy:
- Natural Capital
- Social Welfare etc.

The acceptance of ecological economy as both an alternative and complementary paradigm shows that neoclassical and ecological economy will further diverge and that there is a field that can be further explored (Zengin Taşdemir, 2021).

**Economic Ecology:** It is an approach in which economic systems and their environmental impacts are analyzed together. It investigates the effects of the economy and the environment on each other and the consequences of these interactions on the sustainability of natural resources and environmental sustainability. Economic ecology focuses on the environmental consequences of economic decisions and emphasizes the need to include environmental variables in economic models. Economic ecology reminds economic decision-makers of the need to consider environmental sustainability and emphasizes the limits to economic growth and the finite nature of natural resources. This discipline aims to ensure a balance between the environment and the economy and is important for the construction of a sustainable future.

- Environment-Economy Relationship
- Environmental Costs
- Sustainability
- Environmental Policies and Regulations
- Environmental Inequalities etc.

### 6. Basic Principles of the Ideal Economy System

The economy has different priorities depending on the values, goals, and needs of a society. In general, the basic approaches of the ideal economic system are;

- Equality
- Right and Justice
- Ecological Sustainability
- Ethical Standards



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Sharing Economy
- Merit and Fair Opportunities
- Social Welfare and Human Rights
- Ensuring Dynamic Balance
- Creating an Environment of Trust
- Creating an Equal and Fair Competition Environment
- Long-Term Sustainability against Short-Term Profit
- Having effective and competent legal regulations
- Having Environmental Protection Policies
- Creating a Conscious and Responsible Production and Consumption Culture.

### 7. Economic Activities

It includes the diverse and complex activities that constitute the functioning of a society or economy and create economic value. These activities show how resources are used in the processes of production, distribution, and consumption and how they circulate in the economic cycle. These activities form the basic cycle of the economy. Production activities start with the processing of raw materials or the production of products. Distribution activities involve the transport of manufactured products to markets, shops, or consumers. Finally, consumption activities involve individuals, businesses, and public organizations using these products and services.

Economic activities are generally divided into three main categories;

- **Production Activities:** (Agriculture, Industry, Manufacturing, mining, energy production, Construction activities, etc).
- **Distribution Activities:** (Trade, Transport, Warehousing and Logistics, Distribution and Supply Chain Management etc).
- **Consumption Activities:** (Individual, Institutional, Public, rubbish, waste and residues, etc).

Economic activities affect the growth, functioning, and welfare of an economy. These activities affect how resources are allocated, the efficiency of production processes, how prices are formed, and consumption preferences. Therefore, economists and policymakers use various economic indicators and policy instruments to understand and guide economic activities.

However, an economic understanding that produces for consumption rather than for need in economic activities leads to the emergence of environmental problems as environmental assets





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

are seen as a commodity or commodity that can be bought and sold in the market (Birdiřli, 2014).

The main problems arising from economic activities are; increased carbon emissions and climate change, use of fossil fuel-based energy resources, destruction of natural ecosystems and habitats, reduction of biodiversity, soil, water, and air pollution, increase in settlements and construction, increase in waste and residues, erosion, land degradation, improper land use, etc. Some of the facts associated with these negative consequences on a global scale can be summarised as follows (United Nations, 2023).

- The Group of 20 major economies (G20) accounts for 78% of global greenhouse gas emissions.
- The extraction and processing of materials, fuels, and food contribute half of total global greenhouse gas emissions and over 90% of biodiversity loss and water stress.
- The combined emissions of the richest one percent of the global population are larger than the combined emissions of the poorest 50 percent.
- Demand for natural resources is at an all-time high and continues to grow -- for food, clothing, water, housing, infrastructure, and other aspects of life. Resource extraction has more than tripled since 1970, including a 45% increase in fossil fuel use.
- The energy supply sector (electricity, heat, and other energy) is the largest contributor to global greenhouse gas emissions, responsible for approx. 35% of total emissions.
- Currently, around 80% of global energy and 66% of electrical generation are supplied from fossil fuels.
- Chemicals account for about 10 percent of world trade. The turnover of chemical sales worldwide was € 3,347 billion in 2018. World chemical sales are expected to reach €6.3 trillion in 2030, with China accounting for 44% of these sales (Sanayi Genel M¼d¼rl¼ę¼. 2020).
- Every year, approximately 100-150 thousand living species become extinct and the delicate balances in the ecological system are deteriorating day by day
- Hundreds of millions of tonnes of cyanide wastes containing highly toxic cyanides and various valuable elements such as gold, silver, iron, sulphur, copper, lead, and zinc are produced and discharged into tailings dams every year (Dong et al., 2021), etc.



## **8. Basic Conflicts Between Ecology and Economy Practices**

It is foreseen that there is a struggle or conflict between the economic production and consumption relations in the pursuit of "maximum profit" in the short term in the economic growth targets of countries and the necessity to protect and maintain natural systems and resource values. The main reasons for this conflict or struggle are:

**a. Widespread Rant System** (Rant system is the name of the system formed by the activities of obtaining an income by influencing the political power and bureaucracy by organizing as an individual or interest group).

The rant system is very dominant in today's economy and is perhaps the most important cause of the conflict. In the order of capitalism and globalization, capital develops in the formation of profitability or rant. The rant system refers to the situation in which certain communities and interest groups manage and direct the economy to gain high profits by gaining control of resources without creating social value. The rant system thus leads to multifaceted negativities such as economic injustice, increased unethical behavior, and misuse of resources.

Individual business enterprises prioritize short-term profit over long-term ecological sustainability. This leads to excessive consumption of natural resources, ignoring environmental externalities and ecological degradation. The multifaceted problems and crises in the economy on a global scale have accelerated the emergence of new financial instruments. For example, the creation of a carbon economy, carbon tax, and carbon stock exchange under the name of combating the climate crisis strengthens the view that new products and new rents are created for financial markets.

### **b. Problems in the Spatial Planning/Design and Management Process**

- It is the wrong and improper planning, management, and utilization of land resources, which are the basic capital of the economy and where human activities are carried out.
- Failure to reflect ecological data holistically to the decision-making process in the spatial planning/design process
- Giving more priority to economic investments and development by politicians, administrators, and decision-makers in the process of spatial plan decisions,
- Failure to identify the monetary value of ecosystem services and contributions of natural resources and integrate them into the spatial planning decision-making process, etc.

### **c. Global Production and Consumption Activities**

- Economic investments and businesses prioritize short-term and high profits,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Excessive production and consumption targeting practices that ignore environmental externalities and contribute to ecological degradation,
- Failure to consider the natural environment in industrial production and consumption activities.
- In the economy, the idea that natural resources can be used unlimitedly and the idea of dominating nature is widespread, the economic value of the resources obtained from nature is considered zero and they are not included in the production process,
- Technological developments and products that are not compatible with nature lead to an increase in waste and residues after production and consumption
- Increasingly widespread "use and discard" consumption
- Wastage is widespread and waste and residues are not utilized,
- Individuals and societies do not have conscious and ecological production and consumption awareness, etc.

### d. Legal, Institutional, and Administrative Inadequacies

- Lack of effective and competent state ecological policies for nature conservation
- Inadequate legal regulations on nature and environmental protection and inadequacies experienced in practice,
- Allocation of natural areas protected by law for other purposes,
- Lack of effective and sufficient control and supervision mechanisms in the economic sector,
- Inadequate quality and quantity capacity of state institutions
- Inadequate supervision and control mechanisms of official institutions for nature/environmental protection
- Lack of ethical responsibility in economic activities.
- Non-application or arbitrary application of environmental impact assessment in all economic activities, etc.

## 9. CONCLUSION and RECOMMENDATIONS

The common point of the concepts of ecology and economy can be expressed as the environment (living spaces) and human beings. However, today, the two concepts have become contradictory and conflicting concepts due to the attribution of different meanings, contents, values, and perceptions in discourse and action. It is seen that the responsibility for this confusion lies not in ecology but in the perspective and paradigms of the economy. Today, the



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

harmony or incompatibility of natural (ecological) systems and the relations resulting from the multifaceted economic activities of humans determine and affect the future of both areas of existence.

The global economy is shaped and evolving in line with the rules and interests of the global capital power that governs the system. At the last point, despite complex problems such as the blockage of production and consumption processes in the global economy, deterioration of income distribution, excessive depletion of natural systems and resources, food crisis, climate change, etc., global collapse and chaos continue under the mask of sustainable development or economic growth. The vast majority of humanity suffers and continues to be exploited as a result of the exploitation of nature in line with their interests by the minority who hold the global economic power, seeing every way and method as permissible to gain rent, more profit, and power.

The capital-oriented economy, which has lost its naturalness, serves the monopolies of a minority rather than human beings and adds strength to its power. Every economic production and consumption activity creates damage and pressure on the natural environment. Interventions in nature without understanding the basic principles and laws of ecology cause destruction and heavy costs in a later period. The upsetting of the ecological and economic balances in the world makes it necessary to address environmental, political, cultural, and economic problems in a unity and continuity that affects each other.

Understanding the natural order is a fundamental tool for understanding the economy, more precisely the market economy. Natural resources are a habitat not only for humans but for all living things.

Just as there is a unique harmony and order among all living things in ecology, there should be a unique harmony and order among people in the economy and it should be implemented within the framework of ethical rules. The economy should always be guided by ecology. Because ecology is based on nature and economy is based on human beings.

Although studies are carried out with the initiative of the United Nations for the protection of nature and the environment on a global scale and the concept of "sustainability" is emphasized in many international conventions, it is seen that the desired success has not been achieved. The most important reason for this is that the approaches of some countries to the protection of the environment consist of theory, ecological policies cannot be produced and implemented.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Countries should create ecological state policies that are sustainable, applicable, and free from any kind of rent system approach of nature/environment and guarantee them with legal regulations. Sustainable Development should be prioritized as Ecology>Social>Economy and ecological policies should be adopted and implemented. (ecological policy is the art of reconciling biological facts with the wishes of individuals, society, politicians, and institutions). Today, growth is the main objective for all economies. Economic growth should be considered as growth integrated with the environment, focusing on the benefit of all humanity. If growth causes losses due to environmental degradation, it should not be recognized as growth. The approach of polluting first and cleaning up afterward "*react-and-cure*" as an economic growth strategy has collapsed until today. Instead, the strategy of "*anticipate-and-prevent*" should be targeted by preventing adversities.

Today's individual and social corruption requires the questioning of the "Economy-Ethics" relationship and Production-Consumption relations due to the rapid and wide coverage of the supply-demand issue. "It is an important deficiency that human beings, who are "SOCIALISED" through production, "POLITICALISED" through distribution, and "INDIVIDUALISED" through consumption, cannot establish universal ethical rules in the economic dimension".

Economic and political ethics will also accelerate the transformation and development from individual morality to social morality.

Suggestions for preventing problems and conflicts between ecology and economy;

- ❑ In spatial planning and management processes, natural resources should primarily be protected and conservation-compatible use purposes should be preferred and implemented.
- ❑ The spatial decision-making process should be based on ecological, scientific, and technical approaches.
- ❑ The rent system caused by the capitalist production and consumption system, which forms the basis of the conflict between ecology and economy, must be prevented. For this
  - Administrators and politicians should be determined according to merit.
  - Auditing, transparency, and accountability mechanisms must be developed.
  - Effective and holistic regulations should be made and implemented for economic activities.
  - Fair tax reforms should be established.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Fair policies for land reforms must be developed.
- Sustainable protection policies should be established for public spaces.
- Fair competition policies should be established to prevent monopolization and rent system.
- The media must be honest and impartial and reflect the truth to the public.
- The rule of law must always be ensured and applied equally. etc.
- ❑ Environmental Impact Assessments should be carried out for all spatial activities and more effective mechanisms that can be implemented and audited should be developed.
- ❑ Standards for environmental regulations should be established and implemented.
- ❑ Performance indicators of environmental activities of economic enterprises should be determined and performance reporting, monitoring, and evaluation should become mandatory.
- ❑ Green technologies should be used and incentivizing Green R&D, financial support and incentive mechanisms should be established,
- ❑ Environmental costs should be internalized. Environmental impacts should be included in the accounts of economic enterprises.
- ❑ Environmental values should be included in national income accounts under "Green National Income Accounting". A new concept of savings in national income accounts that takes into account the destruction of the natural environment or includes environmental depreciation in national savings should be discussed (Yücel, 2003).
- ❑ Environmental protection and R&D units should be established in the private sector.
- ❑ Economic enterprises should be audited by the State and independent NGOs.
- ❑ Localism should be prioritized in the economy. Local economy should be encouraged and co-operatives should be prioritized.
- ❑ The small minority holding the power of economic capital in the world (International Companies, Wealth Funds, Mafia, international organizations and clubs, governments, Politicians, Institutions and Organisations, etc.) must first all believe in it, accept it, and have an ecological vision within the scope of ethical and social responsibility.
- ❑ The main ACTORS with minorities in economic activities and financial power should be accountable to the majority and more effective supervision and protection mechanisms should be established.
- ❑ Eco-ethical business practices should be prioritized.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Economic ethical practices should be encouraged in all business sectors and penalty and reward strategies should be developed.
- In terms of discourse and action, it is a vital issue that this responsibility should be carried out simultaneously and in a guided manner by all stakeholders from the upper scale to the lower scale.
- Ecological or nature-oriented education and awareness levels should be increased.
- Ecologically oriented community organizations should be encouraged.
- The number of non-governmental organizations should be increased and they should be made effective.
- Ecological literacy should be developed in schools.
- Cooperation between all national and international stakeholders should be developed.
- A science-based, participatory, and long-term approach should be preferred in economic activities.
- Individuals and society should adopt and practice a lifestyle of production and consumption in harmony with nature.

For a fair, balanced, and sustainable economic system, humanity can understand the essence of nature adopt a lifestyle in harmony with nature in discourse and action, and take social responsibility.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### UYGARLIKLARDA ÇÖLÜN SANAT'TA VAR OLUŞU

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#### ÖZET

Doğa, insanoğlunun var olmadığı zamanlardan beri, bazen görünür ve bazen de görünmez devinim içerisinde. İnsanoğlu da doğanın bir parçasıdır ve kesin sınırlar ile birbirinden ayrılamazlar. Tıpkı sanat ve doğa ikilisi gibi birbiri içinde gizlenmiş iki kavram birbirine bulanmış olarak düşünülür. Doğaya ve çevreye sanat gözüyle bakmak sanatsal öğrenmenin tarih boyunca sanatçıları etkilenmiştir. Sanayileşmenin etkisiyle doğadan uzaklaşma olsa dahi doğanın büyüleyici etkisi insanları hep dönüp dolaşıp yine yeniden kendine hayran bırakmıştır. İnsanların özellikle de sanatçıların doğaya olan ihtiyaçları hep olmuştur. Soyut sanat kavramı ile doğadan kopmayı başardığını düşünen eser sahibi, eserlerin yine doğadan etkileşimle ortaya çıktığını fark etmiştir. Oysa ki insanlık tarihine bakıldığında, insanın yaptığı çalışmalarda ve ürünlerde sürekli bir değişim ve gelişim gözlenmektedir. Örneğin mağaraları kendine mekan yapan insan, mağara duvarlarına yaşam serüvenlerini resimlerle, sembollerle ve şekillerle ifade eden insanoğlu bugünün dev boyutlu gökdelenlerine ulaşan mimarlık yapıtları veya heykel sanatının izlediği gelişim ve değişimin somut bir örneğidir. Peru bölgesi insanları tarafından yaratılmış olan, Antik Nazca çizgileri, tapınma, bereket ve bolluk için yaratılmış küçük taşlarla meydana getirilmiş dev figürleri, ilk Arazi Sanatı üretimlerinin atasını oluşturmaktadır. Doğanın kendisi bir sanat eseridir, doğada var olan süreklilik, (varoluş ve yok oluş) sanatın en güzel örneğidir. İlk çağdan günümüze tüm tarihsel süreçte insanoğlunun yaşadığı mekânları oluşturma ve düzenleme girişimi ve arzusu 'kır/doğa' sanatında önemli bir yere sahip olan doğanın sanatçıya sunduğu sınırsız sayıda şekil, form, renk ve bu kavramlar arasında oluşmuş sayısız ilişki, insanı hayrete düşürecek görsel albeniyle sanat eserleriyle doğada akıl almaz güzelliklerle sanatla var olmuşlardır.

**Anahtar Kelimeler:** Doğa, jeolifler, Sanat



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE EXISTENCE OF THE DEESERT IN ART IN CIVILIZATION

#### ABSTRACT

Nature has been visible and sometimes in invisible movement since when human beings do not exist. Mankind is also a part of nature and cannot be separated from each other with certain limits. Just like art and nature duo, two concepts hidden in each other are considered to be blurred. Looking at nature and the environment through the eyes of art has been influenced by artists throughout history. Even though it is far away from nature due to industrialization, the fascinating impact of nature has always turned around and fascinated itself again. People, especially artists, have always been the needs of nature. With the concept of abstract art, the owner of the work managed to break away from nature and realized that the works emerged with interaction from nature. However, when we look at the history of humanity, there is a constant change and development in the works and products of human beings. For example, human beings who make the caves space for themselves, the cave walls with paintings, symbols and shapes, expresses a concrete example of the development and change followed by the art of architectural works that reach today's giant skyscrapers. The ancient Nazca lines created by the people of the Peru region, the giant figures formed with small stones created for worship, abundance and abundance, formed the ancestor of the first land art productions. Nature itself is a work of art, the continuity that exists in nature (existence and extinction) is the best example of art. From the early age to the present day in the whole historical process, the attempt to create and regulate the places where mankind lived and the desire of 'Rural/Nature' has an important place in the art of nature offers the artist with the unlimited number of shapes, forms, color and numerous relationships between these concepts, the artist with the visual alben will astonish the artist. With their works, they have existed with art with unimaginable beauties in nature.

**Keyword:** Nature, Geolifs, Art





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sanat (Bulat, S. Bulat, M., Aydın, B., 2014), toplumların geçmiş kültürlerinden esinlenir ve yeni bir söylem geliştirerek, gelecek kuşaklara sanat yapıtları vasıtasıyla kalıcı izler bırakır. Yazar konuyla bağıntılı olarak; *“Sanat, toplumun diğer alanlarındaki yaratılarıyla birlikte gelişmekte, onları etkilemekte ve onlardan etkilenmektedir. Yeni toplumun sanatçısı, yeni duygu ve düşüncelerini biçimlendirmede dilini yaratmada, yeni teknik ve malzemelerden yararlanmaktadır. Bu yeni teknik ve malzemeler sanatçıyı yeni plastik dil yaratmaya itmekte ve sanatta iki yanlı bu alışveriş ve etkilenme hep devam etmektedir”* görüşleriyle açıklık getirmektedir (Yağmur, Bulat, Aydın, Ö., S., B., 2014)

Yazar sanatçıyı, *“Sanatçı kimdir? sorusuna sanatın bugün geldiği noktayı esas alarak-verilecek çok sayıda cevap vardır. Tarihte sanatçı figürünün ortaya çıkışına dair bir başlangıç noktası bulmak mümkün değildir. Elbette kolaycı akıl yürütmeye, olma/oluş hali bağlamında düşünüldüğünde sanatçının varlığı ile sanatın ortaya çıkışının eş zamanlı olduğu söylenebilir. Ancak bir bilgi nesnesi olarak sanatçının varlığının en azından adıyla kayda geçirilmesinin tarihi sanat kadar eski değildir.”* (Küçüköner, F., Özkul, T., D.2022)

İnsanoğlu, doğada varlık bulan ve yaşamını sürdürebilmek için de doğa ile ilişki kurmak zorunda olan bir canlıdır. Doğa beslenme barınma ve bir “anne” rolünde insan varlığının yerini bulmasına ve anlamasına yardımcı olan onun ayrılmaz bir parçasıdır. Farklı kültürlerde tarih boyunca insan, doğaya tapar, ondan nefret eder, onu kutsallaştırır ve aynı zamanda yok eder. Yazar toplumlar konusunda da; *“Süreç içerisinde maruz kalınan ve bazı durumlara bağlı olarak yaşanan savaşlar, yer değiştirmek zorunda kalan topluluklar gittikleri yerlere beraberinde anlayışlarını da götürmelerine sebep olmuştur”* ifadelerini öne sürer (Taşar, 2021, s.489).

İlk insanoğlunun yapmış olduğu gibi avlanmak, tapınmak için, güdüsel olarak, tabiat ile birlikte kendisi ve tüm canlıların geçiciliğini vurgulamak için, kimi zamamanda tabiat karşısında varlığını ortaya koyma çabası ile doğaya ve geleceğe iz bırakmak istemişlerdir. Doğa ve sanat ilişkisinden kaynaklanan uygulamaların başlangıcını meydana getiren ilk çağ dönemi kanıtları araştırılınca inanılmaz görsellerle karşılaşmıştır.

Doğa sanatı insanoğluna, yeryüzündeki ekolojik dengenin korunması ve sürdürülebilirliği için doğaya dönülmesi ve ona saygı gösterilmesinin önemli olduğunu İnsanın doğa ile iletişim kurmasını aynı zamanda onun estetik algı düzeyine katkıda bulunarak doğa (kır) sanatın içinde var olarak üretilen ve beğenilen sanattan farklı olarak doğayla tanışmak doğayı deneyimleyerek insan yaşamının sıkıştırılmış olan yaşamını genişletmektir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bu anlamda ekolojik sanat çalışmaları da ekosistem içindeki bütünü koruması ve doğayla insan birlikteliğinin tekrar dengelenmesini sağlama amacındadır. Sanatçıların doğaya yaptıkları iyileştirici müdahaleler bir armağan etme durumu olarak nitelendirilir (Yağmur&Özer,2022:454)

Yazar konu ile bağlantılı olarak; *“Güney Nevada'dan Kaliforniya Körfezi'ne kadar Colorado nehri boyunca dağ aslanlarını, kuşları, yılanları ve tanımlanamayan hayvan benzeri figürleri ve geometrik şekilleri tasvir eden 200'den fazla dev figür toprağa oyulmuştur. 1932'de Las Vegas, Nevada'dan Blythe, California'ya giden bir uçuşta pilot George Palmer tarafından 100 metreden uzun bir insan figürünün ana hatları fark edilmiştir. 1952'de National Geographic konuyla ilgili bir makale yayınlamıştır. Bu makale için yapılan saha çalışmasında ondan fazla gravürden oluşan başka bir küme keşfedilmiş ve Ripley Grubu adı verilmiştir”* (Leska, A., 2008) görüşlerini dile getirmektedir.

Dünya üzerindeki gizemli insan izlerinden biri olan jeolifler/ Nazca Çizgileri, Peru'nun güneydoğusunda, ülkenin başkenti Lima'ya yaklaşık 450 km uzaklıkta bulunan Nazca Çölü'nün ve And Dağları'nın kıyıya bakan eteklerine kazınmış dünyanın en kurak bölgesinde bulunmaktadır.

Nazca Çizgileri/jeoglif, 1927'de Perulu arkeolog Toribio Mejía Xesspe tarafından, ayrıntılı olarak inceleyen ve rapor eden ilk kişidir. Mejía'nın bölgeye gelişinden önce bu çizimlerden yalnızca İspanyol fatihler haberdardı. Pedro Cienza de León, 1553 yılında “Crónica del Perú “adlı bir kitap yayınladı ve bu kitapta, bölgenin eteklerinde bulunan dağlık yükseltiler sayesinde görülebilen Nazca bölgesinin topraklarında bu izlerin varlığından bahsetti. Sonrasında da Luis Monzón bu hatların yol olması gerektiği vurgulamıştır.

Ancak Nazca Çölü'nün kurak topraklarındaki bu izlerin gerçek boyutu ancak dört yüzyıl sonra keşfedildi. Mejía, neredeyse 400 yıl önce Pedro Cienza'nın gördüğü çizgilerin aynısını fark ettikten sonra, Nazca Çölü'nün çizgilerinin belgelemesini sağlayan şeyin ancak havadan keşiflerin olmasıyla mümkün olduğunu Çizimlerin çoğu sadece 20 km<sup>2</sup> üzerinde yoğunlaşmasına rağmen, yukarıdan bakıldığında bu işaretlerin ortaya çıktığı 150 km<sup>2</sup>'lik devasa alanı gözlemlemek mümkün olmasındı.

Amerikalı arkeolog Paul Kosok 1939 'da Nazca Çölü üzerinde bir keşif uçuşu yaparak ilk fotoğraflarının çekimlerini gerçekleştirmiştir. Alman matematikçi ve arkeolog Maria Reiche (1903-98), 1940'tan başlayarak Nazca Çizgilerini araştırdı ve onların tanınmasına yardımcı oldu. Nazca çizgilerinin çölün üst tabakasındaki koyu renkli kumun kazınıp alt

tabakadaki açık renkli kumun ortaya çıkarılmasıyla oluşturuluyordu ifade etmiştir. Bu sayede, toprağa kazınan çizgisel desenler kolaylıkla fark edilmektedir. Burada elde edilen bulgular Maria Rieche'nin tezini desteklemektedir. Çizimlerin, dinî sembolizm kaynaklı olduğu görüşleriyle beraber sulama sistemine yönelik bilgileri yaşayan insanların tarımsal tercihlerinin su ile şekillendirildiğini gösterdiği de varsayılmaktadır. Diğer yandan kuşların, örümceklerin ve bitkilerin bereketi betimlediğini anlatan bilim insanları da bulunmaktadır. Diğer bilim insanları ise, burada yer alan geometrik biçimlerin, yağmur ritüeline ilişkili olacağına ileri sürmektedirler.

Yaklaşık 2400 yıl boyunca, Peru'da varlığını sürdüren ve günümüze kadar gelmiş olan, Nazca jeoliflerin korunmasında bölgenin çöl, rüzgâr etkisinin çok az olması nedeniyle, yapıtlar korunmuştur.



**Görsel 1.** Peru'da bulunan Nazca Çölü'nün, Palpa Jeolifler, insan figürleri

Nazca çizgileri, ikonik çizgilerdir ve farklı yerlerde bulunurlar. Oysa Paracas jeolifler yamaçlara yerleştirilmiş ve aşağıdaki köylere görünebilir hale getirilmiştir. İkisi de farklı sanatsal konuları ele alır. Nazca jeolifleri, çoğunlukla, hayvan figürlerinden ve geometric formlardan meydana gelirken, Paracas bölgesindeki figürlerinin çoğu insanları betimlemeleri biçimindedir.

İnsanlar, dağların düz yüzeylerini ve tepelerin yamaçlarını, devasa geometrik şekiller ve insan tasvirleri çizmek için kullanmışlardır. Bugün arkeologlar bu figürlerin; depremler, kuraklık ve sel gibi doğanın güçlerini kontrol ettiğine inanılan antik tanrıları memnun etmek için yapıldığına inanmaktadırlar. İtalyan arkeolog Giuseppe Orefici, 1983 yılında

Cahuachi’de uzun bir kazı projesine başlamış ve kazılarda büyük bir mezarlıkla karşılaşmıştır. Nazca bölgesinde bulunan mezarlıklarda, yaklaşık olarak otuz bine yakın insan gömülüdür ve bunların bazıları mumyalanmıştır.

Orefici, uzaktan görüntüleme yöntemleriyle, Bölgedeki jeoliflerin sayısının 1500’den fazla olduğunu ortaya çıkarmıştır. Bunların ekseriyeti helezonik, değişken eşkenarlı, mızrak zikzak gibi anlamı bilinmeyen geometrik figürlerden oluşmaktadır. Bunların yanı sıra, bölgenin yaşam popülasyonu içerisinde bulunan hayvan ve bitki figürleri ve hayal ürünü olduğu düşünülen birtakım yaratık çizimleri de tespit edilmiştir.

Jeoliflerin Ay, Güneş ve bazı yıldızların durumlarını göstererek tarım işlerinin sıralamasını dönemsel olarak şematik bir yapıyı takipte kullanılmaktadır. Bu düşünce şekli insan dışı canlıların betimlemeleri diğer çizimlerle ilgili bulgular açıklayamamış, yıllar sonra, Columbia Üniversitesi Amerikalı arkeologlarından, William Duncan Strong, 1950 yıllarında, bu jeoliflerin yaratıcılarının yaşadığına inanılan Cahuachi şehrinde ilk kazıları başlatmıştır. Burada idame dini yaşam ve sosyalleşme alanları kazılarda gün yüzüne çıkartılmıştır.



**Görsel 2.** Paraca/Andes Mumluğu (Şamdan, Paraca Yarımadası, Pisco Körfezi, Peru).

Büyük boyuttaki yer jeoliflerin çapı yaklaşık üç futbol sahası büyüklüğü gibi, binlerce metre boyutundadır. Buradaki toprağın üst ve alt kısımlarını oluşturan yapının farklı renk ve dokusu yüzünden açığa çıkmakta ve bütünü kavrandığında çarpıcı bir zıtlık yaratılmış olduğu görülmektedir.



“Kayalardaki kırmızımsı yüzeyler bileşim, köken bakımından inorganikten örneğin, demir içeren minerallerin oksidasyonu biyojeokimyasal bakterilerin yardımıyla ve daha sonra hemen her yerde bulunabilen tamamen organik algler arasında değişir. Bileşim, menşei bakımından genellikle inorganik olduğunda yüzeyler üzerindeki bu tür kırmızımsı malzemeye demir filmi adı verilir. Demir filmlerde koyu kırmızımsı, kahverengimsi ve menekşe mordan turuncuya değişen belirgin renk farklılıkları vardır. Muhtemelen, farklılıklar kumtaşı alt tabakanın doğasının filmlerin kalınlığının ve yaygınlığının ayrışma kabuklarının derinliğinin yanı sıra, gelgit arası bölgedeki dalgaların yüzeyi düzleştiren etkisinin bir sonucudur. Kaya, s.374, 2023. Kompozisyon, Paracas yarımadasının kuzey cephesinde Pisco körfezi üzerine konuşlandırılmıştır. Denizden yaklaşık yirmi kilometre uzaklıkta ve yüz seksen bir metre uzunluğunda, uzaktan görülebilecek anıtsal boyutlardaki bu yapının, toprağın yaklaşık altmış santimetre derinlikte yontulmasıyla ve büyük ihtimalle de etrafına yerleştirilen parka çakıllardan oluşturulduğu düşünülmektedir. Nazca Çizgileri karmaşık çizimlerdir, Homerik orantıların diyagramları ve inanılmaz derecede kesindir. Nazca Çölü'nün zeminine damgalanmış bu şekillerin büyüklüğü muazzamdır ve en uzun düz çizgi neredeyse on dört kilometre kadar uzanmaktadır. Bunları, daireler çoğunlukla üçgenler, dikdörtgenler, yamuklar ve zikzak çizgiler oluşturmaktadır. Çizgilerin bazıları basit, diğerleri son derece karmaşıktır. Oluşturulan kompozisyonlarda, akbaba, maymun, pelikan, balıkçıl, sinek kuşu, örümcek, orka/balina, kertenkele, köpek ve insan figürleri görülmektedir.



**Görsel 3.** Spaceman Nazca Lines/Uzay Adamı Nazca Çizgileri

Kompozisyonda kaya üzerine yontularak, çölün koyu renkli kayaların üst tabakalarının kazılmasıyla, alttaki açık renk kayaç tabakanın ortaya çıkarılmasıyla oluşturulmuştur. Geçmişten bugüne kadar doğadan ilham alan sanatçı, av sahnelerini ve kendi hayatından kesitleri mağara duvarlarına çizerek ya da kazıyarak iç mekandan dış mekana çıkmış kum/ toprak veya taş bloklar kullanarak uçsuz bucaksız düzlüklere, çöllere ve manzaraya hakim olacak şekilde tepelere yerleştirilen birçok devasa antik zemin çizimi (jeoglif), ve anıtsal heykel eserler yapmışlardır.

Bu eserler kültürel belleği, kimlik meselesini, göç politikalarını, mekânsal değişimi ve bir eyleme dair zihinsel tanıklığı kodlar üzerinden sorgulatma ve yaşamla bütünleşme eğilimindedir. Kullanılan görsel ipuçları ve çağrışımlar anlama dair referansları izleyiciye aktarmaktadır. Zamansal ve mekânsal değişimin etkilerini sembolik unsurlarla yeniden oluşturmuştur. (Daşkesen, 2023)



**Görsel 4.** Orka (Balina), Peru'nun güneyindeki Palpa bölgesinde çöl yamacında yer alan ve kayaların üzerine 70 m uzunluğunda yontularak çizilmiştir

Şili'nin, Atacama Çölü'nde, "Cerro Unitas" bölgede olan yaklaşık yüz on dokuz metre uzunluğuyla, o dönemin arazide yaratılmış olan figür bir tanrı kompozisyonu betimlemektedir.





Görsel 5. Atacama Dev jeoglif,

Kompozisyon, 1000-1400 yıllarında, Peru bölgesinde yaşayan bölge halkı için yaratılmış, çöle ne zaman yağmur yağacağı, Ay'ın ne zaman, nerede olacağını, ekim ve hasat zamanı gibi bölge kültürü açısından önemli zamanları ortaya koymak için kullanılan, en eski astronomik takvim görevini de yerine getirmektedir.



Görsel 6. Phil Turner “Marree Man” Güney Avustralya Finnis Spring Platosu



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Doğa sanatında, küçük dokunuşlarla geçici etkiler yaratarak ve yine doğanın döngüsüne kalıcı şekilde etki etmeyen bu yapılar, anıtsal yeryüzü şekillendirmeleri yerine tercih edilir. Bu yaratılar, Arazi Sanatı'na göre daha pratik, samimi ve küçük ölçekli çalışmalardır.

Ağaç, kütük, dallar, çiçekler, yapraklar, taşlar, çakıllar, su ve buz gibi doğanın sunduğu materyallerle yapılan bu arazide oluşturulan bu tasarımları, fotoğraflanarak ya da süreç videoları ile belgelenerek, galerilerde, web sitelerinde veya kitap haline getirilip belgelenerek, insanlarla paylaşılmaktadır.

Bu bağlamda yazar Antmen ; “Arazi Sanatı, sade, geometrik şekillerin açık alanlara uygulanması açısından Minimalizm ile taş/toprak gibi doğal malzeme kullanımı ve süreçselliği açısından Arte Povera ile, yapıtların genellikle gelip geçici doğası nedeniyle ‘Happening’le, hatta bazen sanatçının doğaya bizzat müdahale sürecine odaklanması açısından Performans Sanatıyla ve projelerin zaman zaman salt belge, fotoğraf, harita ve benzeri ‘artakalan’ malzemeye sergilenmesi dolayısıyla Kavramsal Sanat ile yakınlık taşıyan bir akım olarak nitelendirilmiştir” (Antmen, A., 2009 ).

Yaratılan bu sanat eserleri, doğada, değişime ve dönüşüme bırakılarak, zaman içinde yok olmaktadır. Sanatçı, doğaya gelmeden önce zihninde tasarlamış olduğu fikirleri uygulamak yerine, doğanın barındırdığı potansiyelleri değerlendirerek üretime başlamaktadır. Doğanın yapısal özellikleri tasarım değişkenlerini belirlemektedir. Bu noktada, ortaya konan sanat eserinin oluş şekli tamamen doğanın sunduklarıyla özgünleşmiş olduğunu ileri sürebiliriz.

Peru'nun başkenti Lima'nın 400 km güneyindeki Andean çölünde bulunan yaklaşık 2000 yıllık Nazca çizimleri, devasa boyutlarıyla çölün toprağın, havayla temas etmesiyle oksitlenerek ona kırmızımsı bir renk veren demir açısından zengin kum ve kaya katmanından oluşmaktadır. Daha aşağılarda ise çizimlerin yapıldığı daha dayanıklı kireçtaşı sıva tabakası bulunmaktadır.

İlk kırmızımsı tabaka çıkarıldığında, ikincisi açıkta bırakıldığında, havayla doğrudan temas halinde sertleşmekte ve sarımsı bir renk almaktadır.

Çölün koyu renk üst tabakasının kazılarak alttaki açık renk tabakanın ortaya çıkarılmasıyla oluşturulmuş bu jeolifleri insan eliyle yaratılmış doğa sanatına örnek olarak gösterilebiliriz.

Bu bölgede kuvvetli rüzgâr ya da yağmur olmadığından çizimler/jeolifler günümüze kadar ayakta kalarak, dünya arkeolojik mirası açısından büyük bir kaynak oluşturmuştur.



**Görsel 7.** Taç giymiş insan figürü

Doğa Sanatının, ABD'den M. Heizer, W. de Maria ve R. Smithson, Avrupa'dan Richard Long ve Andy Goldsworthy gibi sanatçılarla birlikte 1960-70'lerde Arazi Sanatı olarak başladığı görülmektedir. Romanya, İran, Finlandiya, Güney Kore gibi ülkelerin sanatçıları, kendi tarzlarını doğup büyüdüğü yerlerin kültürel geçmişlerini yansıtmak için doğa sanatını arazi sanatçılarından farklı bir bakış açısıyla sahiplendiler.

Doğaya zarar verecek makine ve materyallerden uzaklaşıp sadece orada ve o anda buldukları ile yetinmeyi tercih ettiler. Doğada süreç içerisinde doğaya zarar vermeden yine doğada yok olacak doğal malzemeler kullanarak üretmeye başladılar ve ürettiklerini yine doğanın doğal döngüsüne armağan olarak bıraktılar (Özcan B., Ö., 2022).

Günümüzde birçok tartışmanın da odağı olan jeoglif veya yer motifleri, insanın fizyolojik yapısını, sosyal durumunu, bilişsel yeterliliğini, doğa ile olan ilişkisi gibi çok katmanlı bir kültürün ürünü olarak karşımıza çıkmaktadır. Jeolifler veya yer motifleri, nedir, ne zaman ve kim tarafından nasıl yapılmışlardır gibi soruları, bireysel ve toplumsal bağlamlarında çözümlenmeye çalışılmaktadır (Tümer H., 2017).

Doğa /Arazi Sanatında Sanatçı; arazide doğayı gözlemleyerek dolaşır, malzemeleri araştırır. Arazide bulunan malzemelerin özelliklerini keşfederek, tasarım potansiyellerini değerlendirerek Yerinde doğaçlamayla sanat eserlerini yaratır.

Yapıtlar fotoğraflanır ve belgelenir. Tasarım yapıldığı yerde bırakılır ve doğanın kendi doğal döngüsüne terk edilir. Sergilenen ise o anda çekilen süreç veya sonuç fotoğrafı olur (Özcan B., Ö., 2022).





**Görsel 8.** Rus Geyiği jeoglif

Nazca Çizgileri/jeolifler yapılan arařtırmalardan elde edilen bulgularda, doğurganlık ritüellerinde yaygın olarak kullanılmıř olabileceđini, ayrıca bilim insanları, yerli halkların bu resimleri oluřturulmasına, periyodik iklimsel dalgalanmaların da sebep olmuř olduđunu düşünmektedirler. Doğru bir biçimde fikir ileri sürebilmek için, bazı takımyıldızlarını temsil eden çizimlerle birlikte, mevsimlerin ve hasatların bařlangıcında kullanılan, antik dünyanın en olađanüstü takvimini temsil ettiđini de düşündürmektedir. Yine de her řey tahminden ibarettir ve henüz hiçbir řey bilimsel olarak kanıtlanamamıřtır.

Yukarıdaki (Görsel 8) Kompozisyonda, Rusya'nın Zyuratkul bölgesinde yaratılan geyik benzeri figürün, dört ayađı, iki boynuzu ve uzun bir burnuyla, o bölgede yařayan bir hayvanı betimlemektedir.



**Görsel 9.** Uffington Beyaz Atı (Güneř Atı), Yapılıř tarihi olarak Demir Çađı veya Geç Bronz Çađı gibi muhtemel tarihler öne sürölmektedir



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Kompozisyon, sadeleştirilmiş bir biçimde, açılmış olan derin çukurların açık renk kireçtaşının ezilerek doldurulmasıyla oluşturulmuştur. Tasarım yüz on metre uzunluğunda olup Britanya’da bulunan bir tepe üzerinde, dikkat çeken bir tarihöncesi kompozisyon olarak dönemindeki varlığını korumuştur. Britanya’daki devasa Uffington Beyaz Atı-Güneş Atı biçimindeki jeoglif yapı, adeta gökyüzünde bir arabayı çeker gibi ve efsanevi bir vahşi varlığı simgelemiş olduğu düşünülmektedir.

Toplumlarının insani temel ihtiyaçlarını karşılamak için geliştirdikleri refleksleri/tepkileri, resmetme ihtiyacının, yararlı bir yaklaşım ile geliştirilen düşünsel ve fiziksel bir faaliyet olduğunu söyleyebiliriz. Yer motiflerinin tarihlendirilmesi, yapıldığı yüzeyden, iklimsel koşullardan, kimyasal değişkenlerden, eserlerin bulunduğu ortama ve insan faktörüne değin değişkenler içermektedir.

Güney Peru ve Kuzey Şili kıyıları dünyanın en kurak bölgelerinden. Nazca kültürü buradaki bir havzada doğmuş ve bu havzayı And Dağları’ndan on ayrı nehir sulamaktadır. Ancak bu nehirlerin çoğu, yılın en az yarısını kurumuş olarak geçirmektedir.

Dolayısıyla su bu coğrafya için yaşamsal öneme sahiptir. Peru-Nazca jeolifleri, Güney Amerika’nın İspanyollar tarafından ele geçirilmesiyle, bu bölgeye giden gezginlerin aktarımlarından, asırlar boyunca dilden dile efsane olarak dolaşmıştır.

1939 yılında A.B. D’li arkeolog P. Kosok, Peru’nun Nazca Çölü’nde bir araştırması esnasında jeoliflerin farkına vararak, yer çizimlerinin fotoğrafını çekmiş ve ilk somut kanıtları ortaya koymuştur.

Bu yıllardan başlayarak Peru’nun Nazca jeolifleri üzerine farklı ilimsel araştırmalar yapılmaya başlanmış ve ilk bilimsel çalışmayı 1946 yılında, Alman matematikçi Maria Rieche’e (1903-1998) gerçekleştirmiştir. Rieche göre, Peru bölgesi Nazca jeolifler, toprağın üst katmanındaki koyu renkli toprağın yontulup alt katmandaki açık renkli toprağın kazınmasıyla oluşturulmuştur.

Yer çizimleri/jeolifler, Ay, Güneş ve yıldızların konumlarını göstermektedir. Bu mevkiler, Peru bölgesi Nazca halkının hasat, sulama, ekim, gibi zirai çalışmalarında gök takvimi olarak kullanmıştır. Rieche’nin teorisi, geometrik çizimlere dayandırılmış, ancak, insan, bitki ve hayvan desenleri gibi diğer biçimlere ilgili olasılıkları içermemektedir.



**Görsel 10.** Nazca, Sinek kuşu doksan yedi metre uzunluğunda jeoglif

Maria Rieche, 1950'lerde, Columbia Üniversitesi'nden Amerikalı arkeolog William Duncan Strong ekibiyle birlikte, Nazca çizgilerini üretenlerin yaşadıkları düşünülen Cahuachi şehrini kazmaya başlamıştır. Nazca çizgilerinin on kilometre uzağında bulunan Cahuachi'de yapılan kazılarda, kerpiçten büyük bir piramit, birkaç büyük tapınak, geniş meydanlar, platformlar ve merdivenler ile koridorları birbirine bağlayan karmaşık bir şehir planı ortaya çıkartılmıştır. 1983 yılının devamından, İtalyan bilim insanı G. Orefici, Cahuachi'de uzun soluklu bir kazı projesine başlamış ve Orefici kazılarda büyük bir nekropole (mezarlık) karşılaşmıştır. Yirmi dört kilometrekarelik bir alanı kaplayan nekropol (mezarlık) de yaklaşık otuz bin civarında insan gömülüdür ve bunların bazıları mumyalanmış halde bulunmuştur.

Nekropol (mezarlık) deki bazı seramik buluntular üzerindeki desenler, kısmen Nazca jeoliflerini çağrıştırmaktadır. Yapılan kazılarda bir de cenaze elbisesi olduğu düşünülen giysi ortaya çıkarılmıştır.

Alman arkeolog Maria Reiche'nin teorisi, Nazca İzlerinin yaratılmasının, Eski Mısır'ın büyük eserlerinin yapımında da kullanılan "kare indirgeme sistemi" adı verilen bir teknikle mümkün olduğunu öne sürmektedir (Dede, F., 2017).

Kompozisyon Güney Peru çölünün yüzeyine kazınarak yapılmış olan dünyanın en dikkat çekici jeolifleridir. Kilometrelerce genişlikte bir alanı kaplayan bu biçimler, yalnızca gökyüzünden bakıldığı zaman, açık bir biçimde görülebilmektedir.

Bu arazide, çizimleri gerçekleştirmek için düz çizgiler ve eğrileri kesinliğini korumak amacıyla muhtemelen kazık ve halat gibi aletler kullanılmıştır.





**Görsel 11.** Nazca, spiral /sarmal jeoglif

Yapılan arkeolojik arařtımlarda elde edilen bir bařka dikkat çekici nokta ise, buluntularda ortak nokta sudur. Kurak, hatta çöl denecek bir iklimde varlıklığını sürdüren Peru'nun Nazca kültürü için su, hayati bir öneme sahiptir.

Bundan dolayı da Nazcalılar bu bölgelerde sipiral formunda, su kaynakları meydana getirerek, gelişmiş bir su dağıtım sistemi oluşturmuşlardır. Bu oluşturulmuş olan su şebekesinden, etraf da bulunan köyler ve kasabalar yararlanmışlardır.

Bu çalışmanın amacı Peru'nun güneyinde inka öncesi uygarlığa ait olan ve İnsanlar tarafından yapılmış dev yer motifleri/jeoglif çizgileri, Doğa/kır sanatına örnek olarak gösterilebilir olduğu düşünülen çizgilerin sanata katkıları bu sanatsal çizgilerin gelecek kuşaklara ışık tutması açısından tarihsel süreç içerisindeki derlenip arşivlenerek sürdürülebilirliğini sağlamaktır.

Kentlerde her dönem sanatın, kamusal alanla doğrudan bir ilişkisi olmuştur (Şengünalp, 2018: 36). Bir toplumun kültürel miras hafızasının korunması, nesilden nesile aktarılması gereken büyük bir değerdir ve o toplumun yapı taşlarını oluşturur. Toplumların sahip olduğu benzersiz ve farklı kültürel değerler insanların ilgisini çekmekte ve önemli bir bellek oluşturmaktadır.

Sanatın timeline meydana getiren mekân ve sanat birlikteliği toplumların varoluşundan günümüze kadarki döneme kadar, önemini hiç kaybetmemiş olmasına rağmen, bu birliktelikte var olan içerik, düşünce ve etiksel olan değer yargıları geçmişten günümüze değişmiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Konuyla bağlantılı olarak yazar; “Yenilik ve özgürlükten taviz vermeyen sanatçılar sanatsal üretimin her aşamasında ilerlemeci bir tavır ile eserler yapmışlardır.

Eserlerin üretiminde çağına ayak uydurmuş, toplumun teknolojik gelişmelerinden etkilenmiştir. Gelişim ve değişime açık olan sanat ve sanatçı içinde bulunduğu toplumun kültürel alt yapısından, ideolojilerinden, güncel yaşamın etkilerinden beslenerek eserler meydana getirmişlerdir (Zengin, M.H, Bulat, M.2022) ifadelerine yer vermektedir.

Sanat ve doğa, açık durumlarda ortaya çıkar ve insanın sanat icra etme isteğinin doğa tarafından, güdülendiği bir denge ile, sanatı geçici olarak var eder.

Sanatçılar, doğada var olan materyallerle doğaya zarar vermeden yarattıkları ikinci bir doğa düzenlemeleri ve yerleştirmeleri ile yaşamını sonlandıracağı süreç içerisinde, doğayı yeniden yaratarak doğanın bir parçası haline gelirler.

Geçmişten şimdiye kadarki süreçte, uygarlıklarda ve bu uygarlıkların bilinmeyen durumları ile dolu olan Nazca jeolifleri, Nazca medeniyetinin varlığını devam ettirdiği mekan, pasifik okyanusu ile bu okyanusa paralel uzanıp giden And Dağları arasında olan alandır, M.Ö. 200 ile M.S. 600’lü yıllar arasında, Peru'nun güney kıyısında gelişmiş kendine özgü çömlekçiliği, renkli seramikleri, dokuma ürünleri, mumyalama teknikleri, en fazla da çöl toprağı üzerine oluşturulan jeolifleri olarak bilinen çizgilerle tanınmaktadır (Özcan B., Ö.,, 2022).

Asırlardır varlığını sürdüren, ancak sınırları tam olarak hala bilim insanları tarafından çözülemeyen bu kompozisyonlar, gelecek kuşaklara belgesel bir kaynak olarak aktarılabilmektedir.

Sonuç olarak geçmişten günümüze sanatçı, doğaya bedeniyle gider, sezgisel, duyarlı gözlem ve araştırmalarla birlikte, doğa ile iletişime geçer. Doğa, kendi iç-doğasını açığa çıkarıncaya kadar bekler...



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MAKING LANDSCAPE DESIGN EASIER: BLENDER ADD-ONS

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#### ABSTRACT

Space, which is the basic field of study of Landscape Design, is being developed in design, production, representation, etc. with digital technological developments. It is constantly changing in stages such as. The development of the computer in the field of design continued with the production of CAD software, and until today, it has moved to different dimensions with three-dimensional drawings and virtual reality technologies and has become one of the more preferred tools with the use of new concepts and techniques with technological content. Blender is one of the best, free and open-source 3D creation suites. It supports the entirety of the 3D pipeline, modeling, rigging, animation, simulation, rendering, compositing, and motion tracking, even video editing and game creation. One of the most important features of Blender software is the add-ons section. The Add-ons section lets you manage secondary scripts, called “Add-ons” that extends Blender's functionality. In this section you can search, install, enable, and disable Add-ons. This study focuses on scripts which can be installed as Add-ons for landscape design that can be used in Blender, a free software. In this paper, the advantages, disadvantages, and contributions of add-ons that can be installed on the software aiming for a landscape design process are discussed.

**Keywords:** Landscape Design, Computer Aided Design, Add-Ons, Blender



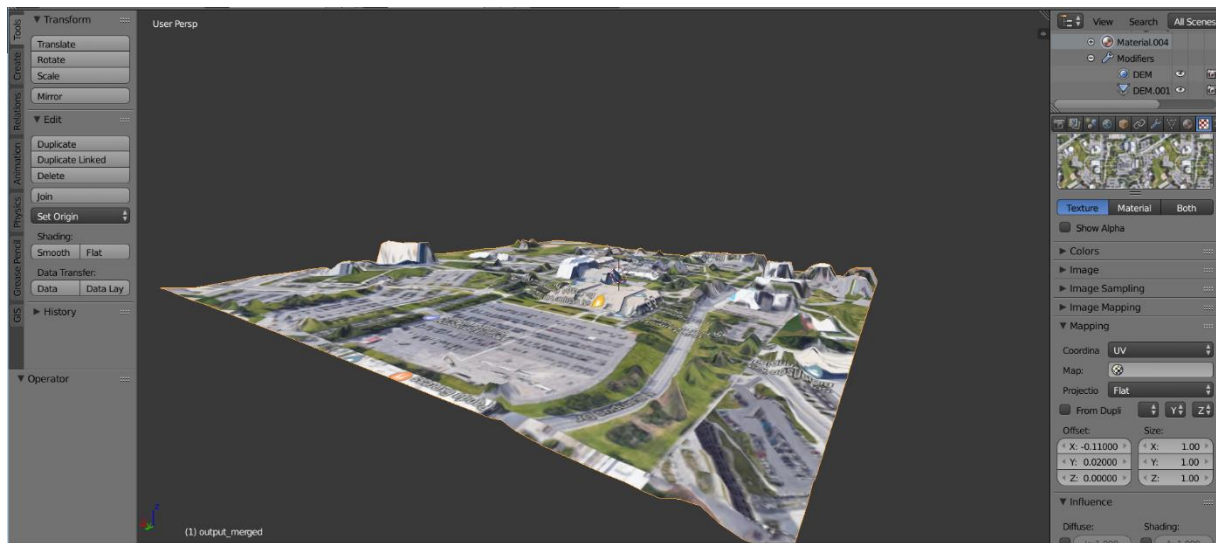
## **1. INTRODUCTION**

As driving rapid growth in many fields, advances in computer science and the Internet have made computers powerful tools of the information age. Nowadays, computers are often used in landscape design to increase efficiency. Designers are given the opportunity to present their ideas in clear graphics and continually analyze and revise their design plans in a very short time.

Computer-aided design, which has been developing since the 1950s, consisted of DOS-based software with limited capabilities till 1980s. AutoCAD, whose first version was released in 1982, has undergone great developments to date, and each new AutoCAD developed has been put on sale with a new version or release number. AutoCAD versions, which is mainly focus on 2D design, were offered for sale in Turkey as DOS-based in 1985. The 3D modeling capabilities in AutoCAD were introduced in later versions, with significant improvements made in releases like AutoCAD 12 and AutoCAD 13. These later versions included some basic 3D modeling features, such as 3D primitives and wireframe modeling, but it wasn't until AutoCAD 14 and subsequent versions that more advanced 3D modeling tools and capabilities were added in 1997 (Ataberk 2023). With Windows-based 3DSMAX, which focuses especially on 3D modeling, much higher quality architectural presentations and animations can be produced. Today, in terms of 3D modeling and presentation techniques, not only AutoCAD and 3dsmax software, but also modeling tools such as ArchiCAD, Cedro, Revit, Rhino 3D, Blender and Sketchup, and presentation tools such as Lumion and Twinmotion software have been developed (Sculpteo, 2023). Through this software, designers can work at a faster rate and produce a better-quality design thereby increasing productivity. The computer aided modelling in landscape architecture also brought infinite possibilities and creativity that a landscape architect can explore (Lallawmzuali and Pal, 2023). One of the most important software of 2023 is Blender.

Blender is an open-source and free software suite used in modeling, animation, rendering and compositing (Fig 1). Its use as a design instrument relies in its generic tool set, where design complexity is built from combinations of simple functions and data containers (Dounas and Sigalas, 2009). Blender also stands out with its 2D animation capabilities, versatile modeling and sculpting tools, built-in video editing features, and its open-source nature, which fosters collaboration and innovation in the 3D creation community (Mages Institute, 2023).





**Figure 1.** Urban Design with Blender (Hunt, 2020)

The Blender Foundation (2002) is an independent public benefit organization. Its spin-off corporation Blender Institute (2007) hosts the foundation's offices and currently employs 24 people who work on the Blender software and creative projects to validate and test Blender in production environments. In 2020 the Institute split into two companies; Blender Institute now solely functions as working company for the Blender Foundation, and the new Blender Studio will contribute to the Blender mission producing content and testing production pipelines. These organizations support the community of contributors on blender.org (Blender 2023).

One of the most important features of the Blender software is the add-ons section. The "Add-ons" section of Blender allows you to manage supplemental scripts that improve its functionality. In this section, you may find, download, set up, and disable add-ons. This study focuses on scripts that can be included as landscape creation add-ons to Blender, a free piece of software. This paper discusses the advantages, disadvantages, and contributions of add-ons that can be installed on software meant for the landscape design process.

## **2. MATERIALS and METHODS**

For this study, Blender software and its add-ons, which can be used as a 3D design tool in landscape design, were chosen as the main material of the research. For this purpose, the study was conducted with 40 landscape architects who were proficient in Blender software. Participants were given one month to conduct research on add-ons which they could use in the landscape design process. At the end of this period, oral interviews were held with the participants. In this way, the most likely add-ons to be used in landscape design processes were

determined. As a result of the research, the advantages, and disadvantages of the plugins most preferred by the participants were discussed.

### **3. FINDINGS and DISCUSSION**

The findings are the interpretation of the evaluations of landscape architects who were informed about the research topic before the oral interviews. Since the 40 volunteer landscape architects who participated in the research were familiar with the Blender software and had used it before, most of them were already using Add-ons, which are a powerful feature in the Blender software. However, the majority of the participants also stated that they did not know all of the add-ons that can be used in landscape design process which are identified as a result of the research before and that they encountered them for the first time while doing research.

The most preferred add-ons determined after the interviews were determined as BagaPie and GeoScatter. Although there are different add-ons preferred by individual participants, the add-ons that 3 or more users stated that they use are explained in alphabetical order.

Ant Landscape add-on creates landscapes and planets using various noise types. A.N.T. stands for Another Noise Tool. Add-on generates a weighted vertex group slope map based on the Z normal value and smooth the mesh, triangulate the mesh, rename and add materials in blend-file (Fig 2). This add-on is totally free to use and has been preferred and used by 6 of 40 landscape architects.



**Figure 2.** Ant Landscape Add-on (Klekner, 2023)

BagaPie GeoPack is a free tool that simplifies the Blender workflow with tools, generators and GeoPack. It enables you to group geometry nodes and assign custom actions for setup during their addition, saving valuable time and simplifying complex node trees. Additionally, can link

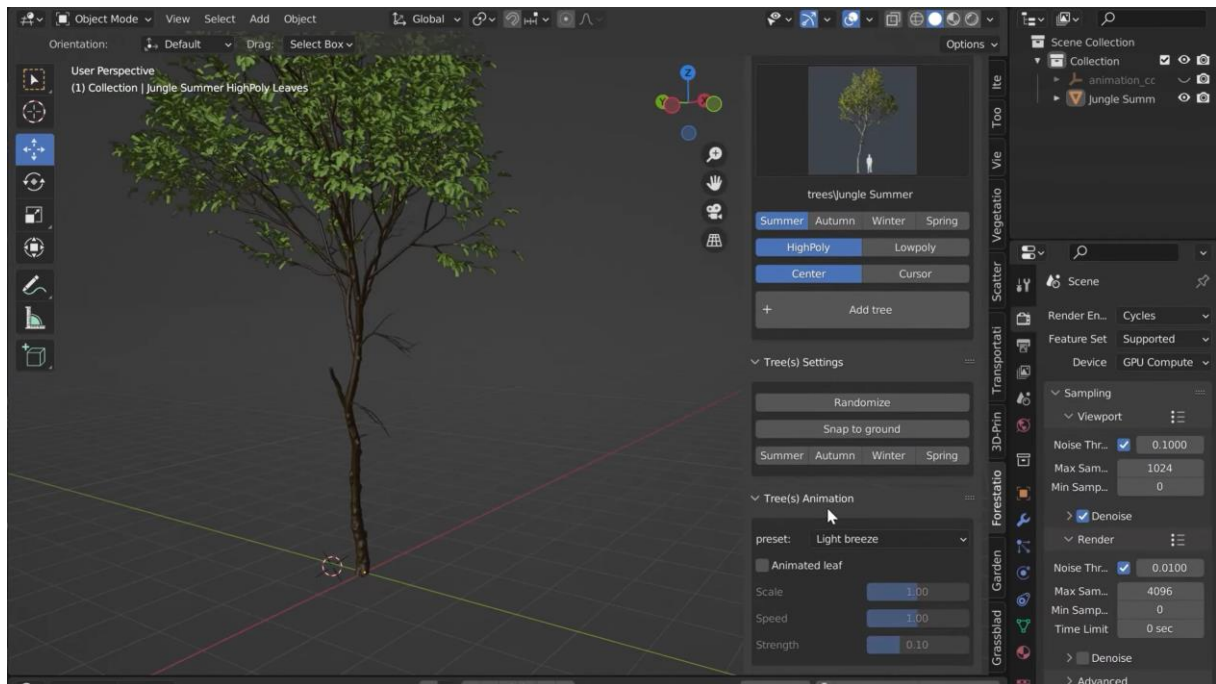


an asset library and export everything to a .geopack file, which can be easily installed by anyone. This add-on has been created by Antoine Bagattini and to have 600+ Assets, BagaPie Modifier, Canyon Demo File and GeoScatter Biomes you have to pay additionally \$95 (Fig3). This add-on has been preferred and used by 22 of 40 landscape architects.



**Figure 3.** BagaPie GeoPack Add-on (McKenzie 2022)

Forestation add-on for Blender is a production tool for designers, CGartist, archviz artists and many others. A large selection of 3D scanned trees is available. Thanks to its integrated plugin it is easy to import and customize each tree: animate the leaves, change the season (winter, summer, autumn, spring), add moss or snow on your trunk, or create as much variation as you want with the trees thanks to the "randomize" function. Trees have a high level of detail (Fig 4). Individual License for the add-on is \$89.99 and has been preferred by 7 of 40 landscape architectures in study group.



**Figure 4.** Forestation Add-on

Gardener - Bushes, Hedges & Shrubs Creator has a large collection of plant species from the 5 continents and offers no less than 39 varieties of plants as well as 45 models of trunk and 96 biomes. It's more than 350 assets total. It was created by Bproduction and has 3 license prices. The cheapest is \$59.99 Gardener lite - Individual License (Fig 5). Add-on has 98 biomes which are ecosystems that allow you to realistically manage the layout, size, and dispersal of each asset. They are included in gardener and are 100% customizable. This add-on has been preferred and used by 5 of 40 landscape architects.



**Figure 5.** Gardener - Bushes, Hedges & Shrubs Creator Add-on (Blender Market 2023)

GeoScatter is a very powerful universal environment creation solution meant to work with any blender assets, with any shaders from any render engine as well because Geo-Scatter is asset agnostic. The Geo-Scatter team works with independent asset creators to create premade

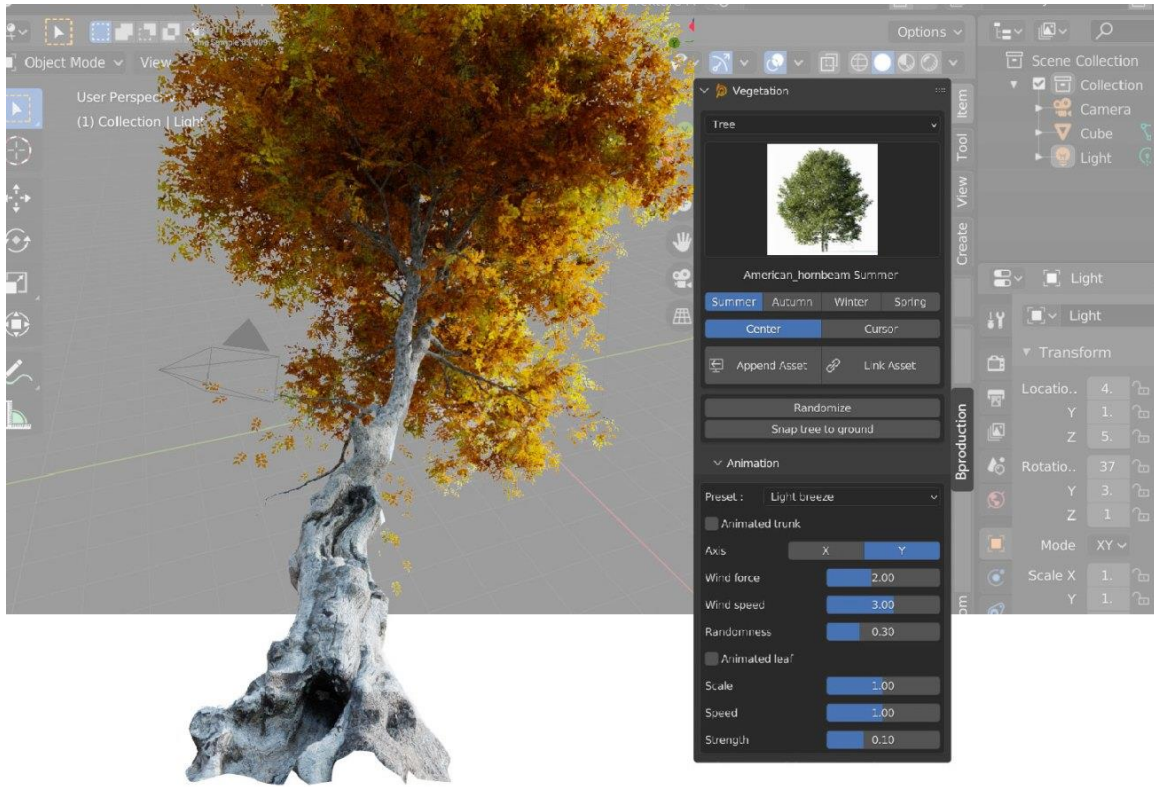


environments for our plugin's users. Biomes will save a great deal of time because tons of pre-cooked environments are available, it's an amazing solution and very efficient. It was created by bd3d and has 3 license prices. The cheapest is \$99.99 Commercial use allowed - Individual License (Fig 6). This add-on has been preferred and used by 19 of 40 landscape architects.



**Figure 6.** GeoScatter Add-on (Blender Market 2023)

Tree Vegetation - Tree and Plant Animation Library Addon is an addon for Blender, compatible with Eevee and Cycles. It contains a big library of diverse and varied plants, trees, shrubs, tropical plants, tree hedges, ornamental plants, garden plants, rocks. The incredible 4 seasons function allows you to create landscapes under the snow or in summer, but also autumn and spring. It's the most realistic 3d models ever created close to the real ones. They were created using different techniques. Use of HD and PBR textures for incredible renderings in seconds. Designers can also make animation with branches and leaves. With the use of add-on, users can add more moss to trees... But above all, this library is optimized for Blender (Fig 7). It was created by Bproduction and has 3 license prices. The cheapest is \$59.99 Vegetation Lite - Individual License. This add-on has been preferred and used by 11 of 40 landscape architects.



**Figure 7.** Tree Vegetation - Tree and Plant Animation Library Addon Add-on (Blender Market 2023)

During the interviews, 8 more add-ons were named. These are respectively; “True-Terrain”, “Tree Scapes: Broadleaf”, “Tree and Grass Library Botaniq – Trees”, “Creating Modular Environment”, “Quick Landscape”, “Nature Landscape Pack”, “World Blender - Advanced Landscape Generator” and “Plant Collection”. During the research, many more add-ons that can be used for landscape design can be accessed. It also shows that the number of these add-ons will increase day by day and that we can easily download data of many detailed models and textures.

#### 4. CONCLUSION and RECOMMENDATIONS

Blender software and Add-ons allow landscape architects to create highly precise and accurate designs, modeling, and renders. This is crucial in a field where even small errors can have a significant impact on the functionality and aesthetics of a landscape project. This efficiency can save time and reduce the need for repetitive manual work.

These tools allow landscape architects to create precise 3D visual representations of their designs. This helps clients and stakeholders better understand the proposed project, making it easier to communicate ideas and make informed decisions. Also, these add-ons allow for the





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**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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exploration of various design alternatives and scenarios, making it easier to assess the impact of different choices on the landscape.

Although Blender software is free, the add-ons used can be purchased for an average of 60 dollars. The main reason for this is that the people who prepare add-ons for Blender software are individual developers or designers.

A designer using Blender software will be able to prepare the same model, design, or image without these add-ons. Because the design element obtained with the help of add-ons is created using Blender features. However, instead of using an existing library, using an add-on that allows the preparation of a special topography and easily reflects special vegetation and flora features can reduce a modeling task that could take days to minutes. For this reason, most of the landscape architects interviewed have purchased libraries and now they are using these add-ons in their commercial project work.

Landscape architects, like other design disciplines, design and sell the dreams, visions and wishes of their customers or users. Although doing this is easier and faster than before, in the world of limited resources, the most valuable one is our time; and Blender add-ons give us the option to spend it on what matters most.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF LIVING WALLS IN THE EXAMPLE OF ANTALYA CITY CENTER

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#### **ABSTRACT**

The natural ecosystems that are accessible to users are getting smaller. The loss of green space contributes to issues like the urban heat island effect and abrupt temperature swings. Vertical green system applications are one of the strategies being examined to improve the amount of greenery in urban areas. Vertical green systems are facade designs where plants are either grown directly on the face of the building or are pointed in a specific direction by means of supporting structures, covering the building's exterior. According to studies, planting the building envelope benefits both the building and the environment. Some of these advantages include lowering the urban heat island, offering heat and sound insulation, promoting biodiversity, and enhancing air quality. Living walls are among the most significant vertical green systems. It also has the benefit of being a crucial component in raising quality of life, particularly in terms of enhancing outdoor comfort. Along with providing insulation, it also serves to improve air quality and lessen surface damage by facilitating rainfall drainage. Antalya city center, which is in the Mediterranean climate zone and where summer temperatures are quite high, was selected as the study area. The initial focus of the research is to determine how to design an appropriate living wall system to improve urban conditions and reduce the need for heating and cooling. In addition, the structural and plant materials that can be used for living wall applications given in the literature will be selected and those suitable for Antalya city center will be selected. Within the scope of this study, the selection of endemic species, which is important in terms of ecological adaptation and sustainability, was also mentioned and local production conditions were examined in the selection of appropriate materials.

**Keywords:** Climate Change, Landscape Design, Living Wall, Vertical Green Systems



## **1. INTRODUCTION**

Today, as cities grow, the natural habitats available to city residents are shrinking. The decrease in green areas causes problems such as the urban heat island effect and sudden temperature changes. In a time when urbanization has created concrete jungles everywhere around us, the rise of living walls as décor has taken a prominence in commercial sectors as well. One of the solutions considered to increase the green texture in cities is vertical green system applications. Vertical green systems are facade systems in which the building envelope is covered by plants being placed directly on the facade or directed in a certain direction through supporting systems. Research shows that planting the building envelope has positive effects on the building and the environment. Reducing the urban heat island, providing heat and sound insulation, contributing to biodiversity, and improving air quality are some of these benefits. One of the most important vertical green systems is living walls. It also has the feature of being an important element in improving the quality of life, especially in providing outdoor comfort. In addition to its insulation feature, it also has functions in terms of improving air quality and reducing surface damage by providing rainwater drainage.

With the increase in urbanization, there is a decrease in vegetation cover and an increase in the urban heat island. Scientists state that the urban heat island emerges due to increasing urbanization and industrialization and can raise the temperature of urban areas by 15°C compared to rural areas. This means that the amount of energy spent on cooling will increase (Davis and Hirmer, 2015). One of the solutions that can be applied to ensure thermal comfort in interior spaces is to apply insulation to the facade. Facades are in direct contact with external environmental conditions (Köhler, 2008). Therefore, it is one of the main components affecting energy efficiency. Plants are considered as one of the materials that can be applied to provide insulation on the facade. It is seen that planting the building envelope increases thermal comfort in interior spaces by reducing heat transfer from the facade to the outside environment. The plant layer applied to the facade surface has a temperature-reducing effect on the facade surface by providing shading, absorbing sunlight, and reducing ray reflection (Sunakorn and Chanikarn, 2011).

Living walls, often called vertical gardens, appear because of planting all vertical surfaces. It is an important step in terms of integrating today's engineering practices with the environment. Living walls are suitable for urban environments where vertical space is abundant but space on the ground is minimal, hence this concept refers to urban gardens. Various plants can be grown



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

under minimum growth conditions to contribute to the solution of environmental and ecological problems in dense urban areas, naturally giving new life to a neglected old building in the middle of city centers or enhancing new construction projects due to their natural air purification properties, cooling effect and attractive beauty. They can also popularize it (Dunnett and Kingsbury, 2008).

Living walls are a feature of creatively sustainable (Hoffman, 2000) or biophilic (Kellert and Wilson, 1994; Kellert, 2005) urban environments. While vertical gardens were introduced with the idea of creating a garden in the past, today they have become important practices, especially in ensuring the sustainability of buildings. Living walls have been evaluated in two groups: green facade and living wall, depending on the way the plant is used (Köhler, 2008; Ottelé et al., 2011). Particularly in Germany, the idea of green façades came from artists such as "Hundertwasser", and architects and planners co-opted these ideas to help support the paradigm shift towards green buildings in the late 17th century. Instead of developing new settlements outside the city, a movement has emerged that encourages restructuring within the city. To support this, incentive programs were implemented in the early 18th century (Kohler and Schmidt, 1997). Putting the wall around the city of Berlin at the center of urban restructuring projects became the meeting point of these ideas. Green facades were among the systems that were least included in the urban design elements popular at that time. After it was realized that green facades were relatively easy to build, an incentive program was developed between 1983 and 1997 to popularize green facades in Berlin, and as a result, 245,584 m<sup>2</sup> of green facades were created (Köhler and Schmidt, 1997). Living walls in Germany mainly refer to free-standing walls that divide properties. Cracks and other surface defects on stone and brick walls allow plants to spontaneously cover the surface (Darlington, 1981). Generally, living walls or green facades are made of woody or herbaceous plants, and often vines, planted in the ground or in planter boxes to cover the plants with buildings. Supporting systems are sometimes required for green facades, and planting boxes may require specific growing media or supplemental irrigation. Annual maintenance is necessary to increase plant survival and growth at the front. The design of green facades varies depending on the location, climate, and architecture of the building. Some important points to consider in the design of green facades are:

1. Plant types: Plant types to be used on green facades should be suitable for the location and climate of the building.



2. Irrigation system: Green facades should be watered regularly. The irrigation system must be capable of providing the water needed by the plants.
3. Support system: Green facades need a support system that can support the weight of the plants.
4. Lighting: Green facades should also be visible at night. The lighting system should be compatible with the architecture of the building.

Living walls provide many benefits in urban areas. These benefits are:

1. Improving air quality: Green facades can improve air quality by absorbing pollutants from the air.
2. Improving energy efficiency: Green facades can increase energy efficiency by keeping buildings cooler in the summer and warmer in the winter.
3. Reducing the urban heat island: Green facades can reduce the urban heat island by lowering the temperature around buildings.
4. Increasing biodiversity: Green facades can increase biodiversity around buildings.
5. Adding aesthetic value: Green facades can add aesthetic value to the facade of buildings.

These solutions include the basic steps for effectively designing and implementing green facades and walls. However, remember that each project has its own requirements and local conditions. Professional landscape architects, engineers and experts can help identify and implement the best solutions to reduce the urban heat island effect (ChatGPT 2023).

It is seen that these types of applications are used increasingly day by day. Vertical gardens and living walls contribute to both the ecological and aesthetic features of the city from the very first stage of their realization. Therefore, they are of great importance for the city and urban life.

## **2. MATERIALS and METHODS**

For this study, the most popular living wall examples that have been implemented in other countries in the same climate zone as Turkey were included in the evaluation. For this process, in addition to internet searches with the phrase "living wall", ChatGPT artificial intelligence was also queried with the phrase "name the most beautiful living wall applications in the world". The techniques, structural materials and plants used during these works, which were applied as living walls, were classified. During the classifications, the materials and plants that could be obtained and used within the borders of Antalya province were emphasized.





### **3. FINDINGS and DISCUSSION**

During the research conducted for the article obtained through internet searches, it is seen that the living walls listed below come to the fore.

- **Caixa Forum:** This beautiful piece of art is 24 meters high and is located next to an art gallery in the center of Madrid city center. This living wall, designed by artist Patrick Blanc, is made up of his 15,000 plants of over 200 species and is open to the public to touch, feel and enjoy this green decoration in an urban environment. It has been.
- **Musee du Quai Branly (Paris):** Located next to the Eiffel Tower, this museum is decorated with beautiful art both inside and out. The beautiful green wall that covers the building's walls was designed by artist Patrick Blanc and contains 15,000 plants from over 150 species.
- **Sydney's Central Park:** No, this is not a park like New York. This is a beautiful green facade installation on a residential and retail tower. One of Sydney's most famous buildings. Urban structure and ecological living are in harmony, offering residents and buyers a part of nature within the urban environment. The award-winning building was designed by artist Patrick Blanc and consists of 23 green walls planted with 35,000 wall plants and his 85,000 facade plants, most of which are native to Australia. More than 350 species of plants are planted here.
- **Tree House, Singapore:** According to Guinness World Records, Tree House has 429 units in his 24 floors and is the largest vertical garden in the world. The building is designed to reduce its carbon footprint by adding eco-friendly elements along the green wall, contributing to approximately \$500,000 in water and energy savings annually.
- **Centro Commerciale Fiordaliso – Rozzano Italy:** This famous shopping center near Milan has a vertical garden with 44,000 species of moss and plants. The entire project cost him 1 million euros and was designed by Francesco Borrani.

As for the ChatGPT AI; determining the "most beautiful living wall applications in the world" is subjective and can vary greatly depending on individual preferences. However, here are ten stunning living wall installations from around the world that have received acclaim for their design and aesthetic appeal:

- **One Central Park, Sydney, Australia** is one of the world's tallest living walls. It features a variety of plants and cascading flowers and is a prominent part of Sydney's skyline.



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

- CaixaForum, Madrid, Spain is designed by Patrick Blanc, the living wall at CaixaForum Madrid is a lush tapestry of plant life that enhances the building's architectural beauty.
- Atocha Train Station, Madrid, Spain is another work by Patrick Blanc, this living wall inside Atocha Train Station is a 2,000-square-meter living wall that provides a refreshing atmosphere in the heart of the bustling station.
- Musee du Quai Branly, Paris, France features an intricate combination of plants that beautifully complements the museum's contemporary design.
- Marina Bay Sands Sky Park boasts an impressive living wall, part of a lush garden with panoramic views of Singapore's skyline.
- The Rubens at the Palace in London has a living wall featuring over 10,000 herbaceous plants, which not only adds a touch of nature to the urban environment but also contributes to sustainability efforts.
- Eden Project, Cornwall, United Kingdom is not a living wall in the traditional sense, but the biomes at the Eden Project house a remarkable collection of plants from around the world in a series of domes, making it a living wall on a grand scale.
- Palazzo Italia, Milan, Italy featured a spectacular living wall made of algae and photobioreactors that produce oxygen and clean the air.
- Aires Mateus' House in Leiria, Portugal is a private residence but features a beautiful living wall that wraps around the building's exterior, creating a harmonious connection with the surrounding landscape.
- The Academy of Sciences' Living Roof, San Francisco, USA is a prime example of a green roof, featuring native plants and serving as an educational exhibit about sustainable architecture.

These living wall installations showcase the diverse range of creative possibilities in incorporating living plant walls into architectural and urban designs, enhancing both aesthetics and sustainability.

Living Wall Systems (LWS) consist of planting boxes or other building materials for stationary plants that can be converted into modular systems attached to walls to facilitate plant growth without being dependent on the rooting area. Green roofs allow for more efficient forms of plant growth compared to green facades. To date, only a small number of examples of living walls have been created and they have been fully integrated into facades (Sharp, 2006). The differences of green facade types are given in Figure 1.



**Figure 1.** The Differences of Green Facade Types (TDC, 2023)

The designs examined show that the plants that are been used in living walls mainly are;

- Commonly used Climbers; *Ampelopsis aconitifolia*, *Smilax aspera*, *Bougainvillea glabra*, *Wisteria floribunda*, *Parthenocissus quinquefolia*, *Parthenocissus tricuspidata*, *Hedera helix*, *Euonymus fortunei*, *Hydrangea petiolaris* (Fig 2),





**Figure 2.** Commonly Used Climber Plants for Living Walls

- Second Group Climbers; *Campsis radicans*, *Passiflora caerulea*, *Lathyrus odoratus*, *Polygonum bauldschianicum*, *Lonicera periclymenum*, *Lonicera caprifolium*, *Persicaria capitata*, *Wedelia trilobata*, *Wisteria sinensis*, *Clematis vitalba*, *Humulus lupulus*, *Aristolochia spp.*, *Jasminum officinale*, *Vitis spp.*, *Wisteria spp* (Fig 3),



**Figure 3.** Second Group Climber Plants for Living Walls

- Others; *Rubus fruticosus*, *Juniperus sabina 'Blue'*, *Carex morrowii 'Variegata'*, *Euonymus japonica 'Variegata'*, *Ophiopogon japonicus*, *Pittosporum tobira 'Nana'*,



*Aucuba japonica, Pyracantha coccinea, Gauralindhe imeri, Pteridium aquilinum, Vinca minor, Juniperus chinensis, Ajuga reptans, Euonymus japonica 'Microphyllus', Photinia serrulata, Nerium oleander, Hedera helix 'Contraindicaciones', Catharanthus roseus, Cuphea hyssopifolia, Duranta repens, Rosa rampicante, Russelia quisetiformis, Jasminum nudiflorum, Rosa canina, Rosa spp., Forsythia suspensa, Cotoneaster spp., Pyracantha atalantiodes* (Fig 4).



**Figure 4.** Examples for Bush Plants

#### **4. CONCLUSION and RECOMMENDATIONS**

Living wall applications, which are increasingly used all over the world, have become an important industry in the world. However, these applications are generally not preferred in prestige buildings as they significantly increase both the building load and cost. Considering the versatile positive effects of living walls, it seems beneficial for the practices to become widespread in Turkey. Society should be more informed on this issue and the production of structural and vegetal inputs to reduce costs should be carried out within the country.

The cost-of-living wall applications is still quite high. For this reason, applications are limited to some metropolitan municipalities, shopping malls, hotels and a few cities and are considered luxury applications. It is inevitable that application and maintenance costs will decrease thanks to new developing techniques. Especially with the development of sensor technologies, the water, fertilizer, and pesticide need of plants can be determined quickly. It will be possible to produce self-sustainable systems with water harvesting methods and cheaper solar and wind energy production.

In planting, it is necessary to carefully examine the wall and determine whether it is suitable for growing plants, whether the wall can bear the load that will occur due to planting, and the method suitable for the selected wall. After determining the selected wall and application method, plant species suitable for environmental conditions, the structural system of the building and material properties should be selected. At this stage, the growth power,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

development direction and sorting characteristics of the plants must be taken into consideration. When choosing plant species, in addition to ecological compatibility, plants that are compatible with coexistence, do not have an extensive root system, do not grow aggressively, could hold on to a vertical surface and require little water should be preferred. Native and natural plants should be used in living wall applications. However, it should not be forgotten that the surface used is vertical and plant selection should be made accordingly.

By choosing the appropriate plant species, it is possible to plant all kinds of walls, both indoors and outdoors. *Ampelopsis aconitifolia* (May also include Vine-leaved Ivy or Grape Ivy) can be used in living walls in Antalya, but it's important to ensure it receives the right amount of sunlight and has good support for climbing. *Smilax aspera* can be used in living walls in Antalya, thanks to its adaptability to Mediterranean climates. *Bougainvillea glabra* (Bougainvillea) is a popular choice for living wall in Antalya due to its vibrant colors and Mediterranean suitability. *Wisteria floribunda* can be used in living walls in Antalya, but it requires sturdy support and regular pruning to manage its growth. Virginia creeper (*Parthenocissus quinquefolia*) is more adaptable to cooler climates but can be used in some parts of Antalya. Boston Ivy (*Parthenocissus tricuspidata*) can be used in living wall in Antalya, especially in areas with some shade. *Hedera helix* (Ivy) is an excellent choice for living wall in Antalya, as it's well-suited to Mediterranean climates and readily climbs walls and trellises. Also *Euonymus fortunei* can be used in Antalya's living walls, thanks to its adaptability to Mediterranean conditions.

*Campsis radicans* (Trumpet Vine) is a vigorous climber known for its beautiful trumpet-shaped flowers. It can thrive in the Mediterranean climate and is suitable for living walling. *Passiflora caerulea* (Blue Passionflower) is a stunning vine with exotic-looking flowers. It can grow well in the Mediterranean climate of Antalya. *Lonicera periclymenum* is a hardy and fragrant climbing plant that can be used in living walls in the region. Similar to *Lonicera periclymenum*, *Lonicera caprifolium*, or Italian honeysuckle, is a suitable choice for a living wall in Antalya. *Wisteria sinensis* (Chinese Wisteria) is known for its cascading clusters of beautiful flowers and can be a great choice for a living wall in Antalya. *Clematis vitalba* (Old Man's Beard) is a popular climbing plant that can be used in living walls in the Mediterranean climate. *Jasminum officinale* is a fragrant climber that can thrive in Antalya's climate and is suitable for living wall applications. *Vitis* spp. (Grapes) can be used in living walls, and they are well-suited to the Mediterranean climate.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

*Rubus fruticosus* (Blackberry) can be used in living wall, provided they are properly supported and pruned. They are also suitable for the Mediterranean climate. The variegated foliage of *Euonymus japonica 'Variegata'* (Japanese Euonymus) can provide color and interest to living walls. *Ophiopogon japonicus* (Mondo Grass) is a low-growing, clump-forming plant that can be used as ground cover in a living wall. *Vinca minor* (Periwinkle) is a trailing plant that can work well in living walls, especially in shaded areas. *Jasminum nudiflorum* (Winter Jasmine) can add a touch of greenery and bright yellow flowers to living wall designs. *Hedera helix 'Contraindicaciones'* (Ivy) is a classic choice for living wall and can tolerate the Mediterranean climate. *Pyracantha coccinea* (Firethorn) is a woody plant that can provide evergreen foliage and colorful berries for living walls. *Rosa rampicante* (Climbing Rose) can be trained to grow vertically and can provide beautiful flowers. *Forsythia suspensa* (Weeping Forsythia) can be pruned and trained for vertical growth and provides bright yellow flowers in the spring. Living walls, which are an ecological solution to make a city more pleasant and relaxing, are an important alternative. They provide not only a beautiful view and climate and temperature control, but also an additional habitat for birds and butterflies. By hiding building facades, they cover the possible ugly appearance of building surfaces and add value to the urban landscape. Considering that this type of application will be used in many buildings of the city in the future, many more studies on the subject need to be carried out in Antalya.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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### ÖZET

Peyzaj, mimarlık ve heykel sanatı'nın ortak noktası olarak değerlendirilebilen Land Art (Arazi Sanatı) 1960'ların sonuna da Amerika'da doğmuş ve 1970'li yıllarda Avrupa'ya yayılarak birçok batı ülkesini de etkisi altına almıştır. Bu sanat hareketi çağdaş sanatın non-art ve ya anti-form hareketleri değerlendirmesinde avantgarde sanat bölümünde yer almaktadır. Doğada insan yaratıcılığı ve müdahalesi olarak ortaya çıkan bu akım, geniş uygulama şekilleri ile de sunulmuştur. Sınırları kaldırmaya çalışan Land Art sanatı aynı zamanda galericilik ve sanatın pazarlanma düzenine karşı oluşan bir tepkidir. Land Art akımı ile yaratılan sanat eserlerinin görselleri bazen galerilerde sergilenenler de bu eserlerin satışı bu güne dek gerçekleştirilmemiştir. Land Art yapıları doğa ile sanatın değerli buluşma noktası olarak doğada değişikliklerden etkilenmektedir, tabiata yapılan bu sanatsal müdahale zamanla dönüştürülür ve ya yok edilebilir. Müze ve galeri duvarlarının dışında sunularak ortaya konulan sanat, insan ve doğa arasında endüstri devrimi ve devam eden sanayileşme döneminde barış ve düşüncenin de davetçisi olmuştur. Amerika Birleşik Devletleri'nde Land Art sanatının başlıca öncü ve tanınmış sanatçıları; Robert Smithson, Michael Heizer, Alice Aycock, Christo, Nancy Holt, Mary Miss, Walter De Maria, Dennis Oppenheim, James Turrell, Alan Sonfist, Ana Mendieta, İngiltere'de ise Richard Long, Andy Goldsworthy dır. XX. yüzyıl Land Art eserlerinde öncü olan önemli sanatçı çifti Christo ve Jeanne-Claude büyük boyutta projeler ortaya koyarak, doğanın sınırsızlığını en iyi biçimde kullanmak sureti ile çok geniş alanlarda mimari nesnelere ve yine doğal malzemeler ile doğanın kendisini doğrudan kullanarak herkesin sanatla yakın temasta olması noktasında büyük katkıları olmuştur. Bu sanatçı çiftinin eşsiz yapıtları halen insanların hafızasında canlı ve ölümsüz olarak yer almış ve almaya da devam etmektedir. Land Art sanat akımı ile, alternatif mekan arayışları, doğaya karşı yeni bir duyarlılık getiren bu sanat hareketleri, alternatif sanatın erken dönem sanat çalışmaları olarak kabul görmüştür. Land sanatçılarının doğaya yaptıkları müdahaleler ile insanlığa farklı bakış açıları kazandırmışlar ve günümüzde bu anlayışlar doğrultusunda sanatsal üretimlere devam edilmektedir.

**Anahtar Kelimeler:** Sanat, Heykel, Doğa, Galeri,



## **LAND ART**

### **ABSTRACT**

Land Art, which can be considered as the common point of landscape, architecture and sculpture art, was born in America in the late 1960s and spread to Europe in the 1970s and influenced many western countries. This art movement is included in the avant-garde art section in the evaluation of non-art or anti-form movements of contemporary art. This movement, which emerged as human creativity and intervention in nature, is also presented with a wide range of applications. Land Art, which tries to remove the borders, is also a reaction against the gallery system and the marketing of art. Although images of works of art created by the Land Art movement are sometimes exhibited in galleries, these works have not been sold to date. Land Art structures, as the valuable meeting point of nature and art, are affected by changes in nature, this artistic intervention in nature can be transformed or destroyed over time. Art presented outside the walls of museums and galleries has been an invitation to peace and thought between humans and nature during the industrial revolution and ongoing industrialization. The main pioneers and well-known artists of Land Art in the United States are; Robert Smithson, Michael Heizer, Alice Aycock, Christo, Nancy Holt, Mary Miss, Walter De Maria, Dennis Oppenheim, James Turrell, Alan Sonfist, Ana Mendieta, and in England, Richard Long and Andy Goldsworthy. XX. Christo and Jeanne-Claude, an important artist couple who were pioneers in the Land Art works of the 19th century, made great contributions to everyone's close contact with art by putting forward large-scale projects, using the limitlessness of nature in the best way, using architectural objects in very wide areas and natural materials, as well as nature itself has happened. The unique works of this artist couple are still alive and immortal in people's memories and continue to do so. With the Land Art art movement, these art movements that brought a search for alternative spaces and a new sensitivity towards nature have been accepted as the early art works of alternative art. Land artists have brought different perspectives to humanity with their interventions in nature, and today artistic production continues in line with these understandings.

**Keywords:** Art, Sculpture, Nature, Gallery,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sanat (Bulat, S. Bulat, M., Aydın, B., 2014), toplumların geçmiş kültürlerinden esinlenip, yeni bir söylem geliştirerek, gelecek kuşaklara sanat yapıtları vasıtasıyla kalıcı izler bırakır. Yazar konuyla bağıntılı olarak; *“Sanat, toplumun diğer alanlarındaki yaratılarıyla birlikte gelişmekte, onları etkilemekte ve onlardan etkilenmektedir. Yeni toplumun sanatçısı, yeni duygu ve düşüncelerini biçimlendirmede dilini yaratmada, yeni teknik ve malzemelerden yararlanmaktadır. Bu yeni teknik ve malzemeler sanatçıyı yeni plastik dil yaratmaya itmekte ve sanatta iki yanlı bu alışveriş ve etkilenme hep devam etmektedir”* görüşleriyle açıklık getirmektedir (Yağmur, Bulat, Aydın, Ö., S., B., 2014)

Yazar sanatçıyı, *“Sanatçı kimdir? sorusuna sanatın bugün geldiği noktayı esas alarak-verilecek çok sayıda cevap vardır. Tarihte sanatçı figürünün ortaya çıkışına dair bir başlangıç noktası bulmak mümkün değildir. Elbette kolaycı akıl yürütmeye, olma/oluş hali bağlamında düşünüldüğünde sanatçının varlığı ile sanatın ortaya çıkışının eş zamanlı olduğu söylenebilir. Ancak bir bilgi nesnesi olarak sanatçının varlığının en azından adıyla kayda geçirilmesinin tarihi sanat kadar eski değildir.”* (Küçüköner, F., Özkul, T., D., 2022) görüşleriyle tanımlar.

XVII ve XIX. yüzyılda batıdaki endüstri devrimi, Fransız ihtilali ve nihayet XX. yüzyılın ilk çeyreği ile ortalarına doğru meydana gelen I. ve II. Dünya Savaş'ları devamında küreselleşen dünyada, hızla değişen düşünceler ve gelişen teknolojik faktörlerin etkisi altında kalan insanoğlu kurulan bu yeni dünya düzenine göre de evirilen duygu ve düşüncelerini sanatsal alanlara da yansıtmış 1960 lı yıllarda ABD de başlayan peyzaj, mimarlık ve heykel sanatının ortak noktası olarak değerlendirilebilen bu bağlamda arazi sanatı olarak tercüme edilen Land art sanatı nihayet 1970 li yıllarda Avrupa kıtasına da yayılmıştır (Antmen, 2008). Ortaya çıkan yeni ekonomik ilişkiler, sanayinin yıpratdığı kentsel doku, değişen ve tüketici bir forma bürünen toplumsal yapı, sanatı kolektif bir üretim anlayışına yöneltmiş, kent-sanat-insan arasındaki bağları onarmada başat bir role soyundurmuştur (Şengünalp, 2019:1616).

Ayrıca 1960'larda Land Art(Arazi Sanatı), müzelerin ve sanat galerilerinin kapitalist tavrına karşı çıkarak sanatın metalaşmasına ve alınıp satılabilirliğine karşı çıkan sanatçıların alternatif mekan arayışlarına yönelmeleridir.Galeri dışına çıkarak yeni sergi mekanı olarak bütün yeryüzünü kullanan Land Art sanatçıları, hemen hemen yeryüzünün muhtelif yerlerinde anıt niteliği taşıyan devasa çalışmalar gerçekleştirmişlerdir(Yağmur,Özer,2022:556).

Bu sanat hareketi çağdaş sanatın non-art veya anti-form hareketleri değerlendirmesinde avant-garde sanat bölümünde yer almaktadır. Klasik sanat anlayışını insan yapımı malzemelere olan bağımlılıktan kurtararak tüm yeryüzünü doğal malzeme olarak kabul eden yeni bir anlayış



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

olarak doğan bu akım da; Estetik alanda, geçmişten gelen mirasını da kullanan insanoğlu, yaratıcılık kabiliyetini doğa üzerine de tatbik etmek suretiyle doğaya da müdahalede bulunmuştur. Böylece Sanatsal yaratımların hızla dönüşüm geçirdiği çağımızın sanatı, malzemenin verdiği olanaklar ile biçim ve düşüncenin sanatını oluşturmaktadır ( Zengin, M. H. S,132:2023).

Günümüz tüketim toplumlarında insanlar sahip oldukları nesnelere ve onlarla olan ilişkileri üzerinden statülerini de ortaya koymaktadırlar. Tüketim olgusu, nesnelere tüketimi ekonomik durumun yanında kültürel yapıyı da etkilemektedir. Nesnelere tüketimi ile beraber toplumsal ve kültürel değerler de değişime uğramaktadır. Tüketimin sebep olduğu atık malzemeler evreni hızla kirletirken bir yandan çözümler aranmaya başlanılmıştır. Her toplumun tükettiği nesnelere farklılık göstermektedir ve sanat buna kayıtsız kalmamaktadır (Taşar, 2021:493).

Başlıca öncülerini kabul edilen Robert Smithson, Michael Heizer, Alice Aycock, Christo, Nancy Holt, Mary Miss, Walter De Maria, Dennis Oppenheim, James Turrell, Alan Sonfist, Ana Mendieta, İngiltere’de ise Richard Long, Andy Goldsworthy bu akımın ortaya çıkmasına ve geniş uygulama alanlarına teşmiline olanak sağlamışlardır (Kastner, 1998).

Nihai hedefi sınırları kaldırmak olan Land Art sanatı aynı zamanda galericilik ve sanatın pazarlanma düzenine karşı oluşan bir tepkidir. Land Art akımı ile yaratılan sanat eserleri bazen galerilerde sergilenirler de bu eserlerin içerikleri gereği, görsel algıların değiştirilerek mekânları yeniden tanımlamaya yönelik olmasından dolayı satışı bu güne dek gerçekleştirilmemiştir (Harrison &Wood, 2011).

Sanatın doğaya uygulanmasında, doğada tabii olarak bulunan materyaller kullanıldığından eşsiz bir bütünleşme ve ahenk sağlanmaktadır. Land art sanatının icrasında başlıca bitki, ağaç, su, kar, taş, toprak, kum, çakıl kullanılırken, yaratılan eserlerin sergi yerleri de genellikle vadi, çöl, dağ tepe, orman ve meşelik gibi doğal sahalardan oluşmaktadır (Saehrendt, 2009). Nitekim sanat eserlerinin kavramsal ve biçimsel bir karşılığı vardır: “Her sanat yapıtı bir tür sanatsal alan olarak adlandırılabilir bir şeyle çevrilidir ve bu alan sanat alıcılarını, satıcılarını, eleştirel sanatsal gelenekleri, edebi yaklaşımları, güncel felsefi fikirleri, politik ve sosyal yapıları ve daha pek çok şeyi içermektedir” (Daşkesen, 2023)

Land Art yapıları doğa ile sanatın değerli buluşma noktası olarak doğada değişikliklerden etkilenmektedir. Doğada tatbiki halinde meydana getirilecek tahribatı yok denecek seviyeye indirgemeyi de hedefleyen bu sanatsal müdahale zamanla dönüştürülür ve ya





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

yok edilebilir. Müze ve galeri duvarlarının dışında sunularak icra edilen sanat, insan ve doğa arasında endüstri devrimi ve devam eden sanayileşme döneminde barış ve düşüncenin de davetçisi olması hasebi ile de ayrı bir öneme sahiptir. Yazar konuyla bağlantılı olarak; *“Bazı sanatçıların gözünde, Arazi Sanatı ilkel insanların doğa bilinciyle yeniden bağ kurmaya duyulan ilgiyle de buluşuyordu. İronik bir durum olarak, bu arzu Stohenge taşları ya da piramitler modellerini esas alan devasa yeryüzü eserleri biçimine büründüğünde, çevreciliğin doğa karşısında alçakgönüllü olma prensibinin karşıtı olan bir kibir ve kasıntı hali ortaya çıkarmıştı”* (Heartney, 2008) görüşlerini ileri sürer.

Yazar bu hareketi; *“Nitekim günün en radikal sanatçılarından bazıları doğal dünya ile ilgilenmeyi kendi pratiklerinin belirleyici bir ilkesi olarak görüyorlardı. Ekim 1968’de, New York’ta Dwan Galerisi’nde gerçekleştirilen “Earth Works” Yeryüzü Sanatı isimli karma sergiye sergiye de ismini veren “yeryüzü işleri” Earthworks ya da “Yeryüzü Sanatı” Earth Art ya da Land Art “Arazi Sanatı” gibi değişik adlarla isimlendirilecek olan bir eğilimin ilk ortaya çıkışıdır”* (Brown, 2014) ifadeleriyle açıklar.

XX. yüzyıl Land Art eserlerinde öncü olan önemli sanatçı çifti Christo ve Jeanne-Claude büyük boyutta projeler icra ederek, doğanın sınırsızlığını en iyi şekilde kullanmak sureti ile çok geniş alanlarda mimari nesnelere ve yine doğal malzemeler ile doğayı direkt kullanarak herkesin sanatla yakın temasta olması noktasında büyük katkıları olmuştur (Fineberg, 2014). Bu çiftin eşsiz eserleri halen insanların hafızasında canlı ve ölümsüz olarak yer almaktadır.

1935 Yılında Bulgaristan da doğan sanatçı, Sofya Sanat Akademisini tamamladıktan sonra Viyana ve Cenevre’de eğitimine devam etmiştir. Resim ve çizim ile sanat hayatına başlayan sanatçı, daha sonra büyük ölçekli projelerle ‘tuvale sığmayan’ eserlerini kamusal alanlara taşıdı. 1958 Yılında Jeanne ile tanışan ve evlenen Christo bu birliktelikten sonra da sanat alanında yaratıcılıklarına beraber devam etmişlerdir. Çift kendi dönemlerinin en tanınmış ve etkili sanatçı çiftlerinden olup, işbirlikleri büyük çaplı, geçici sanat eserleri oluşturarak çevre sanatının ve kamusal sanatın sınırlarını zorlamışlardır. Kendilerine mahsus stil ve tekniklerle çeşitli yapıtlara imza atan sanatçı Christo 2020 yılında Newyork’ta geçirdiği kalp rahatsızlığı neticesinde vefat etmiştir.



**Görsel 1.** Christo ve Jeanne-Claude, 'Sarılmış Reichstag' 1995

Sanatçı Almanya Berlin Parlamento binası üzerinde yaptığı kumaş kaplama ile Doğu ve Batı Almanya'nın birleşmesini ve Berlin Duvarının yıkılmasını sembolize etmiştir (Atakan, 1998). 100 bin metrelik alandan oluşan çalışma sahasının kaplanması için 1.076.390 metrekairelik kumaş kullanılarak takriben 24.800 metrekairelik alan kaplanmıştır. Kaplama kumaşı yüzeye gümüş rengi ve parlaklığı vermiştir. Çalışma 24 Haziran 1995 te başlamış, 7 Temmuz 1995 te tamamlanmıştır(Görsel 1).

Sanat yeni biçimler elde ederken kendi doğasında olan bulma ve oluşturma ilkelerini unutmamalıdır. Kendi olan heykelsi biçimler kendilerini öz nitelikleri ile var ederler. Her biçim kendi sınırlarını kendi içinde oluşturur, eksiklik veya fazlalığını kendisi belirler (Kaya ve Bulat, 2022).

Türünün ilk örneği olma, izleyicilere yapıyı ve çevreyi farklı şekillerde görmelerini sağlama özelliğine sahip sanat eseri, bir çok sanatçıyı ve sanata ilgi duyanları bir araya getirmiş ve gerek Almanya'da, gerekse diğer ülkelerde sosyo-kültürel etkileşime zemin hazırlamıştır (Fineberg J, 2014).

Çevre sanat etkileşiminin çarpıcı örneklerini yapıtlarıyla insan beğenisine sunan sanatçı çift, 1976 yılında Kaliforniya'nın Sonoma ve Marin Country bölgesinde doğal çevreyi insan yapımı çevre ile uyum içinde birleştirmek sureti ile entegrasyonu sağlamıştır(Görsel 2).



**Görsel 2.** Christo ve Jeanne-Claude 'Koşu Çiti', Kaliforniya 1972-76'

Büyük çaplı proje, 39,4 km uzunluğunda beyaz kumaş çitin toprak yüzeyinde uzanarak kırsal ve kentsel alanların birleşmesini sağlamaya yönelik inşa edilmişti. Yüksekliği bazı yerlerde 5 metreyi aşan beyaz kumaş, güneş ışığını yansıtmakta ve rüzgarın etkisi ile dalgalanması da görsel olarak çevreyi değiştirmekteydi.

Yerel halk ve gönüllülerin katılımları ile inşa edilen projede, beton ayaklar yere sabitlenmiş ve projenin tamamlanması 42 ay sürmüştür. Yapım süreci ve sonrasında proje hakkında bir çok belgesel çekilmiş, geniş bir izleyici kitlesine ulaşılmıştır.

Çiftin öncülüğünde gerçekleştirilen bu sanatsal faaliyette bir çok insan bir araya gelerek kolektif faaliyet çerçevesinde, aynı amaç doğrultusunda fikir birliği sağlanmıştır. Bu yapıt ile kırsal ve kentsel birlikteliğin sağlanmasına vurgu yapılmış, çevresel ve toplumsal sınırlar geçici olarak kaldırılarak, farklı dünyaların birleşmesinde sanatın gücüne vurgu yapılmıştır.

Surrounded Islands sanat projesi; Miami nin Biscayne körfezinde bulunan 11 adayı kapsayan devasa proje olması açısından önemlidir(Görsel 3).



**Görsel 3.** Christo ve Jeanne-Claude 'Surrounded Islands 1983

Projede adaların çevresi pembe renkli polipropilen kumaşla kaplanmıştır. Toplam 6.5 milyon metrekare alana yayılan projede, doğa ile insan yapımı çevrenin birleşimi anlatılmak istenmiştir. Çevresel ve doğal unsurların ön plana çıktığı yapıtta, adanın geçici olarak dönüşümü, kumaşın su yüzeyinde hareketi, deniz suyu ile olan etkileşimi farklı açılardan gösterilmiştir.

Doğal güzelliklere ve çevresel hassasiyetlere vurgu yapmayı amaçlayan sanatçı çift bu proje kapsamında doğanın , toplumun ve sanatın birleşmesini de sembolize etmişlerdir.



**Görsel 4.** Christo ve Jeanne-Claude 'The Umbrella Kaliforniya 1991

1991 Yılında Christo ve Jeanne-Claude çifti Kaliforniya Tejon Pass ve Japonya Ibaraki de eşzamanlı olarak gerçekleştirdiği 'The Umbrella' isimli çalışmalarında ,büyük ebatlı ve çok sayıda şemsiye kullanarak tasarladıkları projeyi hayata geçirmişlerdir(Görsel 4).



**Görsel 5.** Christo ve Jeanne-Claude 'The Umbrella Japonya 1991



Uygulanan bu sanat kapsamında, Kaliforniya’da kırsal alanda Tejon Pass projesi için 1760 adet mavi şemsiye, Japonya Iberaki de pirinç tarlasında yer alan proje için ise 1340 adet sarı şemsiye kullanılmıştır. Toprak sathına yerleştirilen şemsiyeler rüzgarın etkisi ile hareket ederek görsel olarak etkileyici görüntüler oluşturmuştur. İki farklı coğrafyayı da birleştirme özelliğine sahip bu proje, doğayla insan yapımı çevrenin birleşimini ifade etmiştir. Ayrıca seçilen mavi ve sarı renklerde, gökyüzü, torak gibi doğal öğelerle ilişkilendirilmiş, doğanın güzelliği yansıtılmaya çalışılmıştır.



**Görsel 6 .** Walter de Maria ‘Lightning Field New Mexico 1977

Walter de Maria 1977 yılında New Mexico çölünde yaptığı şimşek tarlası isimli eserinde çölün ortasında belli bir düzen ile yerleştirdiği 400 adet paslanmaz çelik direkle gök hareketlerini kontrol etmeyi ve yine doğal çevre ile insan yapımı çevrenin birleşimini hedeflemiş ve bunu başarmıştır. Özellikle gece vakti şimşek düşümünü yakalamak ve insan eseri ile etkileşimini müşahade etmek adına tasarlanan bu eser büyüleyici proje olarak bilinmektedir.



**Görsel 7 .** Walter de Maria ‘The New York Earth Room 1977

1977 Yılında sanatçı Newyork un SoHo bölgesinde gerçekleştirilmiş bu eser 45 metrelik kapalı alanda 60 cm yüksekliğinde 250 metreküp topraktır. Tek görsel ögesi toprak olan bu eser halen sergilenmeye devam etmektedir. Her maddenin yaratılışında var olduğu düşünülen toprağın insan ile etkileşimine vurgu yapılır.



**Görsel 8.** Michael Heizer ‘City 1970

Anıtsal bir arazi çalışması olan Michael Heizer in City isimli eseri Orta Doğu Nevada’ da 2,4 km uzunluğunda ve 800 metre genişliğinde ,sıkıştırılmış toprak, kaya ve betondan yapılmış geniş şekilli höyükler ve çöküntülerden oluşan bir komplekstir.



**Görsel 9.** Erzurum Eyof Sokağı 2017-Kar ve Buz Heykeller, 2017





**Görsel 10.** Erzurum Eyof Sokağı 2017-Kar ve Buz Heykelleri, 2017

Erzurum ilinde, 2017 yılı ocak-şubat aylarında, Atatürk Üniversitesi Güzel Sanatlar Fakültesi Heykel Bölümü Başkanı ve Öğretim Üyesi Mustafa Bulat'ın önderliğinde, Heykel Bölümü hocaları ve öğrencileriyle birlikte, mevsim koşullarının en çetin geçen zamanlarında, geçici sanat malzemesi olan kar ve buz malzemenin kullanılmasıyla, yaklaşık beş bin metrekare alanda kurgulanmıştır. Düzenleme, arazi sanatı mantığı ile, şehrin tarihi ve mimari yapıları orijinallerine sadık kalınıp küçültülerek, kar ve buzdan yaratılan “*Eyof 2017 Kar-Buz Sokağı*” eseri ile sanat severlerin beğenisine sunulmuştur (Görsel 9-10).

Sonuç olarak, çoğaltamadığımız ancak her geçen gün biraz daha katlettiğimiz yerküremiz XIX ve XX. da yaşanan buhranlar sonucu doğal kaynaklara olan artan ihtiyaçlar bahane edilerek hoyratça kullanılmıştır. Başta kaybedilince yeniden kazanılması çoğu kez mümkün olmayan veya binlerce yıl içerisinde kendisini yenileyebilen toprak, su, ağaç olmak üzere mevcut doğal kaynakların yaşanabilir ve sürdürülebilir bir dünya için ne kadar önemli olduğunu bilincine varan sanat ortamları, yapılan bu katliama dur demek için, doğayı koruma adına sınırsız duygu ve düşüncelerini yaratıcılıkları ile birleştirerek doğayı bir sanat atölyesi haline getirmeyi hedeflemişler ve bu bağlamda Arazi Sanatı/Land Art akımını tüm dünyaya tanıtırıp yaygınlık kazandırmışlardır.



**IV-International Rural Areas and Ecology Congress  
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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### ASSESSING THE RELATIONSHIP BETWEEN PLANT SPECIES DIVERSITY AND LAND HETEROGENEITY: THE CASE OF DÜZCE

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#### ABSTRACT

Plant species diversity plays a pivotal role in urban biological diversity, underpinning crucial ecological processes and environmental conservation efforts. The examination of how environmental heterogeneity influences the plant species diversity is of paramount importance. This study delves into this relationship within the central district of Duzce, with a primary focus on urban environments. Employing the Braun-Blanquet method, we conducted an extensive survey at 229 sampling points, comprising 389 sub-samples, to identify plant species and assess their coverage. We then transformed the coverage percentages into the Westhoff & Maarel scale for further diversity analyses. The Shannon\_H index was employed to gauge plant species diversity for both herbaceous and woody species, in addition to evaluating land heterogeneity. The subsequent results were mapped and assessed using Geographic Information Systems. In the scope of our research, we identified 722 species and recorded a species abundance of 10,173. The findings underscore a positive correlation between topographic diversity and plant species diversity within urban landscapes. Areas sampled with varying environmental factors exhibited elevated levels of species diversity, particularly noted in the abundance of herbaceous species, which demonstrated high richness values among woody species. Furthermore, urban regions characterized by continuous structures exhibited the highest Shannon\_H index for plant species diversity. In summary, this research investigated the influence of local topographic variables diversity on plant diversity in urban settings. Regions with greater topographic diversity consistently displayed higher species diversity, offering valuable insights for urban planning and the design of green spaces.

**Keywords:** Urban biodiversity, species diversity, topographic diversity.



## **1. INTRODUCTION**

Topographic diversity delineates an irregular or diversified condition pertaining to the topographic attributes of a given region or surface. It signifies the plurality of landforms, altitudes, gradients, valleys, peaks, and assorted topographical intricacies inherent to a specific geographical locale (Stein et al., 2014; Tamme et al., 2010). Topographic diversity frequently arises from the convergence of various factors, encompassing geographical, geological, climatic, and anthropogenic influences. For instance, the topography of a given region can exhibit disparities attributable to divergent geological formations, erosional phenomena, hydrological dynamics, vegetative characteristics, and a host of other determinants (Muscarella et al., 2019).

Topographic diversity has an impact on plant species diversity in urban areas (Redon et al., 2014; Malkinson et al., 2018; Stevens & Carson, 2002). This influence arises from the fact that varying elevations, aspects, and slopes create a mosaic of microclimates within urban environments. These microclimates, in turn, provide unique niches for different plant species to thrive (Tilman 1994). For example, south-facing slopes may receive more sunlight and warmth, favoring certain sun-loving plant species, while north-facing slopes may remain cooler and more shaded, creating suitable conditions for shade-tolerant species. Furthermore, topographic diversity also plays a significant role in determining the distribution of urban green spaces and parks (Yang et al., 2015; Liu et al., 2022). Parks located in areas with higher elevations or steeper slopes may offer visitors diverse plant communities and recreational experiences. Understanding how topographic diversity influences urban plant species diversity is essential for urban planners and landscape architects as they design and manage green spaces that enhance biodiversity, promote ecosystem services, and contribute to the overall well-being of urban residents.

Investigating ecosystems where topographic diversity influences microclimates, which in turn affect soil structures, and consequently impact plant species has become a critical necessity for several compelling reasons (Oliver & Morecroft, 2014). Such research is instrumental, particularly in urban areas, in comprehending alterations in the natural environment due to human influence and assessing their consequences on ecosystems (Daws et al., 2022; Sundqvist et al., 2013; Jucker et al., 2018; Moeslund et al. 2013). Simultaneously, these studies address crucial issues such as biodiversity conservation, sustainability of ecosystem services, and the development of strategies to combat climate change. Therefore, examining the effects of

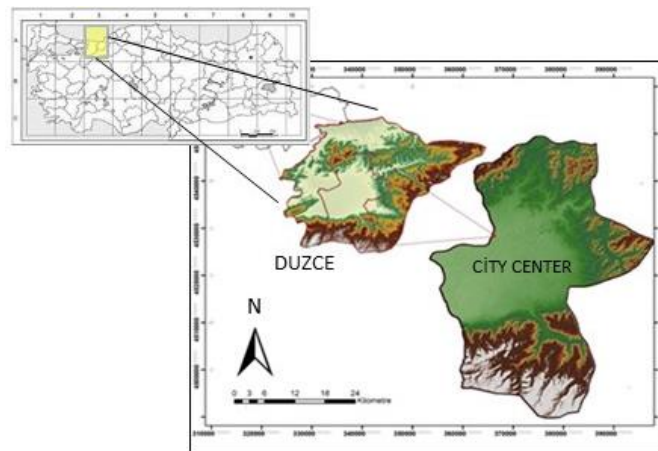
topographic diversity on vegetation represents a fundamental research field that underpins environmental sciences and conservation efforts.

Plant species diversity plays a pivotal role in urban biological diversity, underpinning crucial ecological processes and environmental conservation efforts (Fitter et al., 2010). The examination of how environmental heterogeneity influences the plant species diversity is of paramount importance (Pausas et al., 2003). This study investigated the influence of local topographic variables diversity on plant diversity. We tested the relationship between micro-topography of heterogeneity and plant diversity.

The primary objective of this study is to investigate the relationship between land diversity, environmental heterogeneity, and plant species diversity within urban environments in the central district of Duzce.

## **2. MATERIALS and METHODS**

The research area, which is located at geographic coordinates of 40°45' - 40°54' North latitude and 30°57' - 31°15' East longitude, encompasses the central district of Düzce, covering an area of 709 km<sup>2</sup>, situated in the Western Black Sea Region (Figure 1).



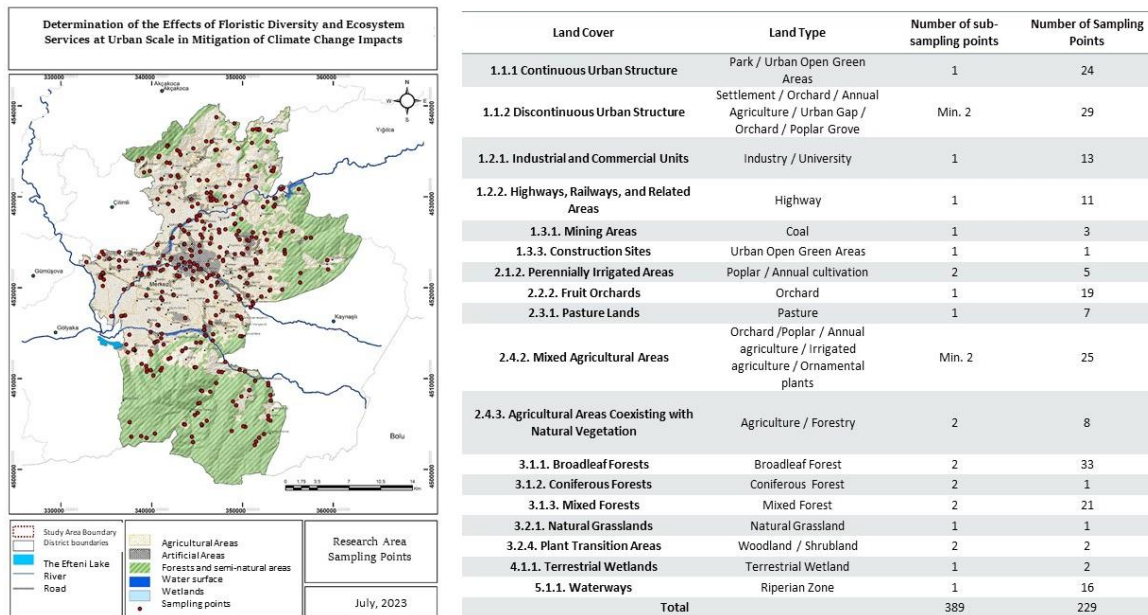
**Figure 1.** Research area

Duzce, which is the smallest province in the Western Black Sea Region with an area of 2,593 km<sup>2</sup>, comprises 14% of its land area, including the Duzce plain where the city center is situated (Aydm, 2009). The study area is situated within the A3 grid square, as defined by P.H. Davis in his Flora of Turkey (1965-1988). The research area is situated within the West Black Sea climatic region, receiving relatively less rainfall compared to other regions along the Black Sea (Özyuvacı, 1999). The Cretaceous formation has the widest distribution in the main rocks located to the north of the region (Tezer et al., 2020). Duzce exhibits rich flora and vegetation diversity, encompassing remnants of maquis, forests, subalpine, and rock vegetation types The



flora of Duzce comprises 102 families and 1200 species and subspecies (Aksoy et al., 2014). Aksoy (2006, 2007, 2014) reports an endemism rate of approximately 9% in the region. In the coastal area, the natural vegetation consists of mixed deciduous species at low altitudes, including *Castanea sativa* L., *Quercus frainetto* Ten., *Tilia tomentosa* Moench, and *Carpinus betulus* L. At higher elevations, the vegetation comprises trees such as *Tilia rubra* DC., *Quercus petraea* (Mattuschka) Liebl., *Fagus orientalis* Lipsky, *Taxus baccata* L., *Acer platanoides* L., *Pinus sylvestris* L., and *Abies nordmanniana* Spach subsp. *equi-trojani* (Asc. & Sint. ex Boiss.) Coode & Cullen, as well as shrubs like *Rhododendron ponticum* L. and *Prunus laurocerasus* L. (Aksoy, 2006; 2007; 2014).

In this study, a stratified sampling model was used. During fieldwork, we determined sampling points using the random sampling method were taken into account. Corine Land Cover classes were used as substrates in the stratified sampling system. Within the scope of the research, field studies were carried out at 229 sample points (389 sub-sampling points) in 2022 (April - September) (Figure 2).



**Figure 2.** Sampling points distribution in the research area

Plant samples were collected from each sample point in the field. Wooden presses (measuring 38 x 28 cm), newspapers, and drying papers were used to dry the plant samples. During the collection of plant samples, information such as the location and ecological conditions where the sample was found, land cover type, date, GPS coordinates, sample number, etc., were noted on the sample area record. Additionally, Braun-Blanquet values of the encountered plants in the field were determined and recorded. For the tree record, the numbers of all the trees in the



20 x 20 m sampling area were noted. The shrub and herbaceous species were evaluated based on their Braun-Blanquet values. The diagnosis of plant taxa, whose pressing and drying processes have been completed, were carried out at Duzce University Faculty of Forestry Herbarium.

The Shannon index was employed to elucidate diversity analyses pertaining to species. While tree species contained numerical values, the situation was different for shrubs and herbaceous species. The overlap percentages of these species' Braun-blanquet values were converted (Table 1) to the scale proposed by Westhoff & Maarel (1973), and a dataset was prepared using the Microsoft Excel program.

**Table 1.** The Braun-Blanquet cover-abundance scale

			<b>Westhoff &amp; Maarel (1973)</b>	<b>Fontaine vd. (2007)</b>
<b>Class</b>		<b>Cover-abundance scale</b>		
r	very few	<<% 1	1	0,01
+	few	<% 1	2	0,02
1		1-5 %	3	0,04
2		6-25 %	4,5,6	0,15
3		26-50 %	7	0,375
4		51 – 75 %	8	0,625
5		76 – 100 %	9	0,875

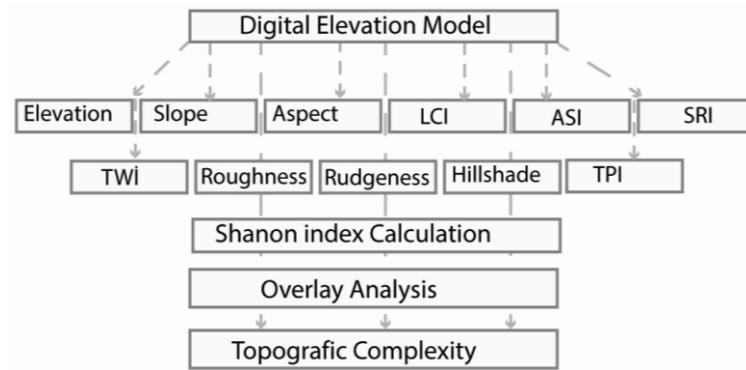
In this study, plant diversity was quantified using the Shannon index (Equation 1). PAST 3.18 software program was used to reveal the plant species diversity at the sampling points.

$$H' = \sum_{i=1}^s Pi \ln(Pi) \tag{1}$$

Where pi is the proportion of characters belonging to the ith type of letter in the string of interest. Pi is often the proportion of individuals belonging to the ith values in the dataset of interest. Then the Shannon entropy quantifies the uncertainty in predicting the variable identity of an individual taken randomly from the dataset (Gülsoy & Özkan, 2008).

Environmental factors that impact the distribution and diversity of plants encompass climate, geology, topography, and geographical coordinates, including latitude and longitude (Guisan & Zimmermann, 2000). Many studies show that “topographic complexity is an indicator of

topographic heterogeneity or habitat heterogeneity. The study investigated the influence of local topographic variables diversity on plant diversity. The topography variables diversity, which can be described as topography complexity (Gairola et al., 2011) consists of 4 stages (Figure3).



**Figure 3.** Topographic complexity / heterogeneity flow diagram (LCI: Landform Clasification Index, ASI: Aspect Suitable Index, SRI: Solar Radiation Index, TWI: Topographic Wetness Index, TPI: Topographic Position Index)

Elevation, slope, and aspect directly affect the quantity and quality of plant diversity, distribution, and ecosystem services (Gairola et al., 2011; Dar & Sundarapandian, 2016). Topographic Position Index (TPI) is a concept used to classify landforms (canyon, valley, plain, etc.) and land slope (ridge, valley ceiling, high slope, etc.) (Çilek vd., 2019). The Landform Clasification Index, which considers slope and TPI values together, allows interpreting the land with different slope and TPI values. The Roughness Index analyzes the spatial distribution of the slope. Ruggedness Index; It is one of the environmental substrates formed as a result of the height differences between digital pixels (Riley et al., 1999). The Ruggedness Index, one of the most critical factors in land water holding capacity and plant distribution, expresses the height difference between neighboring cells. The Solar Radiation Index describes and classifies the level of solar-UV radiation at the Earth's surface. The index value starts from zero and increases (Keating, 2007). The Topographic Wetness Index is one of the most important determinants of plant composition (Van Niel et al., 2004; Evans & Cushman, 2009). The topographic wetness index is calculated by the formula given below.

$$TNI = \ln \frac{a}{\tan b} \quad (2)$$

where 'a' is the upslope area flowing from a given point per unit contour length, tan 'b' is the local slope in radians (Gruber & Peckham, 2008).

A well-known Aspect Suitability Index, a strong predictor of rainfall and humidity in a region, takes values between 0 and 2. The values produced for the areas of the terrain affected by the



shadow range from 0 to 255. For the analysis with the Hillshade Index, each cell on the horizontal is assigned a value that expresses the influence of the sun (Weiss, 2001). If this value is 0, the area is completely shaded.

Firstly, 11 topographic variables were mapped using digital elevation models (DEMs) in the study. Duzce DEM data was obtained from the Alaska Satellite Facility at a resolution of 12.5 m and averaged to match the grid (Alos Palsar, 2023). While the surface command under the Arc Map 10.4 Spatial Analysis tool tab was used to map slope, aspect, hillshade, and elevation, auxiliary tools for topography and roughness were used for other variables.

The study area is divided into a 752 m x 752 m grid in the second step, and topographic values are transferred to the grids. In the third step, the Shannon value (Equation 1) has been calculated for each grid. In the last step, all maps were made overlay analysis and scored between 1-5. Ranking system consists of values between 0-55 points. Ranking system details are given in Table 2.

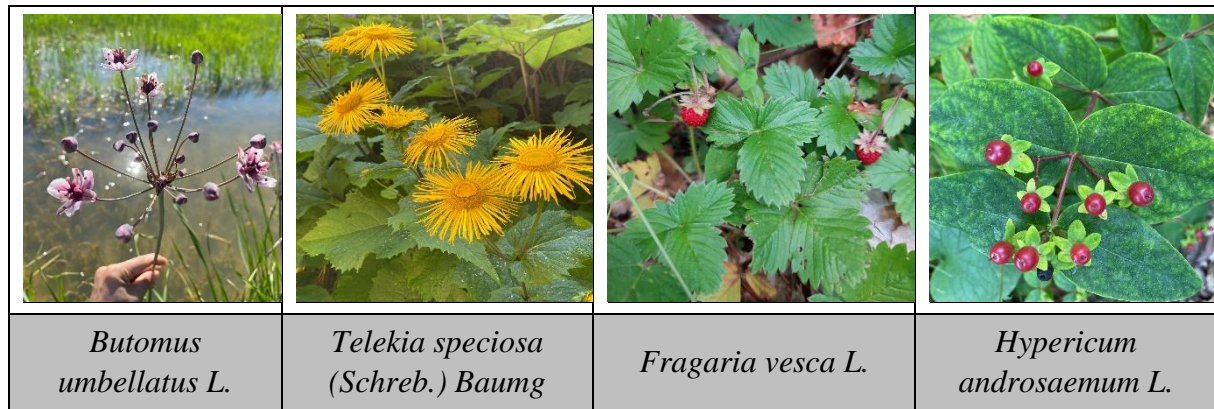
**Table 2.** Topography complexity ranking system

Topographic complexity	Value
Very Low	0-11
Low	12-22
Medium	23-33
High	34-44
Very High	45-55

While a 55-point grid has the highest diversity in terms of 11 topographic variables, it is not possible for a 0-11 point grid to have very high diversity in any variable.

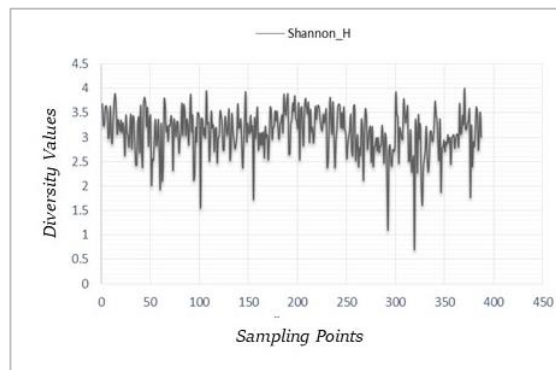
### **3. FINDINGS and DISCUSSION**

Species with different growth forms exhibited similar patterns in the same habitat areas. In sampling areas rich in herbaceous plant species, woody plant species also showed remarkable richness values. This richness reached its highest value towards the core urban areas within the study area. Herbaceous plants exhibited significantly high diversity values in the research area. In our research, 722 species were identified, and we recorded a species abundance of 10,173. While it's not possible to share all the species identified in the study area here, some plant species can be listed as follows: *Tilia tomentosa* Moench, *Castanea sativa* L., *Fagus orientalis*, *Prunus laurocerasus* L., *Carpinus betulus* L., *Taxus baccata* L., *Abies nordmanniana* subsp. *equi-trojani*, *Rhododendron ponticum* L., *Butomus umbellatus* L., *Telekia speciosa* (Schreb.) Baumg, *Fragaria vesca* L., *Hypericum androsaemum* L., *Verbascum blattaria* L., *Spiraea bumalda* L., *Thymus vulgaris* L., *Vinca minor* L., *Malus sylvestris* Miller ssp. *orientalis*.



**Figure 4.** Examples of some plant species samples identified in the sampling areas

High plant species diversity was recorded in the research area (Figure 5). The sampling point in the continuous urban structure group in the Corine land cover was the area where the highest plant diversity was recorded.



**Figure 5.** All plant (tree-shrub-herbaceous) species diversity in the research area.

The sample areas with known coordinates were transferred to the ArcGIS environment along with *Shannon\_H* diversity values, and a spatial distribution was interpolated using the Distance Weighted Interpolation Method (Watson and Philip).

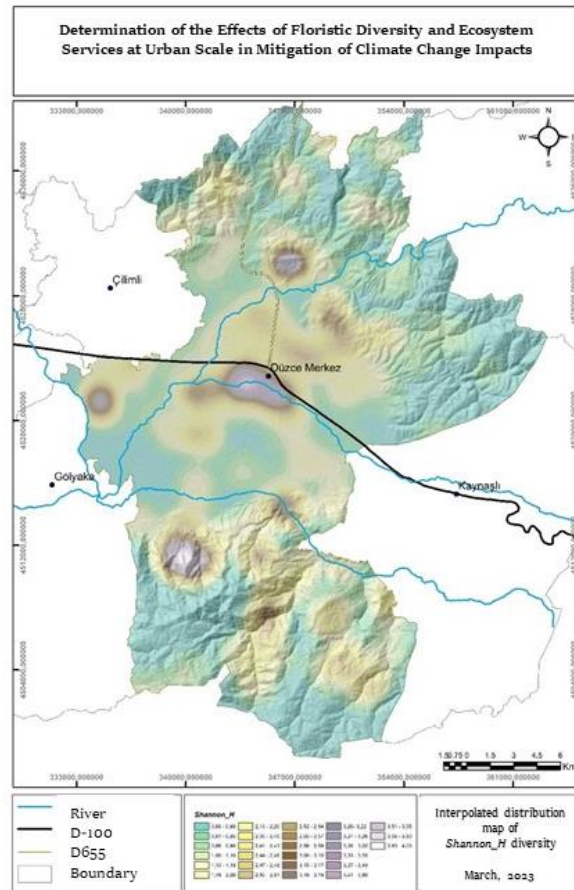
Spatial distribution was mapped using the IDW tool in ArcGIS (Figure). In the IDW method, values for each cell are determined based on distance increase for unsampled points.

The IDW estimator formula is : 
$$z(X_0) = \frac{\sum_{i=1}^n \frac{X_i}{h_{ij}^\beta}}{\sum_{i=1}^n \frac{1}{h_{ij}^\beta}} \quad (3)$$

The location  $X_0$  where predictions are made is a function of neighboring measurements  $n$  ( $z(X_0i)$  and  $i=1,2,\dots,n$ );  $r$  is the upper limit that determines the assigned range of observations, and  $h$  is the distance that separates the observation location  $X_i$  from the prediction location  $X_0$ . As the exponent increases, the assigned weight of observations at a distant distance from the prediction location decreases. Increasing the exponent indicates that predictions closely



resemble observations closest to them (Loyd 2007). Mathematical formulas were calculated in the ARCGIS software environment, and maps were generated (Figure 6). Accordingly, high diversity was recorded in some specific patches in the urban core area, in the north and south of the city.



**Figure 6.** Interpolated distribution map of *Shannon* diversity

The classification of values obtained (which range from 0.6 to 4.0) in the *Shannon\_H* plant species diversity analysis is divided into 5 categories (Table 3).

**Table 3.** Classification of *Shannon\_H* diversity values

	Values	Categories in five group
<i>Shannon_H</i> plant species diversity	0,6 – 1,0	1
	1,1 – 1,5	2
	1,6 – 2,0	3
	2,1 – 3,0	4
	3,1 – 4,0	5





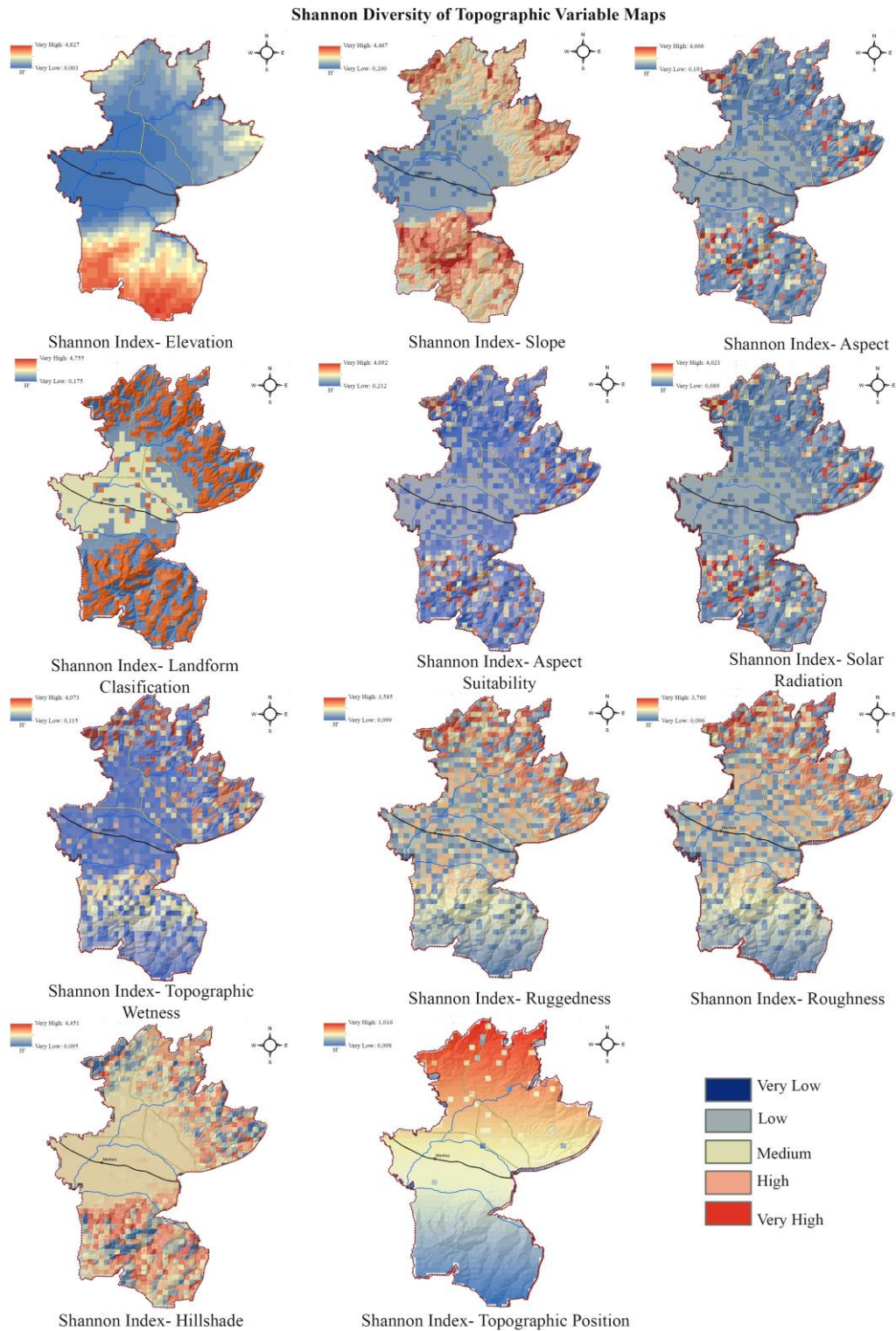
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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

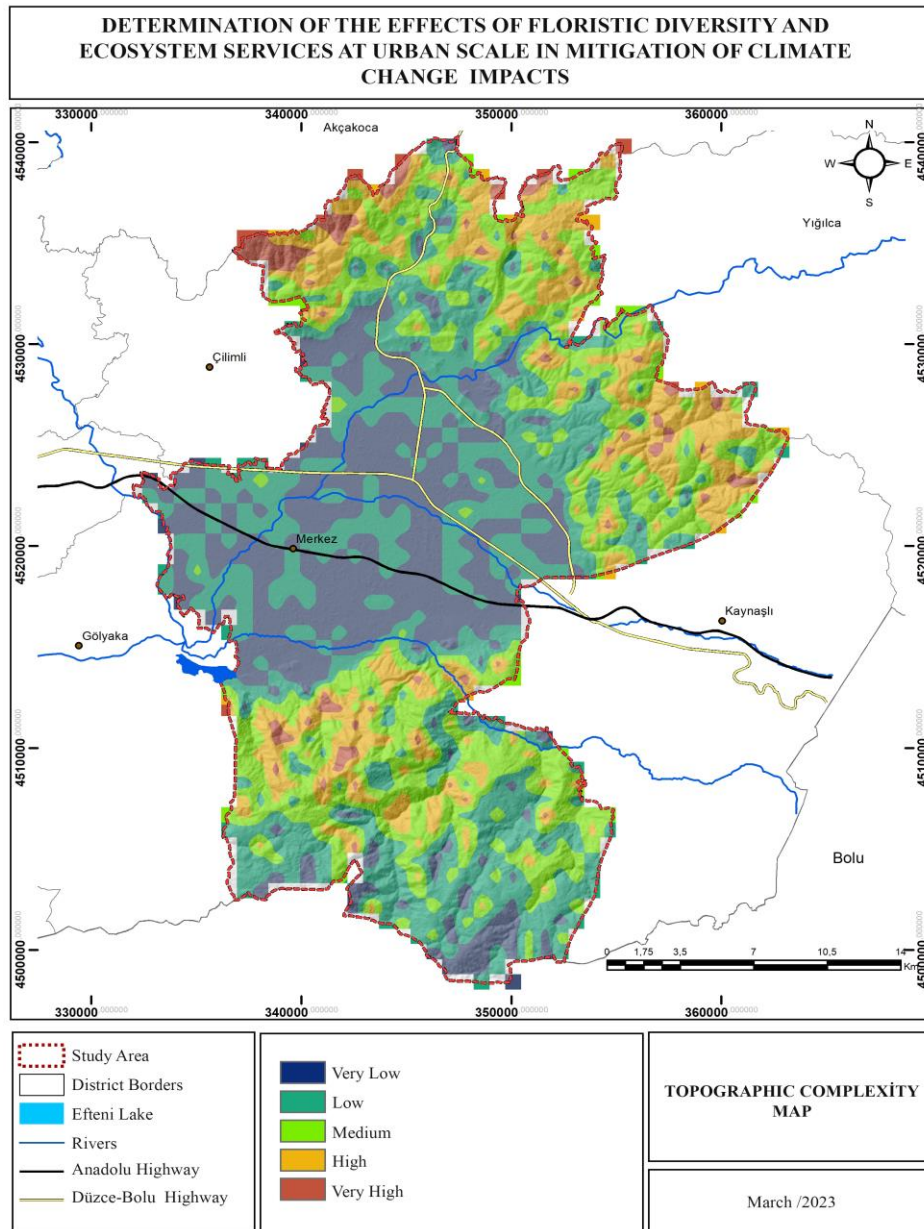
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Both topography and species diversity can be a buffer against climate change and extreme climate events (Ackerly et al., 2010; Isbell et al., 2015). Areas with high topographic complexity in terms of slope, aspect, elevation, and solar radiation reveal climate diversity at the local scale (Badgley et al., 2017). In addition, topographic diversity influences species diversity and functional and structural diversity (Langdon and Lawler, 2015). The northern and southern parts of the study area have hilly and rugged terrain, while the central parts have flat terrain. Therefore, the central regions of the study area have low and very low diversity in terms of all considered topographic variables. Shannon index values and maps of topographic variables are given in the figure 7.



**Figure 7.** Spatial distribution and *Shannon* diversity values of topographic variables. Shannon H values obtained from each topographic variable were scored on a 5-point scale (very high-high-medium-low-very low). Environmental variables, especially elevation, aspect, and

slope, are the main topographic factors that control the distribution and patterns of vegetation (Titshall et al., 2000). Elevation is the most critical factor for detecting diversity distribution (Busing et al., 1992). Elevation Shannon diversity low or very low 2/3 of the study area. Additionally, it is detected that topographic variables such as slope, aspect, solar radiation, and aspect suitable diversity in Düzce city center and its surroundings are very low and low. However, the ruggedness and roughness of Shannon's diversity are changeable in the center. According to Shannon's diversity results, TPI values were not comparable because of values proximity. Based on the data gathered, an overlay analysis was utilized on all maps to generate a topographic complexity map (Figure 8).



**Figure 8.** Spatial distribution of topographic complexity in the study area



It is observed that the topographic complexity is very low and low in the middle part of the study area. Some patches have very high topographic complexity in the mountainous regions north and south of the study area. The topographic complexity is very low and low in the middle part of the study area. Some patches have very high topographic complexity in the mountainous regions north and south of the study area (Figure 7). In this context, the mid-elevation areas of the northern and southern parts of the study area are anticipated to exhibit high plant diversity and capacity for ecosystem services (Table 4)

**Table 4.** Rate of topographic complexity in the study area

Topographic complexity	Area (Hectare)	(%)
<b>Very Low</b>	18.126,6	27,27
<b>Low</b>	21.392,6	32,19
<b>Medium</b>	12.977,8	19,53
<b>High</b>	10.174,1	15,31
<b>Very high</b>	3.777,55	5,68
<b>Total</b>	66.448,65	100

High and very high topographic complexity was determined in only 20,9% of the study area. 59,3 % of the study area has low and very low topographic complexity.

The results, where both Shannon diversity values (topographic diversity and plant species diversity) were classified into five categories, were organized on a new scale for evaluation. Accordingly, the intersection points of the highest diversity values (5,4) were assigned the designation ‘VH’ (very high), while the points with the lowest diversity values (1,2) were designated as ‘VL’ (very low), and other values [High (H), Medium(M), Low(L)] were distributed proportionally in a table (Table 5).

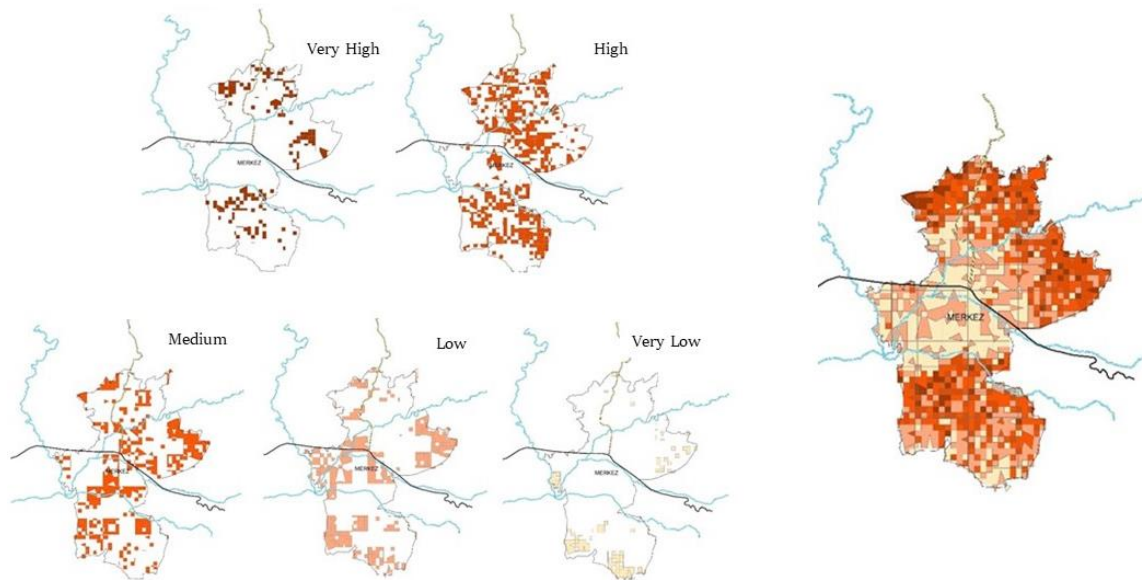
**Table 5.** Integrated Assessment of Topographic Diversity and Plant Species Diversity Values

<b>Integrated Shannon <i>H</i> Plant Species Diversity Values</b>					
<b>Shannon <i>H</i> Topographic Heterogeneity</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
	(3,1 – 4,0)	(2,1 – 3,0)	(1,6 – 2,0)	(1,1 – 1,5)	(0,6 – 1,0)
<b>5</b>	VH	VH	H	H	M
<b>4</b>	VH	H	H	M	L
<b>3</b>	H	H	H	M	L
<b>2</b>	H	M	M	M	VL
<b>1</b>	M	L	L	VL	VL

(VH: very high, H: high, M: medium, L: low, VL: very low)



Using the integrated diversity table as a basis, a topographic heterogeneity map and a map depicting the distribution of plant species diversity were obtained in ArcGIS 10.4. Each encounter was queried using the ArcGIS attribute query toolbar, and the results were mapped.



**Figure 9.** Integrated Assessment of Topographic Diversity and Plant Species Diversity

Topographic diversity and species diversity considered together to determine landscape value (Figure 9). It is possible to discuss a positive relationship between topographic diversity and species diversity. Points where environmental variables show heterogeneity have also showed similar results in terms of species diversity. According to the results, areas with a 'high' value in the study area have the highest diversity distribution rate.

The diversity of tree species is an important indicator of structural diversity. An area consisting of mixed tree species is expected to be resilient to external threats and climate change (Cohen, 1992; Norton et al., 2005). Areas exhibiting high topographic heterogeneity in terms of slope, aspect, elevation, and solar radiation reveal local-scale climate diversity (Carroll et al., 2017; Littlefield et al., 2017). This phenomenon can enhance resistance and adaptive capacity in the face of climate change (Langdon and Lawler, 2015). Elevation, aspect, and slope, among other environmental variables, are the primary topographic factors that control the distribution and patterns of vegetation (Titshall et al., 2000). Among these factors, elevation is considered the most significant (Busing et al., 1992). The diversity of environmental variables determines microclimates and, consequently, the large-scale spatial distribution and vegetation models (Allen and Peet, 1990; Busing et al., 1992). In this context, it was expected that areas with



moderate elevation in the northern and southern parts of the study area would exhibit high plant diversity and ecosystem service capacity, and the results were consistent with this expectation.

#### **4. CONCLUSION and RECOMMENDATIONS**

Topographic diversity influences microclimates and soil structures, consequently affecting plant diversity. This effect exhibited a positive pattern in the research area. The positive pattern observed in our study highlights the intricate relationship between topographic diversity and biodiversity. This phenomenon underscores the critical role that topographic factors like elevation, aspect, and slope play in shaping the distribution and composition of plant communities within an ecosystem. Moreover, the influence of these topographic factors on microclimates and soil characteristics further underscores their significance in maintaining and enhancing plant diversity.

Understanding these relationships and patterns is crucial for effective conservation and management strategies, especially in the context of changing climates and environmental conditions. By recognizing the importance of topographic diversity in supporting diverse plant communities, we can better appreciate the resilience and adaptability of ecosystems to environmental changes.

In conclusion, our study emphasizes the need to consider topographic diversity as a fundamental driver of biodiversity and ecosystem services. As we continue to grapple with the challenges posed by climate change and habitat degradation, acknowledging the role of topography in fostering plant diversity becomes increasingly vital for informed decision-making and conservation efforts.

#### **Thanks and Information Note**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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Within The Framework of Sustainable Development**  
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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MOGAN VE EYMİR GÖLLERİNİN ANKARA KENTSEL YERLEŞİMİNDE OLUŞTURDUĞU ENERJİ ÇEVRE ETKİLEŞİMİNDEKİ YERİ VE OLUŞAN SORUNLARIN ANALİZİ

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#### ÖZET

Araştırmada ülkemiz koşullarındaki kentleşme olgusunda enerji oluşumu ve doğal çevre açısından değerlendirilmesi ile oluşan sorunların minimize edilmesi amaçlanmıştır. Bu bağlamda kentsel yerleşme alanlarındaki gerek gerek doğal çevreye müdahale ve gerekse enerji – çevre ilişkisi günümüz kentleşme olgusunda önem kazanmıştır. Dolayısıyla genel ilişkide tanımlanan kavram, Mogan ve Eymir Göllerinin Ankara kentsel yerleşimi ile olan etkileşimi olarak sebep sonuç ilişkisi ele alınmasıyla; -Kentsel enerji kaynağı olan güneş enerjisinin Ankara kentsel alanı için doğal çevredeki yararlanılabilir ölçüsü, -Doğal çevreye olan müdahale sonucu Mogan ve Eymir Göllerinin olumsuz etkileşimi, -Enerji, kentsel yerleşme ve çevre ilişkisinin arasındaki dengenin korunma zorunluluğu ve Mogan, Eymir Göllerinin bu oluşumdaki rolü, gibi doğal çevre verilerine duyarlık günümüzde artan nüfus karşısında ön plana çıkmıştır. Yukarıdaki temel çerçeve doğrultusunda doğal enerji kaynağı olan güneş enerjisinin kentsel yerleşme ilişkisi kurularak; -Mogan ve Eymir Göllerinin Güneş-Enerji-Çevre ilişkisindeki etkileşim boyutu, -Mogan ve Eymir Göllerinin çevre sorunlarının doğal çevre dengesi ve asgari düzeye indirilmesi, sağlanmış olur. Yukarıdaki sorunlar ve bu sorunların kentlere yansıyan sonuçlarının önlenmesi için. Mogan ve Eymir Göllerinin yakın çevre olgusunda planlama boyutuna kadar olan etkileşimi analiz edilecektir. Bu araştırma su kaynakları ile yakın çevresindeki kentsel yerleşme örneklerinde önem içermektedir. Sonuçta sorunlar saptanıp etkileşimin boyutu üzerinde durularak çözüm önerileriyle enerji çevre etkileşiminde kentsel ekolojik dengenin korunmasının için önemli mesajlar verilecektir.

**Anahtar Kelime:** Enerji, Çevre, Kentsel Yerleşme





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTERACTION BETWEEN ENERGY AND ENVIRONMENT OF MOGAN AND EYMIIR LAKES IN ANKARA URBAN SETTLEMENT AND ANALYSIS OF PROBLEMS

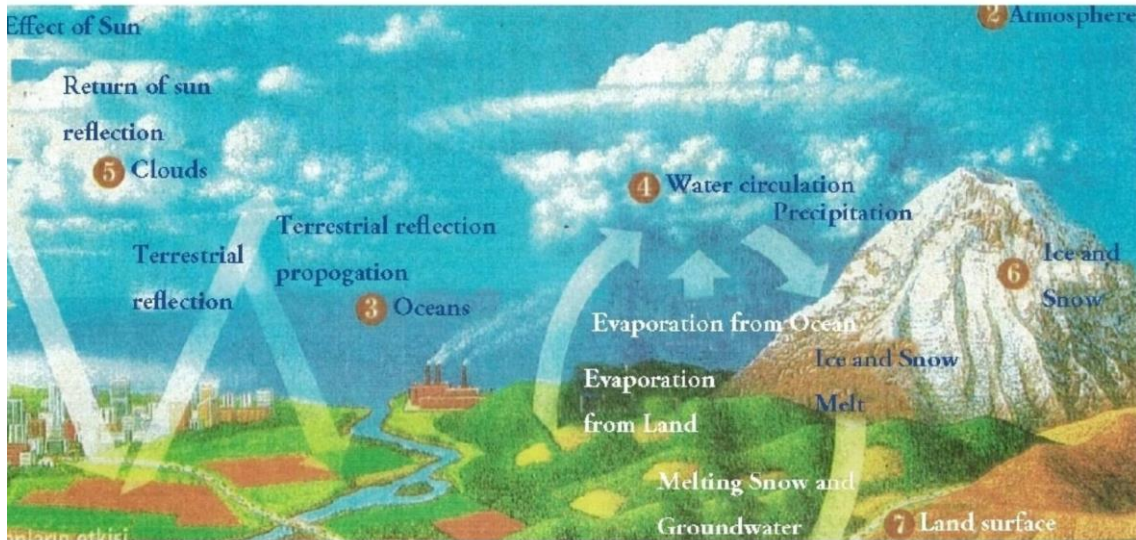
#### ABSTRACT

In the research, it is aimed to minimize the problems that occur by evaluating the urbanization phenomenon in our country in terms of energy generation and natural environment. In this context, both the intervention to the natural environment and the energy-environment relationship in urban settlement areas have gained importance in today's urbanization phenomenon. Therefore, the concept defined in the general relationship, considering the cause and effect relationship as the interaction of Mogan and Eymir Lakes with the urban settlement of Ankara; -The extent to which solar energy, which is an urban energy source, can be utilized in the natural environment for the Ankara urban area, -Negative interaction between Mogan and Eymir Lakes as a result of intervention to the natural environment, -The necessity of maintaining the balance among energy, urban settlement and environment and the role of Mogan and Eymir Lakes in this formation, Sensitivity to natural environmental data such as these has come into the forefront because of increasing population today. In line with the basic framework above, by establishing the urban settlement relationship between solar energy, which as a natural energy source; -The interaction dimension of Mogan and Eymir Lakes in the Sun-Energy-Environment relationship, -Balancing the natural environment and minimizing the environmental problems of Mogan and Eymir Lakes, is provided. To prevent the above problems and their consequences on cities. The interaction of Mogan and Eymir Lakes in the immediate environment phenomenon, up to the planning dimension, will be analyzed. This research is important in water resources and urban settlement examples in the immediate vicinity. As a result, the problems will be determined and the size of the interaction will be emphasized and important messages will be given for the preservation of the urban ecological balance in the energy-environment interaction with solution suggestions.

**Keywords:** Energy, Environment, Urban Settlement

## GİRİŞ

Bu çalışmada ülkemiz koşullarındaki kentleşme olgusunda, enerji oluşumu ve doğal çevre açısından değerlendirilmesi ile oluşan sorunların minimize edilmesi amaçlanmıştır. Dolayısıyla kentsel yerleşme alanlarındaki gerek doğal çevreye müdahale ve gerekse enerji-çevre ilişkisi günümüz kentleşme olgusunda önem kazanmaktadır. Bilindiği gibi doğa da hiçbir şey yoktan var olmaz ve varken yok olmaz kısacası dönüşür, fakat doğal yapıya müdahale ederken dengeli müdahale yapılmalıdır aksi takdirde yaşam alanlarındaki iklim yapısı değişime uğrar. Kısaca güneş enerji kaynağı olarak, kentsel alanlardaki çevre (bitki ve su dengesiyle birlikte) etkileşimi önemli bir yaşam dengesini oluşturur. Yerleşme alanlarında ki kentleşme olgusu nedeniyle doğal yapıdaki ekolojik denge korunamaz ise iklimsel değişimin yaşanmaması için doğal yapıda ki kullanımla da sürdürülebilirlik önem kazanmaktadır. Bu çalışma gelecekte sürdürülebilir doğal enerji kaynaklarının gerekliliğini içermektedir (Şekil 1) (Ergen,2023). Şekil 1.'de görüldüğü üzere kentsel alandaki müdahale, su, toprak, ağaç ve güneş etkileşimi tartışma nedeniyle ekolojik dengenin bozulmasına neden olacağının açık bir ifadesidir.



**Figure-1** Interaction of Water, Soil, and Air in Nature with Climatic Structure  
Source: Sabah Newspaper Sector Titled Melody Annex Page 5 (Saturday, August 15, 1998)

Bu oluşum özellikle Ankara kentsel yerleşmesinde, ekolojik yapıyı bozucu nitelikte doğal çevreye müdahale olarak ortaya çıkmaktadır. Ankara kent yapısı doğal arazinin tarımsal yeteneği yönüyle 1970 ve 1980'li yıllardaki konumu çerçevesinde değerlendirildiğinde kentsel alan ve doğal alandaki toprak yapısı belirli oranda çok fazla tahrip olmamış olduğu görülmektedir (Şekil-2).



**Figure-2** Ankara Kent yapısındaki Doğal Arazinin Tarımsal Yeteneği  
8<sup>th</sup> International Asian Congress on Contemporary Science – Proceedings Book (2023)

Doğal çevredeki bu kentleşme olgusu, Mogan ve EYMİR Gölleri ve yakın çevresinde flora(bitki), fauna(hayvan) ile birlikte olumsuz etkileşerek ekosistemin bozulmasına neden olmaktadır. Bilindiği gibi kentleşme doğal yapıyı olgusunu oluşturan toprak alanlarının yapılaşmayla taşlaşmaya doğru giderek doğal yapının bozulmasına neden olmaktadır(Resim-1). Cumhuriyetin kuruluş yıllarında kırsal alan özelliği %70 kırsal alan %30 kentsel alan olarak yer alırken, Şekil-3’deki yerleşme alanlarındaki nüfus artışı 1970 ile 1980 yılları arasında artış kaydederek günümüze gelirken tam tersine %30 Kırsal Alan %70 Kentsel olarak değişim gösterdiğini nüfus artışından görmekteyiz.

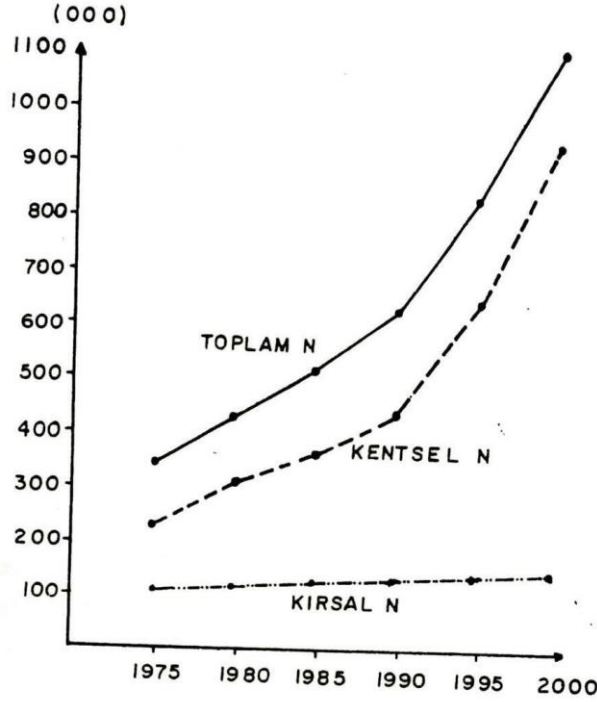


Resim-1 Gölbaşı Kentsel Yerleşmesinden Bir Görünüm

Kaynak:

[https://haber.sol.org.tr/sites/default/files/styles/content\\_image\\_size\\_type4/public/ankara-golbasi.jpg?itok=-KEkvoHR](https://haber.sol.org.tr/sites/default/files/styles/content_image_size_type4/public/ankara-golbasi.jpg?itok=-KEkvoHR) (03.10.2023- Saat:13:30)

Resim:1'deki uydudan hava fotoğrafından görüldüğü üzere günümüzdeki yapı yoğunluğu, 2000li yıllardaki nüfus artışına neden olan hızlı kentleşmenin sonucunu oluşturduğu açıkça Şekil. 3'de görülmektedir.



Şekil 3: Araştırma Alanının 2000 Yılı Kentsel ve Kırsal Nüfus Projeksiyonu (Ç. M. N. P. B., 1981)

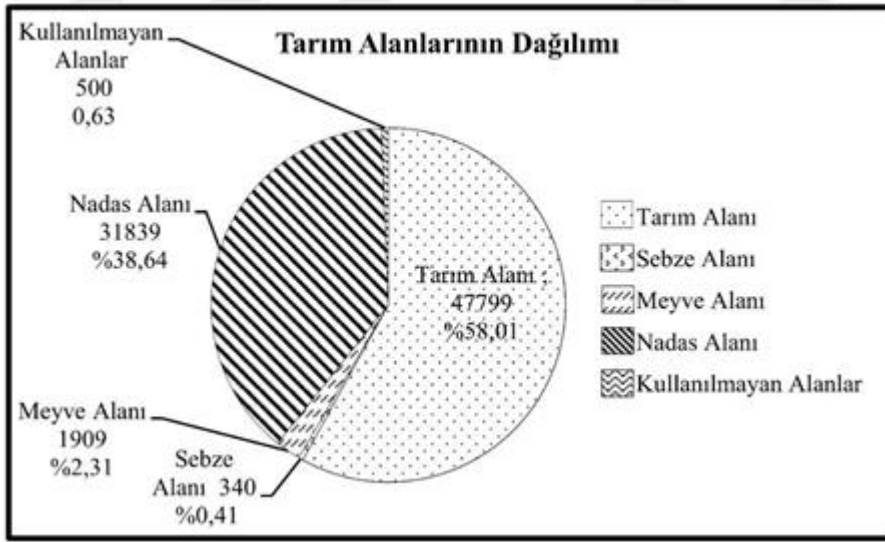
Bu bağlamda ekolojik planlama ağırlıklı kentsel gelişme hedeflenerek, enerji ve çevre etkileşiminde doğal dengenin bozulmasıyla oluşan çevre sorunları kontrole alınmış olacaktır.

Bu özellik kırsal alanın kentsel alana dönüşümünü yansıtmaktadır, Gölbaşında toprak kullanımını kırsal alan niteliğinde analiz edersek tablo 1'deki büyüklükler ve oranlar enerji çevre etkileşiminin toprak ile olan bağlantısını da ifade etmektedir. İlçenin kuzeyinde bulunan İncesu Vadisi haricinde sulama yapılan sebze tarımı bulunmamaktadır. Sebze tarımı, Mogan gölüyle direkt bağlantılı olan Su Kesen Deresi'nin çevresindeki verimli topraklarda yapılmaktadır. Bu alan, dere vadisini takip eden Şerit Şeklinde 340 ha'lık bir alandır. Kavun, domates, salatalık, taze fasulye, taze soğan, biber, patlıcan yetiştirilen sebze ürünleridir (Şensoy, 2022-Anonim 2020e).



Tablo.1 Gölbaşı İlçesi Tarım Alanlarının Dağılımı(Şensoy, 2022)

Gölbaşı İlçesi Tarım Alanlarının Dağılımı		
Cinsi	Tarım Alanı (ha)	Toplam Alana Oranı (%)
Nadas Alanı	31839	58,01
Kullanılmayan Alan	500	0,41
Tarla Alanı	47799	2,31
Sebze Alanı	340	38,64
Meyve Alanı	500	0,63
Toplam	82387	100



Şekil. 4. Gölbaşı ilçesi tarım alanlarının dağılımı (Anonim 2020e)

## MALZEMELER ve YÖNTEMLER

### Ankara Metropolen Alanında Mogan ve Eymir Göllerinin Yakın Çevre Etkileşimi

Mogan ve Eymir Göllerinin doğal yapısı nedeniyle Ankara İmrakor vadisi ile göllerin bulunduğu vadi, birbirinin devamı niteliğinde oluşmuş olup kentsel yerleşme ile de bir iç içelik oluşturmuştur. Bu iç içelik, Ankara kent makro formunun kentin dış saçaklarına doğru büyümesiyle oluşurken etkilenen Eymir Gölü ve Gölbaşı kentsel yerleşmesinin içinde yer alan Mogan Gölü, hem göllerin kirlenmesi ve hem de göllerin yakın çevresindeki doğal çevreye olan müdahaleler ile ekosistemin bozulmasına neden olmaktadır. Gölbaşı kentsel alanında yer alan Mogan ve Eymir Gölleri kırsal bir yerleşme sürecinde iki göl birbirine su akışı sağladığı göllerin konumundan anlaşılmaktadır, ancak hızlı kentleşme ile kırsal alandaki doğal

konumuna yapılan müdahalelerle iki ayrı, birbirinden irtibatı kopuk bir konum oluşmuştur(Resim-2).



Resim:2 Gölbaşına özgünlük veren Mogan ve Eymir Göllerinin fiziki mekandaki konumu

Kaynak:

[https://www.google.com/search?q=ankara+g%C3%B6lba%C5%9F%C4%B1+uydu+g%C3%B6r%C3%BCnt%C3%BCs%C3%BC&sca\\_esv=570303733&rlz=1C1YUHU\\_trTR1006TR1006&ei=JOkbZbjhH--pxc8P6Jqw2Aw&oq=Ankara+G%C3%B6lba%C5%9F%C4%B1+uydu++resimleri&gs\\_lp=EgxnD3Mtd2l6LXNlcnAiUFua2FyYSBHw7ZsYmHFn8SxIHV5ZHUgIHJlc2ltbGVyaSoCCAAYBRAAGKIEmgUQABiiBDIFEAAyogQyBRAAGKIEmgUQABiiBEixVFAAWK8ScAB4AZABAjgBogGgAfwGqgEDMC43uAEBYAEA-AEB4gMEGAAGQYgGAQ&scient=gws-wiz-serp](https://www.google.com/search?q=ankara+g%C3%B6lba%C5%9F%C4%B1+uydu+g%C3%B6r%C3%BCnt%C3%BCs%C3%BC&sca_esv=570303733&rlz=1C1YUHU_trTR1006TR1006&ei=JOkbZbjhH--pxc8P6Jqw2Aw&oq=Ankara+G%C3%B6lba%C5%9F%C4%B1+uydu++resimleri&gs_lp=EgxnD3Mtd2l6LXNlcnAiUFua2FyYSBHw7ZsYmHFn8SxIHV5ZHUgIHJlc2ltbGVyaSoCCAAYBRAAGKIEmgUQABiiBDIFEAAyogQyBRAAGKIEmgUQABiiBEixVFAAWK8ScAB4AZABAjgBogGgAfwGqgEDMC43uAEBYAEA-AEB4gMEGAAGQYgGAQ&scient=gws-wiz-serp)

Doğal yapıdaki bozulmaların yol açtığı bu çevre sorunları ekosistemlerin yer aldığı “biyosfer” yapısında olumsuz etkilediği bilinen bir gerçektir. Çünkü “biyosfer“ deki bozulma ekosistemdeki flora(bitki) ve fauna(hayvan) ile, canlı organizma topluluklarını ve insanı kapsamakla kalmaz, iklim ve güneşin fizik koşullarını olduğu kadar organizmaların kendi aralarındaki ve organizmalarla fiziki koşullar arasındaki etkileşimleri de içerir(Uslu, 1986).

Bu etkileşim Mogan ve Eymir Göllerinin kirlenmesine neden olurken yakın çevredeki ekosistemler ve dolayısıyla “biyosfer”i olumsuz etkileyerek enerji ve iklim etkileşimi ile çevre sorunlarına neden olmaktadır. Bilindiği gibi Gölbaşı yerleşmesi kırsal alan özelliği ile başlayıp, nüfus artışı olgusunun kentleşmeye yönelik etkisiyle büyüyen ve tarımsal özelliğini merkez yerleşmede kaybederek günümüzde tarımsal alanlarda yapılaşmalar ile yer almıştır.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Gölbaşı yerleşme alanını geçmişten günümüze gelirken belirli zaman periyotlarında ki toprak alanı kullanımını Tablo-2’de ki değişimleriyle incelediğimizde, kırsal alan özelliğinden bugünkü kentsel alan ile toprak kullanımı ile yeşil alanların gittikçe azaldığını görebiliriz. Bu tablo bize Gölbaşı’ndaki gelişmenin Mogan ve Eymir Göllerini nasıl olumsuz etkilediğinin birer kanıtıdır.

Yeşil kent alanları, sürekli kent alanlarının ve inşaat alanlarının artmasına bağlı olarak 2000-2006 yılları arasında 122 ha (%20,71), 2006-2012 yılları arasında 163 ha (%34,90) azalmış, 2012-2018 yıllarında da ağaçlandırma ve tarımsal alanların artmasına bağlı olarak 114 ha (%37,5) artmıştır. Konutlaşma, yapılaşma ve ulaşım artmasıyla eğlence ve spor alanları, 2000-2006 yıllarında 139 ha (%35,92), 2006-2012 yıllarında 40 ha (%16,13) azalmıştır. 2012-2018 yıllarında bu alanlar değişmemiştir(Şensoy,2022).

Tablo:2 Havzadaki Yapay Bölgelerin Yıllara Göre Değişim Oranları(Şensoy, 2022)

Arazi Örtüsü ve Alan Kullanımı	Corine 2000-2006 Değişim(ha)	Corine 2006-2012 Değişim(ha)	Corine 2012-2018 Değişim(ha)	Oran (%)	Oran (%)	Oran (%)
<b>1.Yapay Bölgeler</b>				<b>1.Yapay Bölgeler</b>		
Sürekli Kent Alanları	1161	-475	Değişim yok	82,81	-18,53	Değişim yok
Kesintili Kent Alanları	-972	801	75	-20,20	20,86	1,62
Endüstri ve Ticaret Alanları	1075	398	95	75,65	15,95	3,28
Demiryolları ve Karayolları İlgili Alanlar	50	19	6	7,26	2,57	0,79
Maden Çıkarılan Alanlar	109	183	-8	32,06	40,76	-1,27
Boğaltım Alanları	88	-37	25	0	-42,05	49,02
İnşaat Alanları	88	-45	52	25,66	-10,44	13,47
Yeşil Kent Alanları	-122	-163	114	-20,71	-34,90	37,50
Eğlence ve Spor Alanları	-139	-40	Değişim yok	-35,92	-16,13	Değişim yok
Toplam	1338	641	359	13,40	5,66	3,00

+Artış -Azalış



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Yukarıda açıklanan materyaller çerçevesinde enerji çevre etkileşiminde önemli rol oynayan kentleşme olgusunun toprak, yeşil alan ve su ögeleri arasındaki dengenin bozulmasıyla enerji oluşumundaki olumsuz bir gelişme söz konusu olmaktadır. Bilindiği gibi doğanın en önemli sürdürülebilir enerji kullanım dengesi toprak, su ve yeşil alan özelliğidir. Yöntem olarak enerji oluşumundaki bu üç malzeme, enerjinin olmazsa olmazıdır ve kentleşme oranı bu dengenin bozulmadan oluşturulmasını gerektirir.

### BULGULAR ve TARTIŞMA

**Mogan ve Eymir Göllerinin Yakın Çevres Dolayısıyla kentleşmenin gereği olan yapılaşma oranları oluşturulup doğal dengenin bozulmaması sağlanmalıdır. İçindeki Kentsel Gelişimde Enerji, Çevre Etkileşimi ve İklimle olan Etkisi**

Kentsel gelişmenin doğal yapıyı bozucu bir eylem olduğu bilinen bir gerçektir. Bu doğal yapının bozulmasında enerji, çevre olgusu iç içedir çünkü enerjinin elde edilişi ve enerjinin kullanılışı çevrenin sınırları içinde olmaktadır. Dolayısıyla çevre, kentsel gelişme sonucu etkilendiği için Morgan ve Eymir göllerinin yakın çevresindeki doğal yapıya yapay olarak müdahale ile güneş enerjisinden yararlanma oranı değişmektedir. Öncelikle canlıların yaşamının devamlılığını sağlayan güneş ışınlarının yeryüzündeki bu yapay müdahaleleri, güneş enerjisinin fotosentez yoluyla kimyasal enerjiye(besine dönüşümünü etkilemektedir. (Ergen, 1996).



Buradan n sayısı2'den 12'ye kadar değişebilir, ancak glikoz için 6'dır)

Açıklanan enerji ilişkisi bilindiği gibi ekolojik dengenin bulunduğu alanlarda söz konusudur. Kentleşme yoluyla suyun kirlenmesi, yakın çevre yerleşmeleriyle yeterli flora(bitki) ve fauna(hayvan) özelliklerinin korunamaması sonucu önce "ekosistem" de bozulma ardından "biyosfer de bozulmalar olmaktadır. Dolayısıyla bu zincir halkası gibi birbirine bağlı olan kentleşme, Mogan ve Eymir Göllerini ve yakın çevresi birbirini etkilemektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SONUÇ ve ÖNERİLER

#### Sonuç:

Bilindiği gibi doğaya yapılan bu müdahalenin, doğal dengeyi etkileyeceği açıktır. Yukarıda ortaya koyduğumuz etki ve oluşan sorunlar, genelde kent planlama sistemlerimizdeki ekolojik planlama olgusunun gözardı edilmesiyle ortaya çıkmaktadır. Bu bağlamda Mogan ve Eymir Gölleri çevresindeki doğal yapı ile ekolojik bir bütünlük oluşturmakta ve göllerde yaşanan problemler büyük ölçüde bu çevrede gelişen sağlıklı kentsel çevre kullanımlarından kaynaklanmaktadır. Bu ekolojik bütünlüğün korunması ve sağlıklı yaşama mekanlarının oluşturulması için ekolojik planlama yaklaşımının getirilmesi gerekmektedir(Aydoğuş, 1995). Bu ilke doğrultusunda planlama ele alındığında, doğal kaynaklar ne kadar tüketilecek ve ne ölçüde doğal kaynaklara müdahale edilecek(planlama ile) saptanmış olacaktır. Böylece kentsel alan ile iç içe olan Mogan ve Eymir Göllerinin ve yakın çevresinin kullanımında;

- Kentlerin doğal enerji kaynağı olan güneş enerjisinin Ankara kentsel alanı in doğal çevredeki yararlanılabilir ölçütü,
- Doğal çevreye olan müdahale sonucu Mogan ve Eymir Göllerinin olumsuz etkileşimi,
- Enerji kentsel yerleşme ve çevre ilişkisinin arasındaki dengenin korunması zorunluluğu ve Mogan-Eymir Göllerinin bu oluşumdaki rolü,

Gibi doğal çevre verilerinin saptanması gereklidir. Yukarıdaki açıklamalar doğrultusunda ekolojik yaklaşımlı planlama yapılarak kentsel gelişmeler oluşturulmalıdır. Bu bağlamda da Mogan, Eymir Gölleri ve yakın çevresinde etkilenme kuşağı oluşturularak doğal dengenin korunması sağlanmalıdır.

#### Öneriler:

Araştırmanın enerji çevre ilkesi doğrultusunda, doğal enerji kaynağı olan güneş enerjisi ile ilişkilendirilerek;

1-Makro düzeyde,

2-Mikro düzeyde,

Planlama sisteminde analiz edilmelidir. Bu yöntemle elde edilen veriler doğrultusunda Mogan, Eymir Gölleri ile yakın çevresinde flora(bitki), fauna(hayvan) özelliklerinin doğal dengesinin kurulması sağlanmış olur.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Doğal dengenin korunması için yapılan bu çalışma ile öncelikle Mogan ve Eymir Göllerinin kirlenmesi önlenmiş olur. Bu bağlamda doğal enerji kaynağı olan güneş enerjisinin kentsel yerleşme ilişkisi kurularak;

- Mogan ve Eymir Göllerinin Güneş-Enerji-Çevre ilişkisindeki etkileşim boyutu,
- Mogan ve Eymir Göllerinin çevre sorunlarının doğal çevre dengesi ve asgari düzeye indirgenmesi,

sağlanmış olur, böylece yaşanan çevre sorunları, iklimdeki olumsuz değişimler ve bunun kentsel alana yansımalarının önlenmesi olanaklı olabileceği bir gerçektir.

### **Teşekkür ve Bilgi Notu**

Bu çalışma Ankara kentsel alanındaki hızlı kentleşme olgusunun kentin çeperlerine yayılması sonucu oluşan toprak, su ve yeşil alanların yapılaşmada kullanılmasıyla oluşan iklim krizi ve sürdürülebilir enerji sorununu ele alan uyarı niteliğindeki bir çalışmadır. Bu çalışma Peyzaj Mimarı Öğr.Gör. Nihan Şensoy'un Yeşil Alan Yönetimi içerikli Doktora Tez(2022) çalışmasındaki verilerin oluşturduğu mesajlar kapsamında gerçekleştirilmiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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**EXAMINATION OF EDIBLE FLOWERS IN TERMS OF DIFFERENT CULINARY CULTURES**

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**ABSTRACT**

In today's world, consumers engage in dining activities not only to fulfill their nutritional needs but also to enjoy leisure time, participate in social life, and experience different culinary adventures. Particularly, edible flowers have caught the attention of consumers who seek unique and novel experiences. It is known that edible flowers, whose usage is increasing day by day, have been employed in various contexts since ancient times (Zheng, Meenu, & Xu, 2019). Edible flowers, with their attractive colors, fragrances, soothing aromas, and distinctive appearances, have garnered attention. Their tastes, nutritional properties, low fat content, and energy content have expanded their areas of use (Pires et al., 2019). One of these areas undoubtedly includes kitchens and has been part of the culinary traditions of many countries. In this context, this research aims to elucidate the place and significance of edible flowers in various culinary cultures. Within the scope of the defined objective, edible flowers in Turkish cuisine, Chinese cuisine, and French cuisine have been examined, and cross-cultural comparisons of edible flowers have been conducted. The results obtained reveal that edible flowers are highly diverse and are used in similar ways in different cuisines. Nevertheless, the research identifies that edible flowers found in Chinese and French cuisines differ from those in Turkish cuisine.

**Keywords:** Edible Flowers, Culinary Culture, Turkish Cuisine, Chinese Cuisine, French Cuisine





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

With the increase in population, changes in rural and urban areas bring with them a number of problems. While these problems reduce the quality of individual life, they can also cause major social problems. One of these problems is related to agriculture and food production.

Studies show that by 2050, two-thirds of the world's population and 95% of Türkiye's population will live in urban areas, and the importance of not only improving environmental quality and livable areas but also making cities safer by increasing urban food production will increase (Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2023). In this process, edible landscaping as a part of urban green infrastructure has emerged as a vital practice in improving the environment, protecting self-supporting systems, and increasing open and green space functions (Gittleman et al., 2017).

Edible landscaping is a type of landscaping that results from the use of edible plant species (fruit trees, vegetable species, edible flower species and other ornamental plants) to meet both functional and aesthetic expectations that will fulfill multiple functions such as food, taste and aesthetic appearance (He & Zhu, 2018). Also called food landscape, it is a sustainable food systems approach that encourages all people to produce their own food and local food (Karaca, 2019).

Plants in the edible landscape; These are plants that can be safely eaten by humans and/or produce edible parts. Thanks to edible plants, edible plants can lead to the reconnection of people's food systems and urban green areas and the promotion of a more active lifestyle (Ling et al., 2018). Through urban food production and edible plants, in addition to the aesthetic and functional properties of plants (such as reducing the direction and intensity of the wind, balancing the air temperature by controlling the sun's rays, reducing air pollution by trapping dust, increasing air humidity, creating a habitat by providing living space for other living things), ecological. It also contributes to the urban ecosystem with its features.

By increasing biodiversity with these contributions;

- Maximizes water and energy efficiency,
- Supports natural and healthy life,
- Promotes sustainable practices that will reduce the use of chemicals in the landscape,
- Improves the relationship between people and nature and
- Gives more people information about local food systems.



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

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Other benefits provided by the use of edible plants include observing the growth processes of the food consumed by urban people, encouraging people to produce, increasing people's quality of life by bringing them closer to nature, and contributing to urban ecosystem services. It is important for urbanites to experience the growth processes of plants, to be productive rather than consuming, and to enable the society to experience self-sufficiency (Lovell, 2010). This allows people to reconnect to their food systems and can create knowledge about where food comes from, how to grow it, and reconnect individuals to their food and nature (Karaca, 2019). Plants, which are an integral part of human life, have many benefits that can be classified as ecological, economic, functional and aesthetic functions. Ecologically, plants change the urban climate by affecting temperature and precipitation in order to increase the quality of urban life, increase the air quality of the city and create a living space for living things.

Functionally, they are used to control wind, noise, create visual curtains, provide privacy, limit and guide, as well as erosion control in areas requiring landscape restoration and re-qualification of abandoned green areas. Aesthetically, especially the seasonal changes of plants, their components such as leaves, flowers and fruits, as well as the leafless branching, trunk bark and calligraphic formations they create, give cities different landscapes (Eren et al., 2016). Economically, they provide different landscapes to cities, especially in food, health and cosmetics. It contains benefits. In this context, edible landscaping works are gaining importance day by day, especially in urban areas. Edible landscaping forms the basis for promoting urban agriculture with sustainability and biodiversity, highlighting the interest of urban people in more conscious and healthier eating habits.

## **2. MATERIALS and METHODS**

The research has a qualitative design. Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and the qualitative process is followed to reveal perceptions and events in a realistic and holistic way in the natural environment (Yıldırım & Şimşek, 2006). In this context, literature on the uses of edible flowers in Turkish cuisine, Chinese cuisine and French culinary culture was scanned and the obtained data was examined in accordance with document analysis.

Although each country has its own culinary culture, Turkish cuisine, Chinese cuisine and French cuisine are among the few cuisines in the world with their food diversity, recognition and originality (Aktaş & Özdemir, 2012). Based on the 3 cuisines listed within the scope of the



research, first the general characteristics of edible flowers will be mentioned and then information about edible flowers will be given. It is thought that recording the flowers used in Chinese cuisine, French cuisine and Turkish cuisine cultures and evaluating them as a whole will contribute to the literature and sectoral practice.

### **3. FINDINGS and DISCUSSION**

#### **3.1. Edible Flowers**

Edible flowers; It can be defined as a food product that can cause changes in the taste, smell and color of the food or beverage to which it is added (Sarıışık & Kardeş, 2019: 431). Edible flowers are very delicate and delicate products. Although edible flowers are most commonly consumed fresh, they can also be consumed dried, in cocktails (ice cubes), canned in sugar and preserved in distillates (Mlcek & Rop, 2011).

It is used as a natural colorant as an alternative to the use of synthetic dyes in foods. Sometimes candied flowers are crystallized using egg whites and sugar (De, 2020). Flower-flavored oils and vinegars are made by infusing edible leaves into these liquids. Oils obtained from flowers are used in aromatherapy, and some flowers may even be used as dietary therapy due to their medicinal values. Flowers, which are rich in vitamins and minerals, can also be used as decoration on presentation plates or as part of the meal. The flowers in the edible landscape and their bloom times are given in Table 1.

**Table 1.** Edible Flowers ([www.thompson-morgan.com](http://www.thompson-morgan.com), [en.wikipedia.org/wiki/](http://en.wikipedia.org/wiki/)).

<b>Plant name</b>	<b>Flower color</b>	<b>Bloom</b>
Alyssum maritimum (Lobularia maritima)	White, pink, purple	June - August
Allium schoenoprasum L.	Purple	April-May
Antirrhinum majus L.	Wide range	May-October
Begonia tuberhybrida Voss.	Wide range	April-December
Bellis perennis L.	White, pink	March-August
Chamaemelum nobile (L.) All. (Anthemis nobilis L.)	White	June-July
Chrysanthemum morifolium L.	Wide range	June-September
Calendula officinalis L.	Yellow, orange	January-June
Canthamus tinctorius L.	Yellow, white, red, orange	June-July
Campanula spp. L.	Blue, white	June-August
Clitoria ternatea L.	Blue, white	May- September
Cosmos sulphureus Cav.	Yellow, red, orange	July- September
Glebionis coronaria L. (Chrysanthemum coranarium)	Yellow, white	June - August
Dahlia spp. Cav.	Wide range	March-November
Dianthus barbatus L.	Wide range	June - September
Dianthus amurensis L. Dianthus caryophyllus L. Dianthus chinensis L.	Pink, red, white, purple	June - September



**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

Dianthus deltooides L. Dianthus plumarius L. Dianthus superbus L.		
Eschscholtzia californica Cham.	Red, orange, yellow	June - September
Etlingera elatior R.M. Sm.	Red	January-May
Fuchsia spp. L.	Red, purple, pink, white	June - September
Freesia spp.	Red, purple, pink, white	April-July
Galium odoratum L.	White	May-July
Gladiolus spp. L.	Wide range	June - August
Gardenia jasminoides J.Ellis	White	April-May
Hemerocallis fulva L.	Orange, red	June -October
Hesperis matronalis L.	Purple, white, pink, and even some flowers with mixed colors	August
Hybiscus syriacus L.	White, red, orange, purple, yellow	June-September
Hyssopus officinalis L.	Blue, purple	July-September
Iberis sempervirens L.	White, blue, purple, pink	May- August
Impatiens walleriana Hook.f.	Red, lilac, purple, blue, yellow, white.	June - September
Lavandula angustifolia Mill. Lavandula multifida L.	Lilac	June - August
Lilium spp.	White, orange, pink, red	May-July
Melissa officinalis L.	White	June - August
Monarda didyma	Red	May- October
Muscari atlanticum	Purple	February- March
Mimulus L.	Wide range	June - September
Myosotis sp. L.	Blue, pink, white	April-May
Nelumbo nucifera	Red	May-September
Oenothera speciosa Nutt. Oenothera macrocarpa Nutt. Oenothera odorata Jacq.	Pink, white Yellow Yellow	May- August
Impatiens walleriana <a href="#">Hook.f.</a>	Wide range	May- September
Osteospermum ecklonis D.C.	Purple, white, pink	November-March
Pelargonium spp.	Wide range	April- September
Phlox paniculata L.	Pink, white, purple	April-July
Polianthes tuberosa (Agave amica)	Pink, white, yellow	September
Primula vulgaris L. Primula hybrida	Wide range	November-May
Rosa spp.	Wide range	June - September
Rosmarinus officinalis (Salvia rosmarinus)	Blue	April- May
Salvia elegans Vahl.	Red	May- December
Tagetes erecta L. Tagetes tenuifolia Millsp. Tagetes patula L.	Yellow, orange	September-February
Tropaeolum majus L.	Wide range	June- October
Tulbaghia violacea Harv.	Pink, purple, white	July- November
Viola odorata L. Viola tricolor L.	Purple, white Wide range	June- August



#### **4.Examination of Edible Flowers in Terms of Different Culinary Cultures**

Culinary culture is a holistic and unique structure consisting of food and beverages, meals and their preparation, cooking, storage, materials used, the tradition of eating and drinking, and the traditions and practices developed within this framework in order to meet people's nutritional needs (Doğdubay & Giritlioğlu, 2011: 433- 435). One of the most basic cultural characteristics of the people living in the same region is their food culture, in other words, their cuisine.

It is known that countries have a wide variety of foods and beverages in their cuisine. One of these is edible flowers, whose importance is increasing day by day. In addition to their widespread use as ornaments, flowers are also reported to be consumed as food as part of traditional cuisine or alternative medicine in various cultures around the world. Contrary to popular belief, flowers are much more than just decorations for delicious dishes and desserts; It provides a unique combination of sensations and increases the nutritional value of food preparations. They can be consumed fresh (e.g. Tagetes salads), but also in savory dishes containing meat and fish, in soups and beverages (wine, beer), in desserts, desserts, jellies, spices and dyes. More broadly, edible flowers are often used to add color, scent, and flavor to foods such as salads, soups, appetizers, desserts, and beverages (Mlcek & Rop, 2011; Fernandes et al., 2017; Rop et al., 2012).

##### **4.1. Edible Flowers in Turkish Cuisine**

Turkish cuisine, which is among the top three cuisines of the world, is one of the cuisines with a deep-rooted cultural value (Çakıcı & Eser, 2016: 216). Turkish cuisine, especially influenced by nomadic culture, was shaped by meat and dairy products and created today's rich food culture by interacting with other different cultures (Güldemir, 2014; Gökdemir, 2009). Turkish cuisine generally consists of soups, stews prepared with grains, meat and vegetables, pastries, olive oil dishes, fried foods, desserts and drinks; It also contains various unique food varieties such as bulgur, molasses, yoghurt and tarhana (Sürücüoğlu & Özçelik, 2008). In addition to all these foods and beverages, foods and beverages prepared from different flowers also have a special place. Flowers, used in many areas, have made significant contributions to the enrichment of Turkish cuisine. The flowers used in Turkish cuisine and their properties are listed below.

##### **4.1.1. *Tropaeolum majus* L.**

Nasturtium is the most popular among edible flowers (Friedman et al., 2007). Since it has a slightly bitter taste and colorful appearance, it is used to flavor and decorate salads (Eryilmaz



Acikgoz, 2017). Additionally, soups can be prepared with its leaves. It is also known that it is good for various diseases in teas prepared thanks to the vitamins and antioxidant properties it contains (Bazylko et al., 2013).



**Figure 1.** Foods prepared with *Tropaeolum majus L.*

#### **4.1.2. Rosa spp.**

Rose is a flower belonging to the Rosa genus in the Rosaceae family (Çetindaş, 2013). Thanks to its aroma and taste, it has been used in kitchens for many years in the preparation of various foods and beverages (Kirker & Newman, 2016). In particular, it is frequently used fresh in salads and garnishes, as well as as the main ingredient in jams, syrups/sherbets. It is also known that rose water is used in a wide variety of areas, from meat dishes to pilafs, from dough desserts to milky and light desserts, from pastes to Turkish delight (Belli & Belli, 2009; Yerasimos, 2010).



**Figure 2.** Foods prepared with *Rosa spp.*

#### **4.1.3. Dianthus caryophyllus L.**

It attracts the attention of gastronomy chefs due to its vibrant colors and spicy taste, and its flowers are used in kitchens. It is consumed raw, served in wine, and flower petals are crystallized with sugar and used to decorate cakes and other foods (Bayram, 2015). Apart from this, in some cookies and pastries such as cakes; It is used in quince and pear desserts, compotes and sherbets (Halıcı, 1990).





**Figure 3.** Foods prepared with *Dianthus spp.*

#### **4.1.4. Allium schoenoprasum L.**

The flavor of onion blossoms, commonly used in salads, sandwiches, and main dishes, is mildly pungent. The flowers of chives, which are collected from common onions, are utilized to impart flavor and enhance aesthetics in culinary applications. The petals of the flower are separated and consumed. Additionally, they are preferred in presentations due to their vibrant color. (Örnek, 2021).



**Figure 4.** Foods prepared with *Allium schoenoprasum L.*

#### **4.2. Edible Flowers in Chinese Cuisine**

China has one of the most well-known culinary cultures in the world (Aktaş & Özdemir, 2012). The Chinese people, who do not see eating only as a means of filling their stomachs, prioritize the idea of having fun and having a good time in the preparation and consumption of meals. Chinese cuisine contains a wide variety of dishes as it varies according to climatic conditions, agricultural product richness and regions (Polat, 2019). It can be said that in Chinese cuisine, emphasis is placed on a vegetable-based diet, meals are eaten using chopsticks, and milk and dairy products are consumed very little. It is known that edible flowers are constantly increasing in Chinese cuisine, which has a wide variety of food sources. Since ancient times, the Chinese have used edible flowers in herbal dishes, as flavor enhancers, and even to garnish food (Zhenk et al., 2018).

#### 4.2.1. *Etilingera elatior*

The taste of this flower species, which is frequently consumed in China, can be described as sour and sweet. Flowers, usually served with seafood, are also used in making Laksa (Noodle Soup) and give a different taste to the sauces ([www.asianinspirations.com](http://www.asianinspirations.com)).



**Figure 5.** Foods prepared with *Etilingera elatior*

#### 4.2.2. *Chrysanthemum morifolium L.*

The cultivation of chrysanthemums as a source of sustenance in China dates back to around 500 BC. It has a sharp spicy taste. The base of the leaves is bitter and must be plucked before eating. It is often used in soups or sprinkled on other dishes to add color. Known as the "radicchio" (red chicory) of edible flowers, the leaves of this plant add flavor to salads, cakes, stir-fries, rice dishes, and even broths and stews (Mlcek & Rop, 2011:562; Kumari et al., 2021; Lentini & Venza, 2007; Kevin, 2019).



**Figure 6.** Foods prepared with *Chrysanthemum morifolium L.*

#### 4.2.3. *Musa acuminata*

It is similar in taste and texture to an artichoke, a type of edible flower. Banana flowers can be eaten raw and are also used in soups, stews and curries. It can also be steamed, served with sauces, and peeled like an artichoke ([www.asianinspirations.com](http://www.asianinspirations.com)).





**Figure 7.** Foods prepared with *Musa acuminata*

#### 4.2.4. Osmanthus fragrans

This flower has an intense sweet scent. In Chinese cuisine, it is used to prepare guihuāchá (guicha), a fragrant tea. Its flowers can be mixed with green or black tea leaves. The flowers are also used to produce osmanthus-scented jam, sweet cakes, dumplings, soup and even liqueur. Osmanthus is also used to make many traditional Chinese desserts, such as Osmanthus Tang yuan with rice wine syrup ([en.wikipedia.org/wiki](https://en.wikipedia.org/wiki/Osmanthus_Tang_yuan)).



**Figure 8.** Foods prepared with *Osmanthus fragrans*

#### 4.2.5. Nelumbo nucifera

It is an almost entirely edible plant. Its leaves, stems, seeds and flowers have different flavors and uses. The rhizomes and roots are the most edible part of the flower and are often dried and cooked into chips, served in soups, and have a potato-like taste. While the leaves of the flower are frequently used as a garnish, its seeds are consumed as a snack throughout Asia and are also used to make a paste for stuffing in dumplings ([www.asianinspirations.com](http://www.asianinspirations.com)).



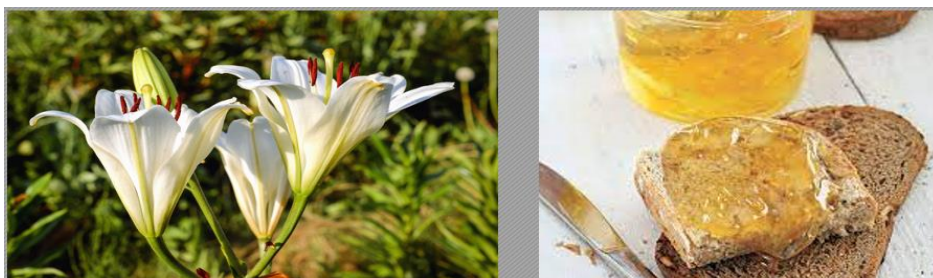
**Figure 9.** Foods prepared with *Nelumbo nucifera*

#### 4.3. Edible Flowers in French Cuisine

French cuisine, one of the leading cuisines in the world, has been enriched by the fact that each region in the country has its own local products and the palace cuisine (Grolier, 2005). In addition, in French culinary culture, eating is seen as entertainment and meals are eaten with pleasure (Aktaş & Özdemir, 2012). Bread types, chocolates, wines, cheeses and world-famous sauces are the first products that come to mind in French cuisine.

##### 4.3.1. *Lilium spp.*

Traditionally, it is used to represent French royalty and in this sense is said to signify perfection, light and life (Fox Davies, 1909). It is often used as a garden and ornamental plant, and some bulbous species are edible by humans (www.gardenia.net). The buds of the lily, which has a very sweet taste, are a source of vitamin C. It is known to be used in jams and garnishes. Especially used in French cuisine, lily flowers can be used in salads, soups or desserts. However, other parts of the lily plant (root, leaf, seed) can be poisonous, so it is recommended to consume only the flowers (Jefferson-Brown & H.Howland, 1995).



**Figure 10.** Foods prepared with *Lilium spp.*

##### 4.3.2. *Alyssum maritimum*

*Alyssum maritimum* is a type of flower with a peppery aroma, generally similar to arugula in taste. Its color is generally lilac and white. Its flowers and leaves are edible. It is often used to flavor fish dishes, especially white fish. It can be used to enhance the flavors of seafood or



sprinkled over grilled fish. It is known to be commonly employed to impart taste to oysters. Additionally, it is utilized in salads, ice creams, and syrups ([www.papillesetpupilles.fr](http://www.papillesetpupilles.fr)).



**Figure 11.** Foods prepared with *Alyssum maritimum*

#### 4.3.3. *Antirrhinum majus* L.

This flower has a strong odor and a slightly bitter taste. It is used for decoration, cold cuts and salads. You can sprinkle it on your salads or use it as an edible decoration on your meals ([mariusauda.fr/catalogue-fleurs-comestibles](http://mariusauda.fr/catalogue-fleurs-comestibles)).



**Figure 12.** Foods prepared with *Antirrhinum majus* L.

## 5. CONCLUSION and RECOMMENDATIONS

Although the rich vegetation on earth and the edible flowers that are the subject of research are found in abundance in nature, they have not found the same use in food and beverage businesses. It can be said that the introduction of flowers into the kitchen, which were widely used in the field of health and visibility in the past, is a new trend.

Edible flowers, used as ornamental plants in open and green areas, constitute a healthy food source for their users with their contribution to nutrition as well as their aesthetic properties. Other benefits provided by the use of edible plants can be said to be users' desire to try new



**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

tastes, rediscovering their previous eating habits, interacting with nature, improving their quality of life, and contributing to biodiversity in cities.

Apart from contributing to nutrition, edible flowers also have an educational and instructive side. Its benefits include observing the growth processes of the foods one consumes, encouraging people to grow plants, and gaining more information about the plants chosen as food.

Edible flowers, which have an important place in the edible landscape, have recently been used as an ingredient in salads, side dishes, appetizers, beverages, desserts, and sauces, jellies, syrups, dough, with their unique appearance, as well as their taste, nutritional properties, low fat and energetic content. It is preferred to add color, scent and flavor in different uses such as work.

It has been observed that as the contribution of edible flowers to nutrition increases day by day, the number of studies on this subject increases. However, in the literature review, it was seen that the focus was on the nutritional values of edible flowers and their use in the food and beverage industry, and that only certain flowers were focused on and flowers in different culinary cultures were neglected. In this context, within the scope of the research, the edible flowers in Turkish cuisine, Chinese cuisine and French cuisine were examined.

It has been observed that some of the edible flowers included in Chinese cuisine and French cuisine are not included in Turkish cuisine or that different usage areas or cooking methods are preferred. It is thought that the study will contribute to the literature in this aspect. Suggestions have been developed as follows to make the relevant subject contribute more to both the sector and the literature:

When using edible flowers in the kitchen, it is necessary to ensure that they are edible. For example, while only the leaves of the *Cyclamen persicum* plant are edible, the roots of the plant can be harmful. For this reason, correct identification of edible flowers is important. Especially at banquets, care should be taken to ensure that foods placed on the table or plate for decoration purposes do not cause poisoning.

It is important not to eat medicated plants, as the chemicals used during the cultivation of edible flowers may accumulate on the flower.

If information about the conditions under which the flowers are grown cannot be obtained, they should be obtained from reliable sources. For the fresh appearance of flowers, they should be





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**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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stored and packaged appropriately after harvest. In order to create visual appeal in presentations, care should be taken to ensure that the flowers are not wilted.

The blooming times of edible flowers vary. Determining this timing correctly during use in the kitchen will ensure that there is no loss in both visuality and nutritional value.

When it comes to edible flowers, producers should follow plant characteristics and food trends. The plants, their ecological demands, and their production and growing conditions must be taken into consideration.

In this study, only edible flowers used in Turkish cuisine, Chinese cuisine and French cuisine were examined. It is important for researchers who will work on this subject in the future to conduct research based on different culinary cultures in order to expand the scope of the subject. In the literature review, no studies were found that examined studies on edible flowers with bibliometric analysis. In this context, a bibliometric examination of edible flowers to date will be beneficial in gathering the subject under one roof.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **STORMWATER MANAGEMENT CONCEPT AND RAIN GARDENS**

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### **ABSTRACT**

Stormwater, which gives its name to the concept of stormwater management, is an umbrella term that refers to water that runs off the land surface after a rain or snowmelt event. As urbanization continues to expand, the rapid conversion of porous surfaces into non-porous ones results in decreased water absorption within the area, leading to increased water runoff. In forested drainage areas, the majority of rainfall infiltrates the soil and mixes with groundwater or returns to the atmosphere through evaporation. As urbanization increases the amount of impermeable surfaces, undrained precipitation gathers pollutants and causes water damage to areas it flows through. Ultimately, it is discharged into large bodies of water, carrying its pollutants with it. Minimizing the movement of stormwater and filtering as much pollutants in the moving water as possible are the objectives of stormwater management. Changes in the flow rate and volume within basins, due to the impact of urbanization, have a direct effect on the morphology and nature of urban streams, rivers, and valleys in general. Urban development within a watershed has a number of direct impacts on streams and waterways, including changes in stream flow behaviour and geometry, degradation of aquatic habitat, and extreme water level fluctuations. The impacts of climate change on precipitation are increasingly evident. Despite little alteration in the total amount of precipitation, irregular precipitation, sudden and extreme downpours, extended dry spells beyond anticipated durations illustrate the greater necessity for effective stormwater management. Stormwater management refers to the strategies developed to address these issues, with rain gardens being a crucial component. This research examines the concept of stormwater management and the role of rain gardens in this system.

**Keywords:** Rain garden, rain water, stormwater management



## **INTRODUCTION**

Throughout history, it has been recognized that rainwater should be redirected and controlled to prevent any damage to buildings or areas of occupation. Many civilizations have inhabited and cultivated land affected by such precipitation events. Traditional stormwater management methods comprise systems which are implemented to rapidly eliminate water that flows after precipitation on urban and impermeable surfaces. Designing drainage systems for urban runoff has become prominent in the effective management of floods due to the increasing urbanization and the subsequent growth of impervious areas across the world (Roozbahani et al., 2020; Zamani et al., 2023). Stormwater systems are defined as the physical and organizational infrastructure used to collect, transfer, treat and manage rainfall runoff (Butler et al., 2018). Existing stormwater systems are typically designed using historical rainfall data (Mallakpour and Villarini, 2017). However, there is growing evidence that climate change is leading to changes in rainfall patterns, resulting in more frequent and intense rainfall events in many areas. As a result, there is a need to revisit existing designs and adapt them to current and future weather conditions to ensure their continued effectiveness. Effective management of stormwater systems is essential for the protection of both the built and natural environment.

### **Stormwater Management Concept**

Stormwater refers to water originating from precipitation, inclusive of heavy rain and meltwater from hail and snow. Stormwater can infiltrate into the soil, becoming groundwater, being stored on depressed land surfaces in ponds and puddles, evaporating back into the atmosphere or contributing to surface runoff. Majorly, runoff directly flows as surface water into nearby streams, rivers or other big water bodies such as wetlands, lakes and oceans, without receiving any treatment. In natural settings such as forests, the soil absorbs a considerable amount of stormwater, and plants further reduce stormwater by enhancing infiltration, intercepting precipitation as it falls, and absorbing water through their roots. In urban areas, uncontrolled stormwater can give rise to two significant problems: flooding, caused by the amount and timing of the runoff, and water pollution, due to the possible contaminants carried by the water. Managing the volume and quality of stormwater is referred to as Stormwater Management. It involves techniques and strategies aimed at mitigating and controlling the undesirable effects of stormwater runoff on the environment and public infrastructure (Washington State Department of Ecology, 2005).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Integrated water management (IWM) of stormwater has the potential to address numerous issues impacting waterway health and water supply concerns in modern urban cities. In the design process, IWM is typically linked to green infrastructure, and professionals in various fields, including urban planning, architecture, landscape architecture, interior design, and engineering, frequently view it as a design process cornerstone.



**Figure 1.** Urban Flood

Also referred to as Low Impact Development (LID) in the United States or Water Sensitive Urban Design (WSUD) in Australia, Integrated Water Management (IWM) has the potential to enhance the quality of runoff, diminish the risk and impact of flooding, and provide an extra water resource to supplement potable supply (Prince George's County, Maryland. Department of Environmental Resources, 2000).

There has been number of researches conducted on the efficacy of green stormwater infrastructure, such as bioswales, retention and detention basins, rain gardens, green roofs, permeable pavements. These systems aim to mitigate flooding, increase surface water supplies, recharge groundwater, and enhance water quality (Burns et al. 2012, Dhakal and Chevalier 2016). There is also research that backs the implementation of smart stormwater systems with remote monitoring equipment (Bilodeau, K. et al. 2018, Persaud, P.P. et al., 2019).

To achieve a comprehensive approach to stormwater decision-making and management, it is necessary to integrate engineering, social, and environmental criteria. This will aid in the identification of the most suitable and efficient stormwater infrastructure, as well as in the evaluation of the synergies between these diverse disciplines. Such a holistic perspective is essential for effective stormwater management (Hale et al., 2015).

## **The Role of Rain Gardens in Stormwater Management**

Stormwater management can be achieved through the implementation of raingardens, also known as biofiltration or bioretention systems. These systems help to safeguard waterways by retaining, treating, and utilizing stormwater at its source (Lloyd et al., 2002) while simultaneously restoring flow regimes to levels closer to those prior to urbanization (Bratieres et al., 2008).

The definition of a rain garden states that it's a depressed section in a landscape with ornamental grasses and perennial flowers which gather stormwater from various surfaces, enabling it to infiltrate into the earth (EPA, 2023).

Primary advantages of rain gardens are the economical construction, low maintenance costs, ability to adapt urban and suburban environments, and highly aesthetic value.

Numerous European regulations focus on enhancing urban wastewater quality and reducing pollution, especially with regards to climate change. An example of this is the EU action plan entitled 'Towards zero pollution for air, water and soil' (European Commission, 2021, European Commission, 2019).



**Figure 2.** Urban Rain Garden

Rain gardens offer several benefits such as, reduction in total stormwater runoff and peak flow, increasing groundwater infiltration, reducing property damage and loss caused by flood, filtration of pollutants, improving water quality, providing beautiful landscapes, storing rainwater and reusing it for irrigation.

## **DISCUSSION**

Rain gardens, as a type of Green infrastructure technology, have a significant role in urban areas by mitigating the effects of stormwater runoff. Rain gardens have been shown to decrease surface run-off, reduce and flood peaks and damage, lower the pollutant load of receiving water



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

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bodies and replenish groundwater. The implementation of rains gardens in providing for surface water drainage not only reduces surface water runoff and pollution, but also aids in carbon absorption and interconnects specific niche habitats throughout the larger urban region. Rain gardens can also provide a low-cost and environmentally friendly substitute and assistance to the costly redevelopment of sewer systems.

### **CONCLUSION**

Factors such as changing climate, increasing urbanization, inadequate infrastructure show the need for properly planned stormwater management systems. Especially in urban environments, where infrastructure development is not possible or too costly, it is becoming increasingly evident that green infrastructure systems that support existing gray infrastructure should be used more widely. In this context, given its various benefits and low building and maintenance costs, the necessity to build more rain gardens is essential to make cities more resilient to the sudden rainfall and disasters.





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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KIRSAL ALANLARDA YAĞMUR BAHÇELERİNİN İŞLEVLERİ

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#### ÖZET

Değişen iklim sebebiyle, aşırı yağışlar ve kuraklık tehlikeleri, afetlere dirençli tasarımların gerekliliğini göstermektedir. Değişen dünyaya uyum sağlamayan yaşam alanları sürekli artan afet riskiyle karşı karşıya kalmaktadır. Kentsel ve kırsal yaşam alanlarında yağışların neden olduğu hasarları engellemek veya minimize etmek için çeşitli yaklaşımlar uygulanmaktadır. Bu yaklaşımların en önemlilerinden biri yağış suyu yönetimidir. Yağış suyu yönetimi çoğunlukla yüzey akışını yönetmek anlamına gelmektedir. Bu yüzden daha çok yüzey geçirgenliğinin oldukça azalmış olduğu kentsel alanlarda kullanılmaktadır, ancak kırsal alanlarda daha geniş kullanım alanları bulunmaktadır. Yağış suyu yönetimi, tarım arazilerinin erozyonunu ve yerleşim yeri olan kırsal alanların taşkınlarını önlemek için esastır. Özellikle kanalizasyon ve su arıtma tesislerinin, aşırı yağış nedeniyle hasar görmesi, çevreye ve yaşayan halka oldukça fazla zarar verebilmektedir. Kırsal alanlardaki ana sorun geçirimsiz yüzeylerin (yollar, binalar vb.) akış yönünde neden olduğu değişiklikler ve yağışlar sonucu zorlanan kanalizasyon sistemleridir. Ayrıca yönetilmemiş akışlar, kırsal alanlarda ve tarım arazilerinde erozyona neden olabilmektedir. Geleneksel yağış suyu yönetimi sistemlerinin temel amacı pik yapan akışları engellemektir. Bu durum sadece yüksek yağış yüklerinin yerini değiştirmeyi sağlar. Modern yaklaşımlar, doğal su döngüsünü yeniden oluşturmayı, yani akan suyu belirli bir süre tutmayı, yer altı sularını yeniden beslemeyi ve toplanan suları sulama veya evsel ihtiyaçlar için yeniden kullanmayı amaçlamaktadır. Bu yaklaşımlar, kırsal alanlarda sahip olunan daha geniş alanlar ve daha kolay alan seçimleri sayesinde, kentsel alanlarda uygulanması zor olan yöntemleri kullanabilme olanağı sağlamaktadır. Kentsel ve kırsal yaşam alanlarını afetlere daha dirençli hale getirmek için yağış suyu yönetimi sistemlerini ve yaklaşımlarını mümkün ve gerekli olan her alana entegre etmek gerekmektedir. Bu çalışmada kırsal alanlarda yağış yönetimi yaklaşımları ve yağmur bahçelerinin bu yaklaşımlar içerisindeki fonksiyonları irdelenmiştir.

**Anahtar Kelimeler:** kırsal alan, yağmur bahçesi, yağmur suyu, yağış suyu yönetimi



## **FUNCTIONS OF RAIN GARDENS IN RURAL AREAS**

### **ABSTRACT**

Due to the changing climate, extreme rains and drought hazards show the necessity of disaster-resilient designs. Habitats that do not adapt to the changing world are facing increasing disaster risks. Various approaches are applied to prevent or minimize the damage caused by stormwater in urban and rural living areas. One of the most important of these approaches is stormwater management. Stormwater management often means managing runoff water. Therefore, it is mostly used in urban areas where the surface permeability is considerably reduced, but it has wider usage areas in rural areas. Stormwater management is essential to prevent erosion of agricultural land and flooding of residential rural areas. Particularly, the damage to the sewerage and water treatment plants due to excessive precipitation can cause a lot of damage to the environment and the living people. The main problem in rural areas is the changes in flow direction caused by impermeable surfaces (roads, buildings, etc.) and sewer systems that are forced by stormwater. In addition, unmanaged flows can cause erosion in rural areas and farmland. The main purpose of conventional stormwater management systems is to prevent peak flows. This only allows to displace high precipitation loads. Modern approaches aim to recreate the natural water cycle, i.e. to retain running water for a certain period of time, recharge groundwater and reuse collected water for irrigation or domestic needs. These approaches provide the opportunity to use methods that are difficult to apply in urban areas, thanks to the larger areas and easier site selection in rural areas. In order to make urban and rural living spaces more resilient to disasters, it is necessary to integrate storm water management systems and approaches into every possible and necessary area. In this study, precipitation management approaches in rural areas and the functions of rain gardens within these approaches are examined.

**Keywords:** rain garden, rain water, rural areas, stormwater management.

## **GİRİŞ**

Kentsel ve kırsal alanlarda geleneksel yağış suyu yönetimi, suyun kanalizasyon sistemlerine veya kanallara hızlı bir şekilde aktarılmasını amaçlamış, bu da kirleticilerin ve büyük hacimlerde suyun nehirlerle ve akarsulara hiçbir işlemlemeden taşınmasına neden olmuştur. Böyle bir yaklaşım hidrolojik döngüde olumsuz değişikliklerin yanı sıra yeraltı su kaynaklarının tükenmesine, su kalitesinin bozulmasına ve ekosistemlerin zarar görmesine neden olmuştur (Mishra, B.K. 2019, Yuan, Z. et al. 2018). Artan kentleşme, tarımsal üretimin yoğunlaşması ve ilerleyen iklim değişikliği bir paradigma değişimini zorunlu kılmıştır (Eckart, K. et al. 2017). Yağış suyu, özellikle kuraklık riskinin her geçen yıl artması ve aşırı sıcaklıkların daha sık görülmesi nedeniyle hızla değerli bir kaynak haline gelmektedir. Bu nedenle, yağış suyuna yönelik yeni yaklaşım, yağışı tutma, infiltrasyonunu sağlama bu sayede yeraltı sularının yeniden kazanımının artırılması, yüzey akışının azaltılması ve doğadaki döngüye benzer şekilde yağış suyu yönetimi yöntemlerinin kullanılması ile ilgilidir (Eckart, K. et al. 2017, Hamidi, A. et al. 2021, Fowdar, H.S. et al. 2022).

### **Kırsal Alanlarda Yağış Suyu Yönetimi**

Kırsal alanlarda yağış suyu yönetimi ve sürdürülebilir drenaj sistemleri, tarımsal üretim alanlarının kayıplarını minimuma indirmenin yanı sıra, erozyon ve taşkınların azaltılması, tarımsal kaynaklı kirleticilerin olumsuz etkilerini minimize etme, biyolojik çeşitliliğin artırılması ve su kaybının sınırlandırılmasını içerir (Adams, R. 2018, Avery, L.M. 2012). Bu yaklaşımlar, kırsal alanlarda şehirlere kıyasla sahip olunan daha geniş alanlar ve doğru alanın daha kolay seçimi ve kullanılabilmesi sayesinde, kentsel alanlarda uygulanması zor olan yöntemleri kullanabilme olanağı sağlamaktadır.



**Şekil 1.** Kırsal Taşkın

Kentsel ve kırsal yaşam alanlarını afetlere ve hızlanan iklim değişiminin etkilerine daha dirençli hale getirmek için yağış suyu yönetimi sistemlerinin ve yaklaşımlarının, gerekli olan tüm alanlara entegre edilmesi gerekmektedir.

Sürdürülebilir yağış suyu yönetimi, ekosistem hizmetleri ve yerel çevreden insanlar için faydalar sağlamakla beraber düşük karbonlu, enerji tasarruflu, sağlıklı ve vatandaş dostu bir çevre yaratmanın önemli bir parçası haline gelmiştir (Oral, H.V. et al. 2020, Rodak, C.V. et al. 2019).



**Şekil 2.** Su Altında Kalan Tarım Alanları

### **Kırsal Alanlarda Yağmur Bahçeleri**

Kırsal alanlarda da, şehirlerde görülen yağış ve drenaj kaynaklı sorunlar yaşanabilmektedir. Ancak bu sorunların mekanikleri şehirlerdekinden oldukça farklıdır. Şehirlerde daha çok geçirimsiz yüzeylerin fazlaca artması sonucu suyun toprağa infiltrasyonu kesilmesi sonucu suyun yüzeysel akışa geçmesi görülmektedir. Kırsal alanlarda ise suların doğal toplanma ve drenaj güzergahlarına kullanımların getirilmesi ve dolayısıyla bu alanların morfolojik tahribatı, yağış anında suyun taşkınlara dönüşmesine neden olmaktadır.

Yağmur bahçesinin tanımı olarak, çeşitli yüzeylerden gelen yağmur suyunu toplayarak toprağa sızmasını sağlayan çeşitli yer örtücü veya çok yıllık çiçeklerin bulunduğu bir peyzajdaki alçaltılmış bir bölüm olduğu belirtilmektedir (EPA, 2023). Yağmur bahçelerinin başlıca avantajları düşük yapım ve bakım maliyetleri, kentsel ve kırsal ortamlara kolay uyum sağlama kabiliyeti ve yapıldığı alanların estetik değerini yükseltmesidir.





**Şekil 3.** Kırsal Alanda Yağmur Bahçesi

Yağmur bahçeleri normalde sıradan bahçeler gibi görünür ancak onları sıradan bahçelerden ayıran spesifik özellikleri vardır. Tipik bir yağmur bahçesi temel olarak üç bölüme oluşur; göllenme alanı, giriş ve taşma yapıları. Göllenme alanı, zeminde doğal olarak oluşan veya yapay olarak inşa edilen bir çöküntüdür. Göllenme alanının altı malç ve mühendisliği yapılmış toprak tabakaları, altında ise kum ve çakıl katmanları bulunur. Alternatif olarak alt kısımda delinmiş bir alt drenaj borusu da kullanılabilir. Büyük eğimli yüzeyler yağmur bahçesi inşası için çok uygun değildir, bu nedenle bu tür peyzajlarda toprak kazısı ve aşağı eğimli tarafta bir toprak banket inşa edilerek oluşturulur. Giriş yapısı, borulardan veya çevredeki geçirimsiz alanlardan (sokaklar, kaldırımlar) veya drenaj güzergahı olarak tasarlanan bölgelerden gelen akış, giriş yapısı tarafından göllenme alanına yönlendirilir. Taşma yapısı, göllenme alanı dolduğunda, toplanan su taşma yapısı aracılığıyla yağmur bahçesini terk eder ve istenen yere (genellikle kanalizasyon şebekesine) yönlendirilir. Bu yapı erozyon riskini azaltmaya yardımcı olur (Malaviya, P. ve ark., 2019).

Kırsal alanlarda kurulan yağmur bahçeleri, suyun doğal akış güzergahındaki stratejik noktalara yapılarak, toplam yağış suyu akışında ve pik akışta azalma, yeraltı sularına infiltrasyonunda artış, selden kaynaklanan maddi hasar ve kayıpların azaltılması, tarımsal kirleticilerin filtrelenmesi, su kalitesinin iyileştirilmesi, güzel peyzajlar sağlanması, yağmur suyunun depolanması ve sulama için yeniden kullanılması gibi önemli faydalar sunmaktadır.

### **TARTIŞMA**

Sürdürülebilir yeşil altyapı sistemlerinden olan yağmur bahçeleri, yağmur suyu akışının etkilerini azaltarak kentsel ve kırsal alanlarda önemli işlevlere sahip olduğu görülmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Yağmur bahçelerinin yüzey akış miktarı ve hızını azalttığı, sel piklerini ve hasarını azalttığı, alıcı su kütlelerinin kirletici yükünü düşürdüğü ve yeraltı suyunu yenilediği pek çok çalışmada gösterilmiştir. Yüzey suyu drenajının sağlanmasında yağmur bahçelerinin uygulanması sadece akışa geçmiş suyun hızı, miktarı ve kirliliği azaltmakla kalmamakla beraber, aynı zamanda karbon emilimine yardımcı olmakta ve daha kırsal alanlarda bazı habitatların birbirine bağlanmasına yardımcı durak noktaları olmaktadır. Yağmur bahçeleri aynı zamanda altyapı sistemlerine düşük maliyetli ve çevre dostu bir destek sağlayabilmektedir. Kırsal alanlarda kullanılan yağmur bahçesi varyantlarını incelediğimizde, şehirdekilere kıyasla daha büyük ve derin kullanımlarının olması, şehirlerdeki alan seçimi kısıtlamalarının çoğunlukla kalkması sebebiyle daha ideal noktalara kurulabilmeleri, yağış suyu yönetimi açısından kırsal alanlarda kullanımlarını oldukça gerekli ve önemli hale getirmektedir.

### SONUÇ

Sürdürülebilir yağış suyu yönetimi için bir değerlendirme çerçevesinin oluşturulurken, paydaşlara ve karar vericilere kendi coğrafi bağlarına göre en uygun stratejilerin seçilmesi de bu sistemlerin uygulanması kadar önemlidir. Hızlı değişen iklim, artan kentleşme, yetersiz altyapı gibi faktörler, doğru planlanmış yağmursuyu yönetim sistemlerine olan ihtiyacı ortaya koymaktadır. Bu bağlamda, faydaları, düşük yapım ve bakım maliyetleri göz önüne alındığında, şehirler kadar kırsal alanların da ani yağışlara ve afetlere karşı daha dirençli hale getirmek için daha fazla yağmur bahçesi inşa edilmesi gerekliliği ortaya çıkmaktadır. Geri dönülmez şekilde tahrip edilen doğal drenaj güzergahlarının ıslahında gelecekte yağmur bahçelerinin daha yaygın kullanılması, kırsal alanların sürdürülebilir ve afete dirençli yeşil alt yapı sistemleriyle donatılmasında büyük katkı sağlayacaktır.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### INVESTIGATION OF PRE-FREEZE, FREEZE AND POST-FREEZE UNCONFINED COMPRESSIVE STRENGTH CHANGES IN CLAYS SUBJECTED TO FREEZE- THAW CYCLES

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#### ABSTRACT

When the air temperature drops below freezing and this lasts for more than a few days, it is possible for the pore water in the soil to freeze. In cold seasons, frost occurs in water-saturated soils. Frost effect in soils is important in terms of engineering. With the effect of frost, the soil volume increases by about 10% and swelling occurs in the soil. With the disappearance of the frost effect, thawing occurs and the mentioned freezing and thawing events adversely affect the mechanical, physical and bearing capacity properties of fine and coarse grained soils in both hot and cold climate zones. Considering that soils with temperatures below 0° C are frozen for a long time, it is necessary to know how the mechanical and physical properties of soils are affected during or as a result of freezing. In this study, the specimens prepared with clay soil were subjected to freeze-thaw tests at different cycle numbers and the behavior of the specimens in the frozen state and under pressure after thawing were investigated. As a result, the unconfined compressive strength value of the clay soil in the freeze state increased approximately 5 times compared to the pre-freeze strength value. The unconfined compressive strength value of the thawed clay soil after the freeze-thaw cycle showed a strength loss of more than 2 times compared to the pre-cycle. Considering the freeze-thaw event occurring in clay soils, engineering structures such as sewerage and communication lines, road infrastructure and underground structures are damaged.

**Keywords:** Unconfined compressive strength, clay, freeze-thaw



## **INTRODUCTION**

When the air temperature drops below 0° C, especially if this lasts for more than a few days, it is possible for the pore water in the soil to freeze. For this reason, in cold seasons, frost occurs on water-saturated soils. The volume of the soil also increases in a short time due to the approximately 9% volume increase that occurs with the freezing of water in the soil voids (Andersland & Ladanyi, 2004). In our country, freezing depth varies between 1m-1.5m in cold regions. In warm seasons, unlike freezing, thawing occurs and the water content of the soil increases. As a result of the mentioned freezing-thawing phenomenon, soils are negatively affected in terms of their physical and mechanical properties. Especially in capillary saturated soils, ice lenses first form and they grow under the capillary effect by absorbing water from the free water level. For this reason, excessive swelling occurs on the soil surface and causes major damage to engineering structures. In cold climate regions, frost events are examined in three main groups: seasonal, permanent and discontinuous. In the cold climate regions in the first row, the soil is exposed to freezing according to the seasons, while in the second row in the continuous cold climate regions, the entire soil freezes, and in the third row in the discontinuous cold climate regions, some parts of the soil freeze (Zaimoğlu et al., 2013). Soils in regions with seasonal frost in cold climates are exposed to freeze-thaw at least once a year. When freezing occurs in fine-grained soils, ice particles are first formed in the largest pores where the water potential is the highest and the freezing point is the highest, while the water in smaller pores freezes later. As a result, cracks are formed in the soil and the cracks formed as a result of repeated freeze-thaw cycles grow and cause the strength of the soil to decrease (Erol, 2007).

Considering that in many regions of our country and the world, temperatures drop below 0° C and the soil is frozen for a long time, it is necessary to determine the behavior of soils before freezing, during freezing and after repeated freeze-thaw cycles.

It is seen that previous studies in the literature have generally focused on the properties of soils at the end of repeated freeze-thaw cycles.

Therefore, the aim of this study is to determine the unconfined compressive strength of fine-grained soil subjected to repeated freeze-thaw cycles before, during and after repeated freeze-thaw cycles. For this purpose, specimens prepared with fine-grained soil (clay) were subjected to freeze-thaw tests at different number of cycles and the behavior of the specimens under compression in freezing and after thawing was investigated.



## MATERIALS and METHODS

The clay soil we used in the study was taken from Oltu district located in the Northeast of Erzurum province. The clay soil was dried in an oven at 105°C and then sieved through sieve number 40 (Figure 1). The clay soil was determined to be in CH class according to the USCS classification system. Some geotechnical parameters of the clay soil are presented in Table 1.



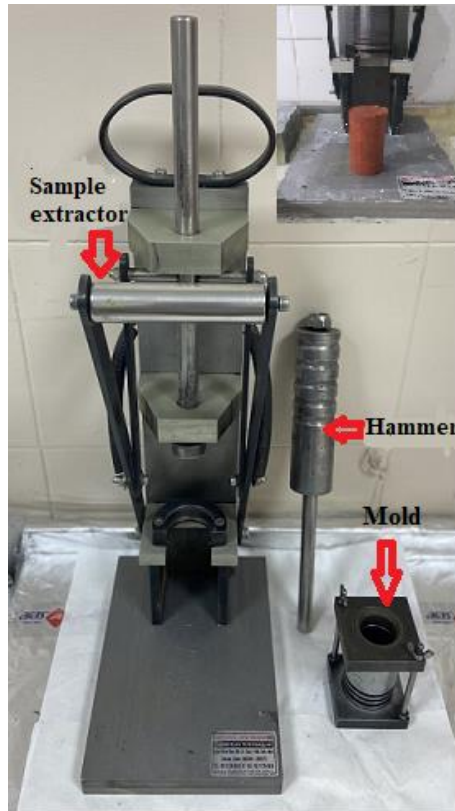
**Figure 1.** Clay soil (a- taken place, b- sieved state)

**Table 1.** Some geotechnical properties of clay soil

Temel Özellikler	Kil zemin
Color	Red
Liquid Limit (%)	81
Plastic Limit (%)	31
Plasticity Index (%)	50
Classification (USCS and TS 1500)	CH
Optimum Water Content (%)*	23
Max Dry Unit Weight (kN/m <sup>3</sup> )	14,6

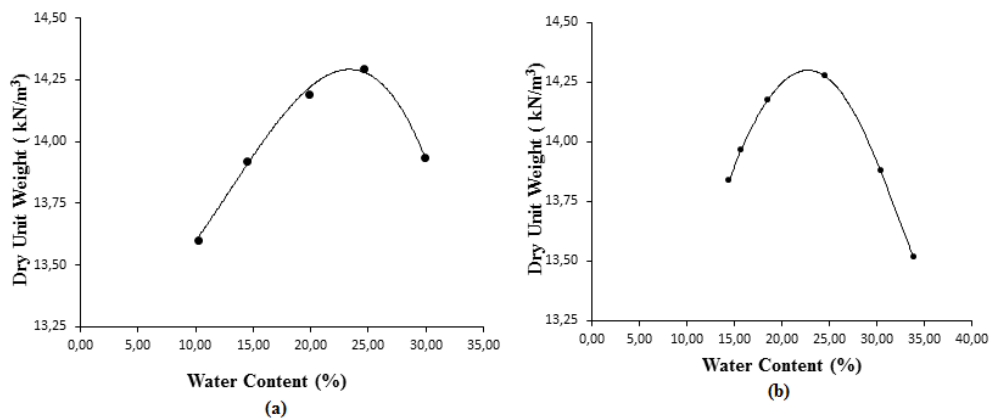
### \*Harvard Miniature Compaction Test

The optimum water level and maximum dry unit volume weight values of the clay soil were determined in the Harvard miniature compaction apparatus. Harvard miniature compaction test was performed in accordance with USBR-5510-1989 standard. The Harvard miniature compaction test apparatus and its components are shown in Figure 2.



**Figure 2.** Harvard miniature compaction apparatus

In this study, the Harvard miniature compaction tester was calibrated by comparing the water content-dry unit volume weight relationships drawn using the data obtained with the Harvard miniature compaction tester (USBR-5510-1989) and the standard compaction tester (ASTM D 698).



**Figure 3.** Water content-dry unit volume weight relationship (a-Standard Proctor test b-Harvard miniature compaction test)

The optimum water content and maximum dry unit volume weight results of the clay soil obtained by standard compaction test and Harvard miniature compaction test are shown in Figure 3 as  $w_{opt} = 23\%$ ,  $\gamma_{kmax} = 14.32 \text{ kN/m}^3$ ,  $w_{opt} = 23\%$ ,  $\gamma_{kmax} = 14.27 \text{ kN/m}^3$  respectively. The closeness of the obtained results to each other reveals the accuracy of the experiments performed.

Cylindrical samples were prepared with the determined optimum water content and maximum dry unit volume weight, with a diameter of 33mm and a height of 71mm, three for each pre-frost cycle and three for each cycle after freezing and thawing (1, 3, 5, 10, 15 cycles).

The prepared samples were placed in a 110 cm x 55 cm x 55 cm freeze-thaw test apparatus with a minimum temperature of  $-25^\circ \text{C}$  and maximum temperature of  $+60^\circ \text{C}$  and programmable, and subjected to closed system freeze-thaw cycles (1, 3, 5, 10, 15 cycles) (Figure 4).

The prepared samples were placed in a 110 cm x 55 cm x 55 cm freeze-thaw test apparatus with a minimum temperature of  $-25^\circ \text{C}$  and maximum temperature of  $+60^\circ \text{C}$  and programmable, and subjected to closed system freeze-thaw cycles (1, 3, 5, 10, 15 cycles) (Figure 4).



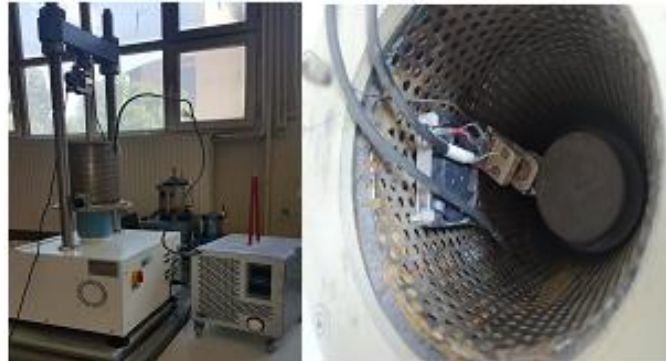
**Figure 4.** Programmable freeze-thaw cabinet

The soil samples are subjected to 6 hours of freezing ( $-18^\circ \text{C}$ ) and 6 hours of thawing ( $22^\circ \text{C}$ ). This 12-hour freeze-thaw period was defined as a freeze-thaw cycle (Ghazavi & Roustaie, 2010; Zaimoğlu, 2016; Saygili & Dayan, 2019).

After completing each cycle, the specimens were subjected to unconfined compression tests in the frozen and thawed states. In order to keep the frozen specimens at a constant freezing temperature ( $-18^\circ \text{C}$ ) during the experiment, an adjustable cooling device suitable for the unconfined compression test apparatus was built.

The image of the refrigeration device is shown in Figure 5. The samples produced for the unconfined compression tests and subjected to the freeze-thaw test were kept constant at the desired temperature with the help of the refrigeration unit and were subjected to unconfined

compression tests in accordance with ASTM D 2166 in the area where the cabin was placed (Figure 6).

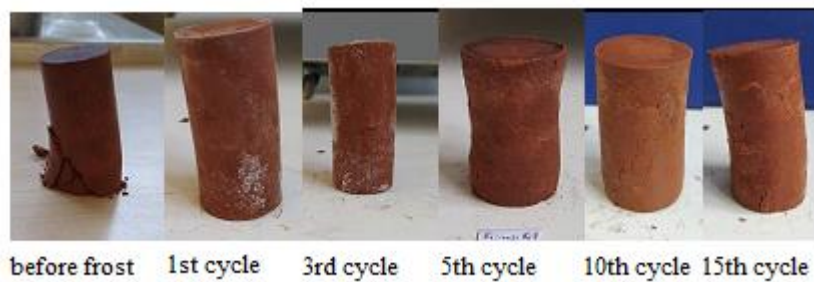


**Figure 5.** Refrigeration cabinet and refrigeration unit placed in the unconfined compression tests apparatus

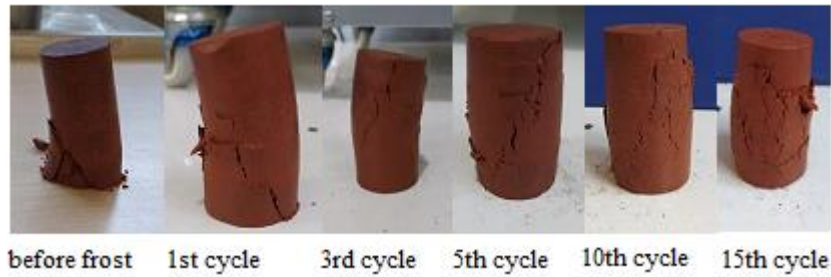


**Figure 6.** Unconfined compression test apparatus

The specimens fractured in the unconfined compression test are shown in Figure 7 and Figure 8.



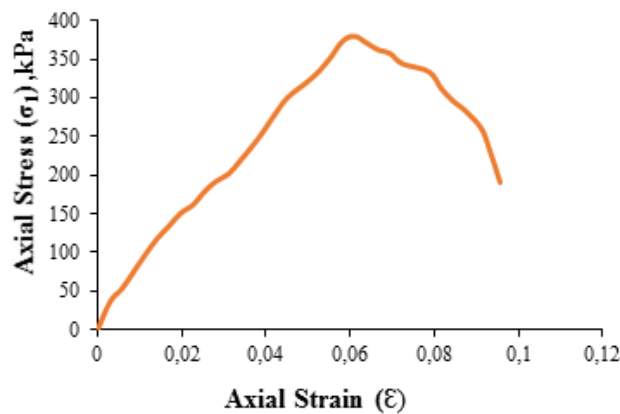
**Figure 7.** Fracture planes of clay samples in frozen state before frost and after 1,3,5,10,15 cycles as a result of unconfined compression test



**Figure 8.** Fracture planes as a result of the unconfined compression test of thawed clay samples before frost and after 1,3,5,10,15 cycles

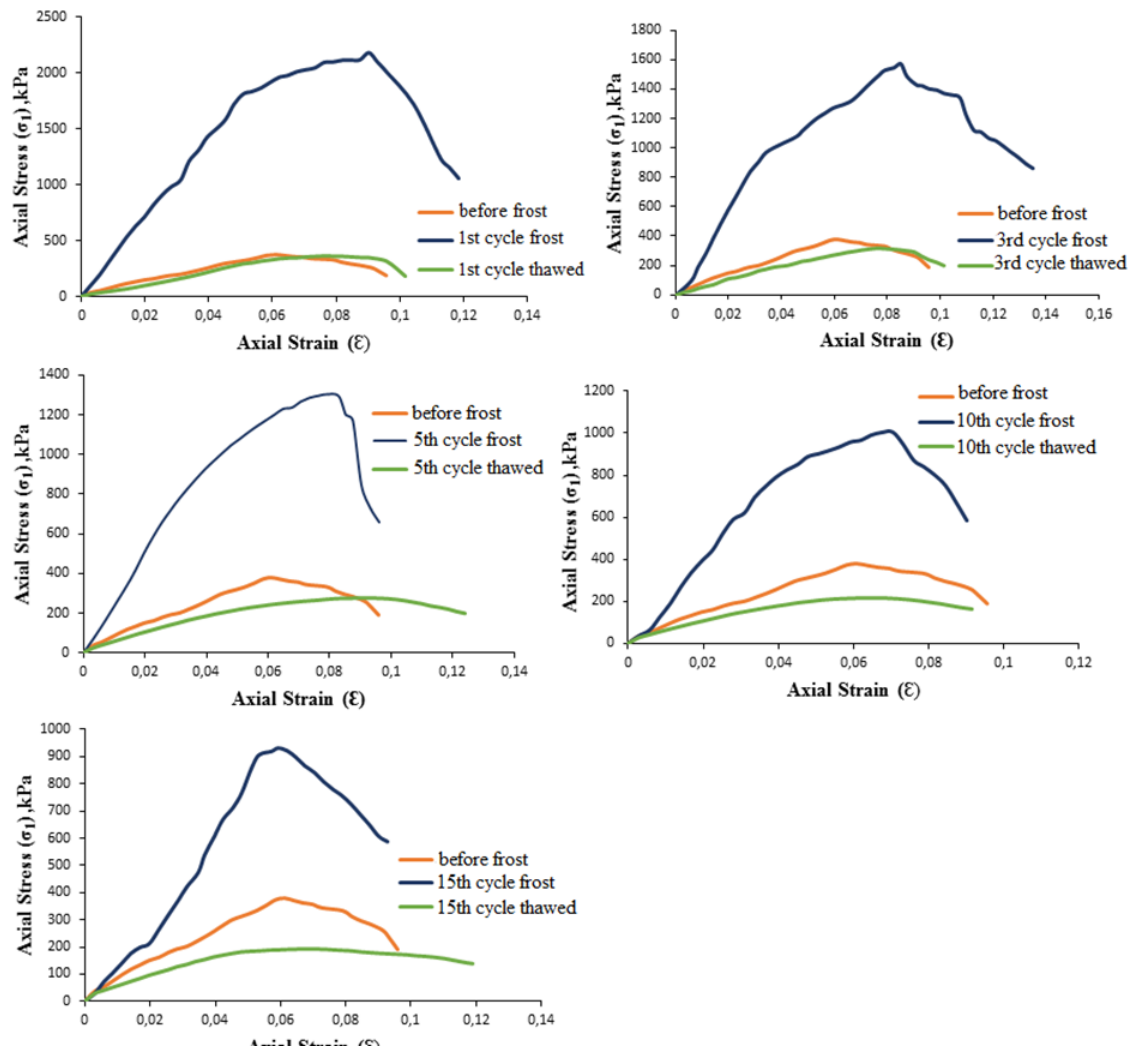
#### FINDINGS and DISCUSSION

In the study, as stated in the method section, unconfined compression test were carried out in both frozen and thawed states on each sample that completed the number of freeze-thaw cycles, and the obtained stress-strain graphs and values are given below.

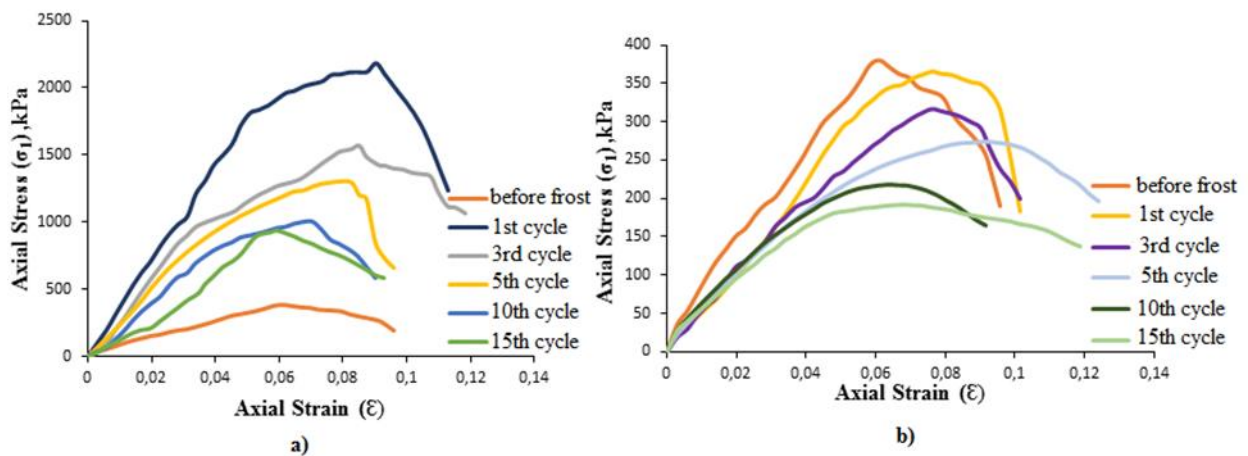


**Figure 9.** Stress-strain curve obtained as a result of the unconfined compression test of the clay sample before freezing





**Figure 10.** Stress-strain curves of the clay sample in pre-freeze, freeze and thawed states (pre-freeze, 1,3,5,10,15 cycles)



**Figure 11.** Stress- strain curves of clay specimens a) before freezing and after 1,3,5,5,10,15 cycles in frozen state b) before freezing and after 1,3,5,10,15 cycles in thawed state obtained as a result of unconfined compression test



**Table 2.** Unconfined compression test results of clay samples in the frozen state before freezing and after 1, 3, 5, 10, 15 cycles

Sample Code	Unconfined Compressive Strength in Frost	Unconfined Compressive Strength in Thawed State
	q <sub>u</sub> , kPa	q <sub>u</sub> , kPa
Before Frost	380.56	380.56
1st Cycle	2181.48	365.62
3rd Cycle	1574.39	316.40
5th Cycle	1301.53	274.30
10th Cycle	1006.06	217.20
15th Cycle	929.48	192.52

As a result, the unconfined compressive strength of the frozen clay soil increased by approximately 5 times compared to its pre-frost state. As the number of cycles increased, the unconfined compressive strength of the frozen clay soil decreased, but even after 15 cycles, the unconfined compressive strength of the frozen clay soil was twice as high as before the frost. In the case where the clay soil was thawed, there was a loss of strength of more than twice as the number of cycles increased compared to the state before freezing. Considering the freezing and thawing phenomenon that occurs in clayey soils, it damages engineering structures such as sewage and communication lines, road infrastructure and underground structures.

#### **CONCLUSION and RECOMMENDATIONS**

During the cold climate in our country, the soil does not remain constantly frozen due to temperature differences. During cold climates, due to these temperature differences, unlike freezing, thawing occurs and the water content of the soil rises greatly. This freezing-thaw phenomenon repeats throughout the cold season. The increase and decrease in the strength of the soil in frozen and thawed states, which we observed in our experiments, can cause damage to many engineering structures.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KENT İMGELERİNİN KENT YAŞAYANLARININ ZİHİN HARİTALARI ÜZERİNDEN DEĞERLENDİRİLMESİ: ORDU İLİ ÖRNEĞİ

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#### ÖZET

Zihin haritaları, bireylerin çevreye ilişkin depoladıkları fiziksel ve bilişsel verilerin kağıda aktarılması sürecidir. Bireylerin kişisel özellikleri, kentte bulunma süreleri ve kent deneyimindeki farklılıkları kent algılarını değiştirmekte ve zihin haritalarını her birey için özel kılmaktadır. Lynch 'kent imgeleri' çalışmasında zihin haritalarını kullanmıştır ve kent algısını oluşturan yollar, bölgeler, sınırlar, düğüm noktaları ve işaret öğeleri olmak üzere beş temel unsurdan bahsetmiştir. Bu çalışmada kentte deneyim süreleri, yaşları ve cinsiyetleri farklı olan bir grup kent yaşayanından, Ordu ili, Altınordu ilçesinde belirlenen Taşbaşı-Zaferimilli-Aziziye-Düz ve Şarkiye Mahalleleri olmak üzere beş adet mahalleye ilişkin zihin haritaları çizimleri istenmiştir. Katılımcıların ortaya koydukları zihin haritalarında yer alan imgeler için Kevin Lynch'in kent imgelerinden faydalanmaları beklenmiştir. Çalışmada, katılımcıların çizimleri aracılığı ile hangi imgelerin öncelikli olarak vurgulandığı, hangi imgelerin referans unsuru oluşturduğu, algılanan kent imgesinde ağırlıkla hangi öğelerle karşılaşıldığını ortaya çıkartmak amaçlanmıştır. Araştırmanın sonucunda, kullanıcıların çevre algısı ve zihinlerinde oluşan kent imgelerinin farklılaştığı ortaya çıkmıştır.

**Anahtar Kelimeler:** Kent, kent imgesi, kent algısı, zihin haritası, Ordu



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF CITY IMAGES THROUGH THE COGNITIVE MAPS OF CITY RESIDENTS: THE EXAMPLE OF ORDU PROVINCE

#### ABSTRACT

Cognitive maps are the process of transferring onto paper the physical and cognitive data that individuals store about their environment. Individuals' personal characteristics, the length of time they have been in the city, and the different experiences they have had with the city change their perceptions of the city and make the cognitive maps unique to each individual. Lynch used cognitive maps in his study, "The Image of the City," and identified five basic elements that make up perceptions of the city: Paths, Edges, Districts, Nodes, and Landmarks. In this study, a group of city residents with different urban experience, age, and gender were asked to draw mind maps of five neighborhoods in Altınordu district in Ordu province: Taşbaşı-Zaferimilli-Aziziye-Düz and Şarkiye neighborhoods. The participants were expected to use Kevin Lynch's theory of city imagery for the images in their cognitive maps. The purpose of the study was to find out which images were primarily highlighted in the participants' drawings, which images were used as reference elements, and which elements were predominantly encountered in the perceived image of the city. As a result of the study, it was found that users' perceptions of the environment and the images of the city formed in the participants' minds were different.

**Keywords:** City, urban image, urban perception, cognitive maps, Ordu





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Kentler, tarihsel süreç içinde büyüyen ve gelişen, geçmişe ait izler barındıran toplumsal yaşam mekanlarıdır (Çelen Öztürk, 2016; Yolalan ve Çelen Öztürk 2021). Aynı zamanda kentler her türlü sosyal, kültürel, ekonomik etkileşimin ve bilişsel, düşünsel eylemlerin gerçekleştiği mekanlardır. Birey, gündelik yaşamın gerektirdiği eylemler ile kentte etken ve edilgen bir rol üstlenmektedir. Kent mekanları hacimler ve boşluklar arasında oluşan bir kabuk tanımlar. Yaşantımızın kabuğunu oluşturan ve dış dünya ile ilişkimizi biçimlendiren bu mekanlar; var olması için gerekli olan yapısal donatılar, sınırlar, örgütlenmeler ile tanımlanmaktadır (Turgay, 2013). Kullanıcının yaşanmışlıkları, sevinç, hüznün gibi duygu durumları içinde barındığı mekanlar ile ilişkilerinde derin bir bağ taşımaktadır (Tayanç, 2021). Başka bir deyişle mekan kavramı, salt fiziksel bir kavram olmayıp bireyin deneyimleri ve algılarıyla anlam kazanmaktadır.

Birey karmaşık, belirsiz, öngörülemeyen dış kaynaklardan değişen zaman aralıklarıyla gelen uyarılarla uyarılmaktadır. Bu uyarıları duyular aracılığıyla işleyerek kapsamlı bir edinim sürecinden geçmektedir (Downs & Stea, 1973). Bu edinim sonucu zihinde bir temsil oluşmaktadır. Kentsel imge, kullanıcının zihninde oluşan yansımaların bütünüdür. Dolayısıyla bireyin duyuları ve fiziksel algıları kent imgesinin oluşumunda etkilidir (Okudan, 2003). Birey, içinde bulunduğu kent mekanlarını fiziksel çevrenin koşulları ve kendi keşiflerinin, eylemlerinin, deneyimlerinin sonuçlarına bağlı olarak algılamaktadır. Bu nedenle kentsel mekanın algılanması ile insan-mekan arasındaki ilişkilerin incelenmesi tarihten günümüze birçok araştırmaya konu olmuştur. Bu araştırmalardan en çok bilinen ve pek çok çalışmada referans olarak alınan Kevin Lynch'in 'kent imgeleri' dir.

Lynch, kentte her koşulda duyuların ötesinde keşfedilebilecek bir dekor veya manzara bulunduğunu belirtir. Ona göre deneyim kendiliğinden gerçekleşmez, çevresiyle bağlantılı, kendisini meydana getiren olaylar dizisi ve geçmişin hatıralarıyla algılanabilir (Lynch, 1960). Kullanıcıların tarihsel, sosyal ve kültürel değerleri 'kent imgeleri' aracılığı ile kent boşluklarında, kamusal alan ve gündelik yaşam alanlarında sergilenmektedir ve toplum belleğinde kendi anlam ve hatıraları ile yer edinmektedir (Tayanç, 2021). Diğer bir ifadeyle kent imgesi kullanıcıların duyum algı ve biliş süreçlerini kapsamakta ve kent mekanlarının deneyimi ile zihinde oluşmaktadır (Kaya ve Akdemir, 2021).

Zihinsel haritalar, deneyimlenen yapıllı çevrenin yer, konum, uzaklık gibi fiziksel verilerinin zihinde oluşturulması, hatırlanması ve organize edilmesini (Downs & Stea, 1973; Ülkeryıldız



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

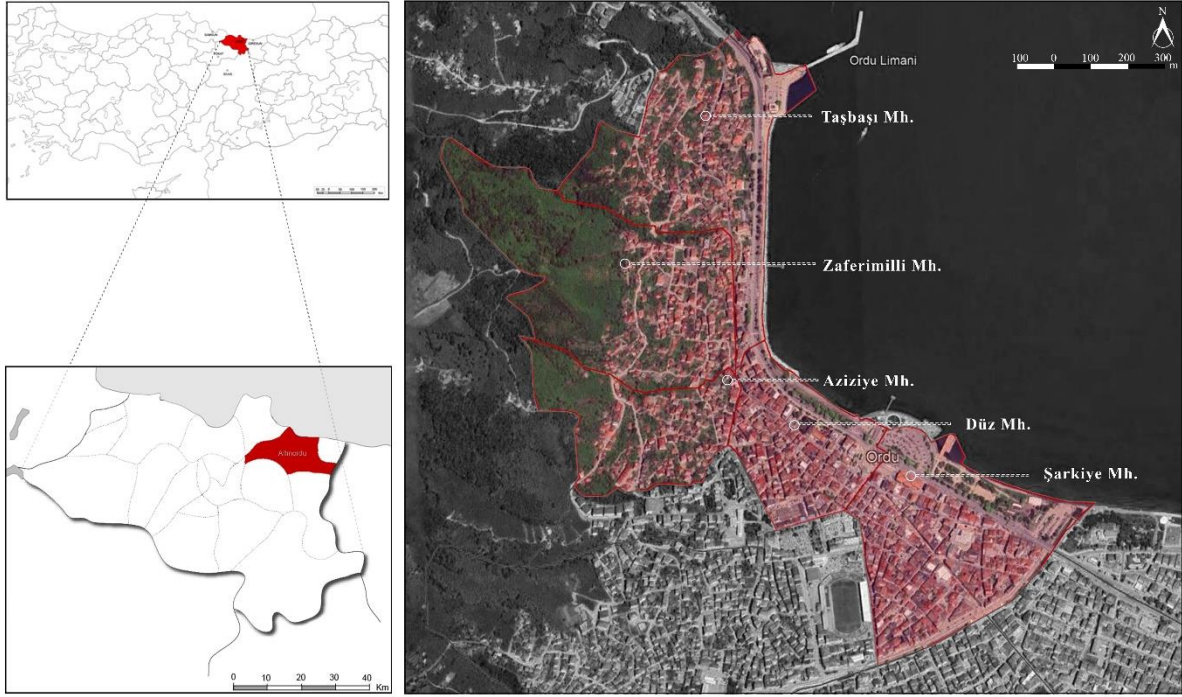
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

ve ark., 2009) ieren bir dizi sreten oluřmaktadı. Kent kullanıcılarının kent mekanına ait fiziksel ve biliřsel verileri kent algılarını oluřurmaktadır. Dolayısıyla kent algıları zihin haritalarını oluřurmakta ve eřitlendirmektedir. Zihin haritaları, kullanıcıların zihninde yer eden kent mekanına ait kağıt dzlemine aktarılması olarak tanımlanabilir (Akengin ve Ayaydın, 2017). İlk olarak E. Tolman'ın (1948) psikoloji alanındaki alıřmalarında kullanılmıř (Gifford, 1987; Kaya ve Akdemir, 2021) daha sonrasında ise farklı alanlarda pek ok arařtırmada kullanılmaya devam etmiřtir (Mutlu, 2018).

Kent yařayanları, yařadığı kentte eřitlenen eylemlerinin gerekleřtiğı kent mekanlarında kendini konumlandırmak, evresinin fiziksel zelliklerini tariflemek eğılimindedir. Kullanıcıların yař, cinsiyet, meslek, gnlk rutinleri, duyu durumları gibi kiřilik zellikleri bireylerin evresinden edindiğı verileri deęerlendirme srelerini eřitlendirmektedir. Dolayısıyla bir kente iliřkin farklı ve zgn zihin haritaları ortaya konmaktadır (elen ztrk, 2016). Bu alıřmanın amacı evresiyle srekli etkileřim halinde olan kent kullanıcılarının gndelik yařamlarının getiğı mekanlara olan algı dzeylerini arařtırmaktır. Bu nedenle farklı srelerde kentte bulunan kullanıcıların zihin haritalama yntemiyle kent algıları ortaya konmuřtur. Kenti tanımlayan zellikler: odaklar, iřaret geleri, blge, sınır ve yollar ile meknsal geler ve katılımcıların zihnindeki Ordu iline ait imgeler ortaya konulmuřtur. Ordu ilinde yrtlen bu alıřmanın Ordu ilinde bu ynde yapılacak dięer alıřmalar iin bir zemin oluřturacağı dřnlmektedir.

### **MATERYAL ve METOD**

Arařtırma alanı, Ordu ili Altınordu ilesi olup (řekil 1) 235.096 nfusu ile Ordu ilinin en kalabalık ilesi konumundadır (Anonim, 2023). alıřma alanı olarak Altınordu ilesinde bulunan Tařbařı, Aziziye, Zaferimilli, řarkiye ve Dz Mahalleleri seilmiřtir. alıřma alanını oluřturan mahalleler Ordu ilinin ilk yerleřim yerleri olarak bilinmektedir ve seilen alan pek ok ticari, kamusal ve konut yapılarının yoęunlařtığı bir blge zelliğı tařımaktadır.



Şekil 1. Araştırma alanı

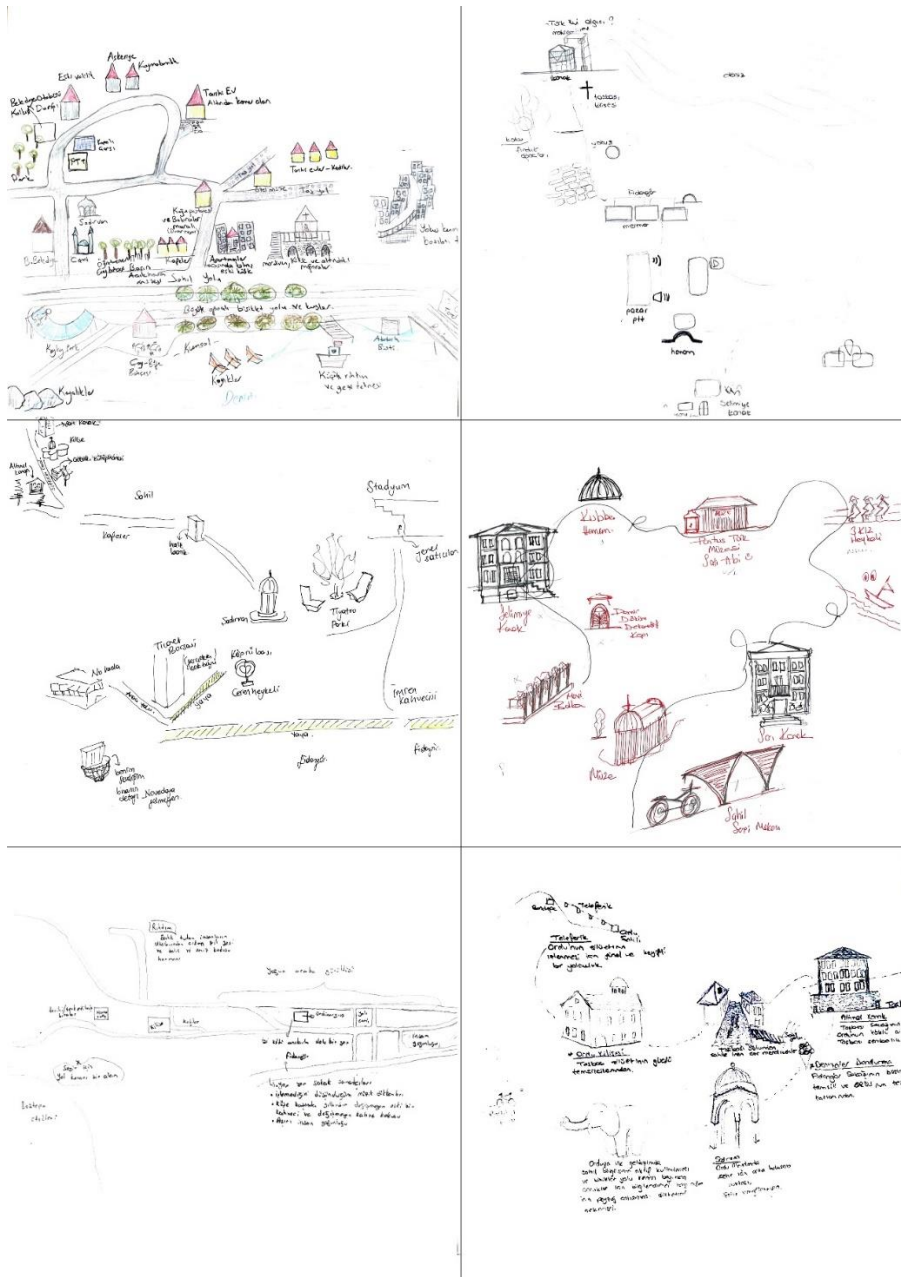
Araştırma kapsamında vaka analizi gerçekleştirilmiş olup kullanıcıların deneyimleri sonucu ortaya çıkan kent algılarında, hangi imgelerin vurgulandığını belirlemek adına anket ve zihin haritalama yöntemi uygulanmıştır. Bu iki uygulamanın birbirini destekleyeceği öngörülmüş ve bu bağlamda kent yaşayanlarının kent algıları saptanmaya çalışılmıştır.

Anket soruları katılımcıları tanımaya yönelik olarak; yaş, cinsiyet, memleket, Ordu İli'nde bulunma süresi sorularından oluşmaktadır. Anket çalışması 22 kişiye uygulanmış olup; katılımcıların %50'si Ordulu, %50'si ise Ordulu olmayan kent yaşayanlarından seçilmiştir. Katılımcıların kentte bulunma süreleri ise 1-39 yıl arasında çeşitlilik göstermektedir.

Zihin haritalama yöntemi uygulaması kapsamında katılımcılara çalışma alanı sınırları belirtilmiştir. Katılımcılardan A4 boyutundaki bir kağıda seçilen alana ilişkin hafızalarında kalan ve kendi kişisel deneyimleri, keşifleri ve hatıralarına eşlik eden cadde, sokak, yapılar, anıtlar gibi kent öğelerini çizerek zihin haritalarını oluşturmaları istenilmiştir. Daha sonra katılımcıların hazırladıkları çizimlerden Lynch'in kenti algılamanın beş ana unsurunu oluşturan yollar, kenarlar/sınırlar, bölgeler, odak noktaları/düğüm noktaları ve işaret öğeleri çıkarılmış ve bu çizimler incelenerek hangi imgelerin öncelikli olarak vurgulandığı, hangi imgelerin referans unsuru oluşturduğu, algılanan kent imgesinde ağırlıklı olarak hangi öğelerle karşılaşıldığını ortaya çıkartılmıştır.

## BULGULAR

Araştırmada katılımcıların çalışma alanı olarak tanımlanan Taşbaşı, Aziziye, Zaferimillî, Şarkiye ve Düz Mahallelerinde Lynch'in beş temel unsuruna ilişkin tüm öğelere yer verdikleri görülmüştür. Buna göre katılımcıların bu unsurlardan en çok işaret öğeleri, ardından odak noktaları, ardından da yolları algıladıkları ortaya çıkmıştır. Öne çıkan öğeler arasında Taşbaşı kilisesi, Ordu Büyükşehir Belediye Binası, Atatürk Bulvarı ve Şadırvan öğeleri tespit edilmiştir. Katılımcıların kente ilişkin zihin haritalarını oluştururken gündelik pratiklerine sahne olan mekanlara yer verdikleri gözlenmiştir (Şekil 2).



Şekil 2. Zihin haritalarından örnekler



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

İncelenen zihin haritalarında yer alan cadde ve sokaklar, duvar, merdiven ve erişimi sınırlı noktalar, ticari, kamusal ve konut alanları, kavşaklar ve meydanlar, yapılar, anıtlar, heykeller ve çeşmeler yollar, sınırlar, bölgeler, odak noktaları ve işaret öğeleri olarak kategorilendirilmiştir (Tablo 1).

**Tablo 1.** Kent imgelerini oluşturan unsurlar

Yollar	Caddeler, Sokaklar
Sınırlar	Duvarlar, Merdivenler, Kıyılar, Limanlar, Erişimi sınırlı noktalar
Bölgeler	Ticari alanlar, Kamusal alanlar, Konut alanları
Odak Noktaları	Kavşaklar, Meydanlar, Açık Alanlar
İşaret Öğeleri	Yapılar, Anıtlar, Heykeller, Çeşmeler

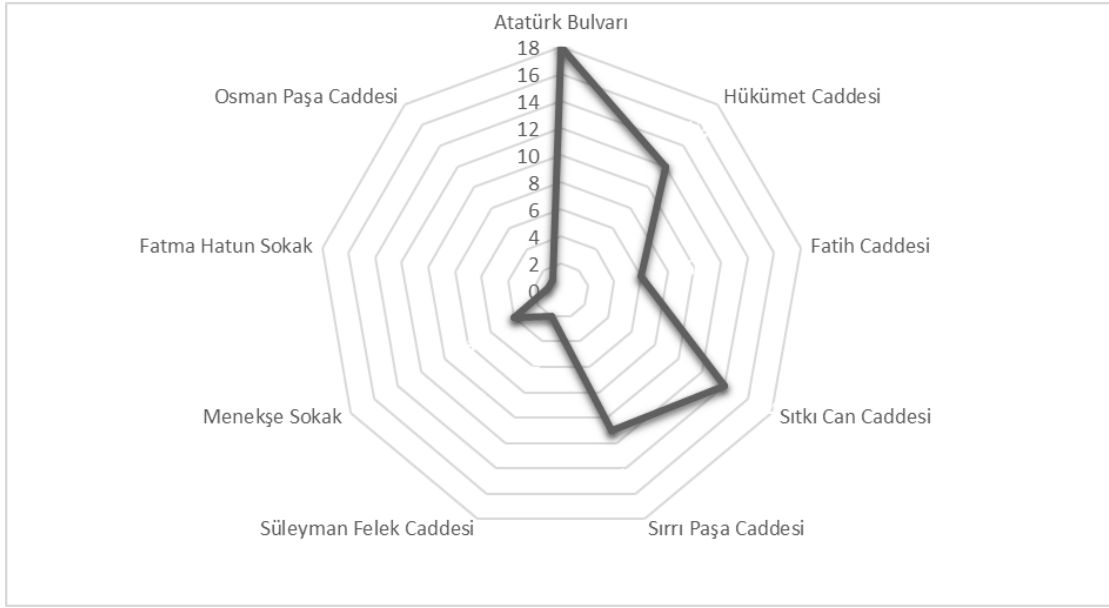
Zihin haritalarında çalışma alanına ilişkin 49 farklı kent imgesinin tekrarladığı görülmüştür. Buna göre katılımcıların zihin haritalarında ortaya konulan kentsel öğelere Tablo 2’de yer verilmiştir ve çizilen haritalarda 9 farklı yol, 4 farklı sınır, 5 farklı bölge, 13 farklı odak noktası ve 20 farklı işaret öğesi saptanmıştır.

**Tablo 2.** Kullanıcıların algıladıkları kent imgeleri

Algılanan Yollar	Atatürk Bulvarı, Hükümet Caddesi, Fatih Caddesi, Sıtkı Can Caddesi, Sırrı Paşa Caddesi, Süleyman Felek Caddesi, Menekşe Sokak, Fatma Hatun Sokak, Osman Paşa Caddesi
Algılanan Sınırlar	Menekşe Sokak Merdiveni, Taşbaşı Yokuşu, Rıhtım, Boztepe
Algılanan Bölgeler	Bankalar Yapı Adası, Taşbaşı Mahallesi, Selimiye Mahallesi, Kapalı Çarşı
Algılanan Odak Noktaları	OBB Meydanı, OBB Sahil Park, Cumhuriyet Meydanı, Gazeteciler Parkı, Mahalle Çocuk Parkı, Beton Park, Otobüs Durağı, Otopark, Taksi Durağı, Tiyatro Parkı, Kaykay Park, El Sanatları Çarşısı
Algılanan İşaret Öğeleri	Taşbaşı Kilisesi, OBB Binası, Sarı Konak, 3 Kız Heykeli, Ordu Saray Hamamı, Altınel Konak, Denizciler Dondurma, Şadırvan, Serüven Kafe, Teleferik, Agope Kilisesi, Yalı Camii, Orta Camii, Çocuk Kütüphanesi, Halk Bank, Yapı Kredi Bankası, Ziraat Bank, Novada, İmren Kahvecisi, PTT, Eski Valilik Binası, Askeriye Binası, Büfeler, Belde Otel, Sinema Otel, Olive Kafe

Katılımcılar tarafından çalışma alanına ilişkin algılanan yollar ve bu yolların çizilme sıklıkları Şekil 3’te verilmiştir. Buna göre çizilen zihin haritalarında katılımcıların %81,8’i Atatürk Bulvarı’nı, %54,5’i Hükümet Caddesi’ni, %27,3’ü Fatih Caddesi’ni, %63,6’sı Sıtkı Can Caddesi’ni, %9’u Süleyman Felek Caddesi’ni, %18’i Menekşe Sokak’ı, %4,5’i Fatma Hatun Sokak’ı ve %4,5’i Osman Paşa Caddesini algıladıkları görülmüştür.





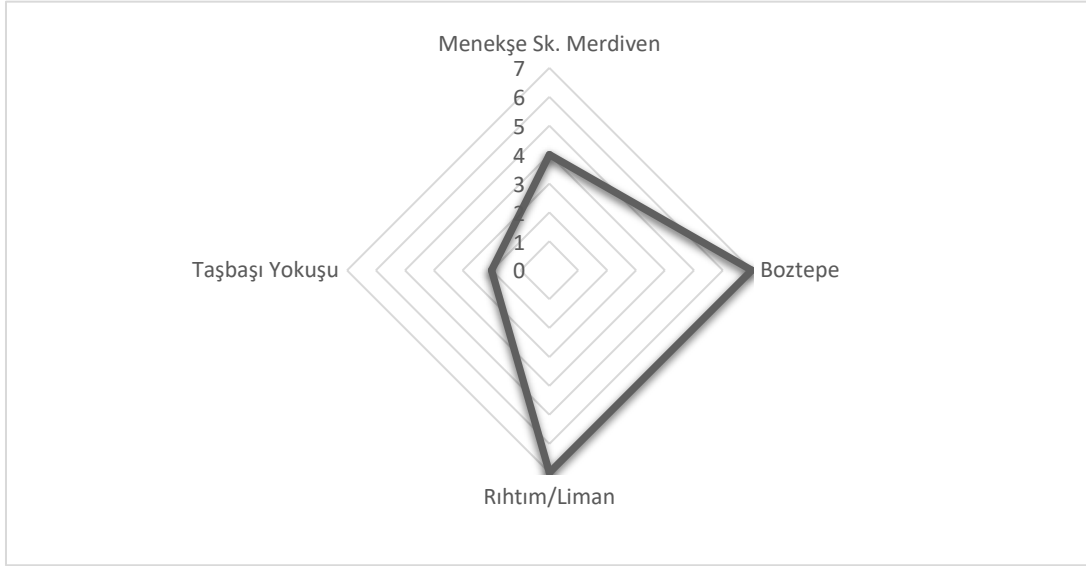
**Şekil 3.** Yolların çizilme sıklığı

Zihin haritalarında sıklıkla tekrar eden yollardan olan Atatürk Bulvarı Karadeniz Sahil Yolunun 1.3 km'lik kısmı olup kentin omurgasını oluşturan ögedir. Sıtkı Can Caddesi, Taşbaşı Mahallesi'nin sahile erişimini sağlayan ana ulaşım aksı olup kentsel sit alanında konumlanmaktadır. Katılımcıların çalışma alanına ilişkin algıladıkları yollar kent haritasında gösterilmiştir (Şekil 4).



**Şekil 4.** Zihin haritalarında algılanan yol örnekleri

Katılımcıların çalışma alanına ilişkin algıladıkları sınırların çizilme sıklıkları Şekil 5'te verilmiştir. Buna göre katılımcıların %18'i Menekşe Sokak Merdivenlerini, %31,8'i Boztepe'yi, %31,8'i Ordu Limanı/Rıhtım'ı ve %9'u Taşbaşı Yokuşu'nu sınır olarak algıladıkları saptanmıştır.



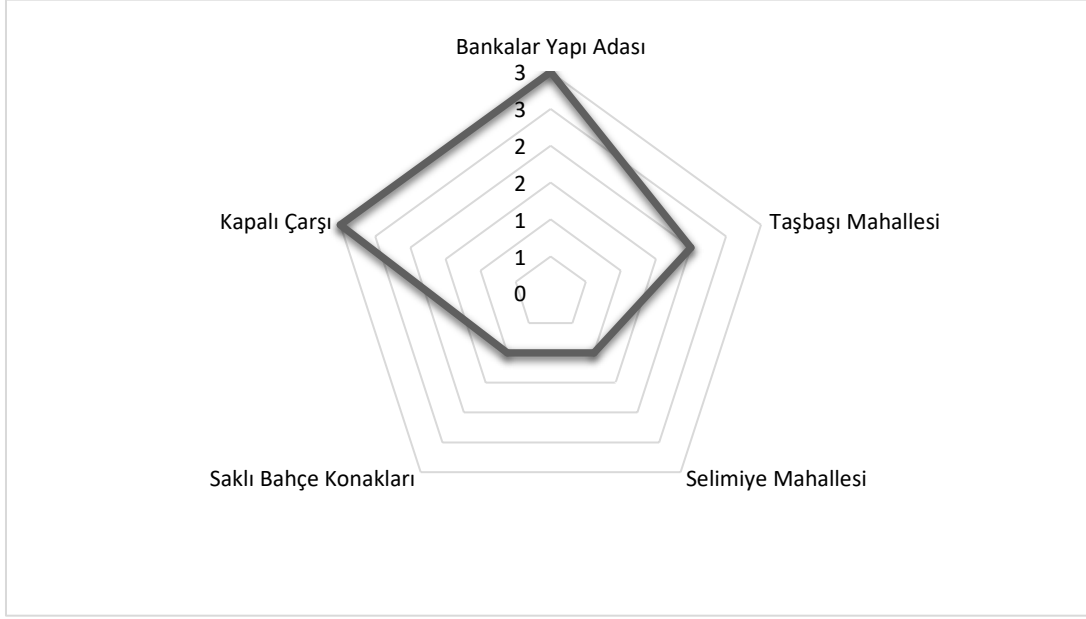
**Şekil 5.** Sınırların çizilme sıklığı

Katılımcıların çalışma alanına ilişkin algıladıkları sınırlar Şekil 6'da gösterilmiştir.



**Şekil 6.** Zihin haritalarında algılanan sınır örnekleri

Çizilen zihin haritalarında katılımcıların bölgeleri çizme sıklıkları Şekil 7’de yer almaktadır. Buna göre katılımcıların %13,6’sı Bankalar Yapı Adası’nı, %9’u Taşbaşı Mahallesi’ni, %4,5’i Selimiye Mahallesi’ni, %4,5’i Saklı Bahçe Konakları’nı, %13,6’sı Kapalı Çarşı’yı bölge olarak algıladığı saptanmıştır.



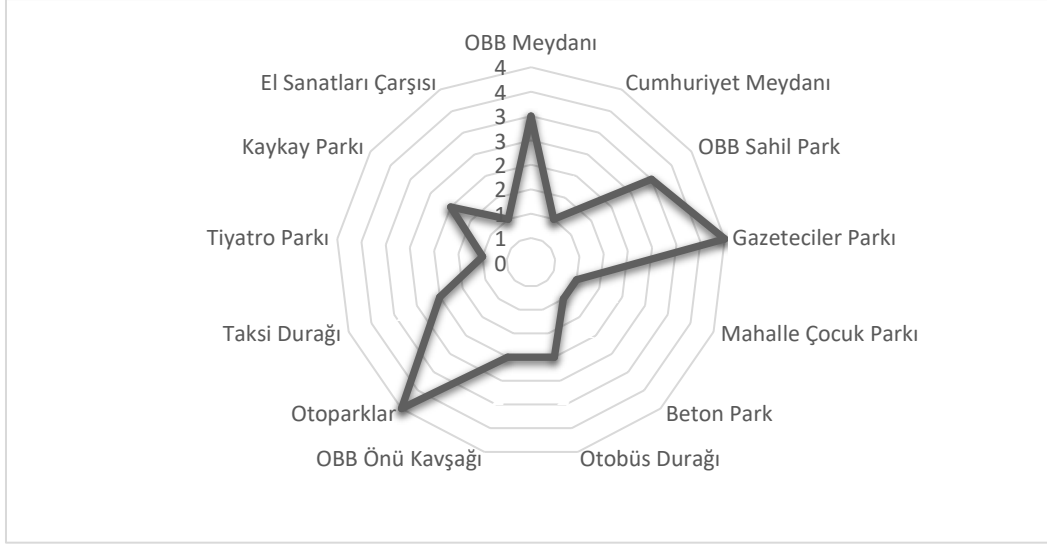
**Şekil 7. Bölgelerin çizilme sıklığı**

Katılımcıların çalışma alanına ilişkin algıladıkları bölgeler Şekil 8.’de gösterilmiştir.



**Şekil 8. Zihin haritalarında algılanan bölge örnekleri**

Katılımcıların çalışma alanına ilişkin algıladıkları odak noktalarının çizilme sıklıkları Şekil 9'da yer almaktadır. Katılımcıların %18'i Gazeteciler Parkı'nı, %13,6'sı Belediye Meydanı'nı, %13,6'sı Sahil Park'ı, %9'u Otobüs Durağı, %9'u Belediye Kavşağı, %9'u taksi durağını, %9'u Kaykay Park'ını, %4,5'i Cumhuriyet Meydanı'nı, %4,5'i mahalle çocuk parkını, %4,5'i Beton Park'ı, %4,5'i Tiyatro Parkı'nı ve %4,5'i ise El Sanatları Çarşısı'nı bölge olarak algıladıkları ortaya çıkmıştır.



**Şekil 9.** Odak noktalarının çizilme sıklığı

Katılımcıların çalışma alanına ilişkin algıladıkları odak noktaları Şekil 10'da yer almaktadır.



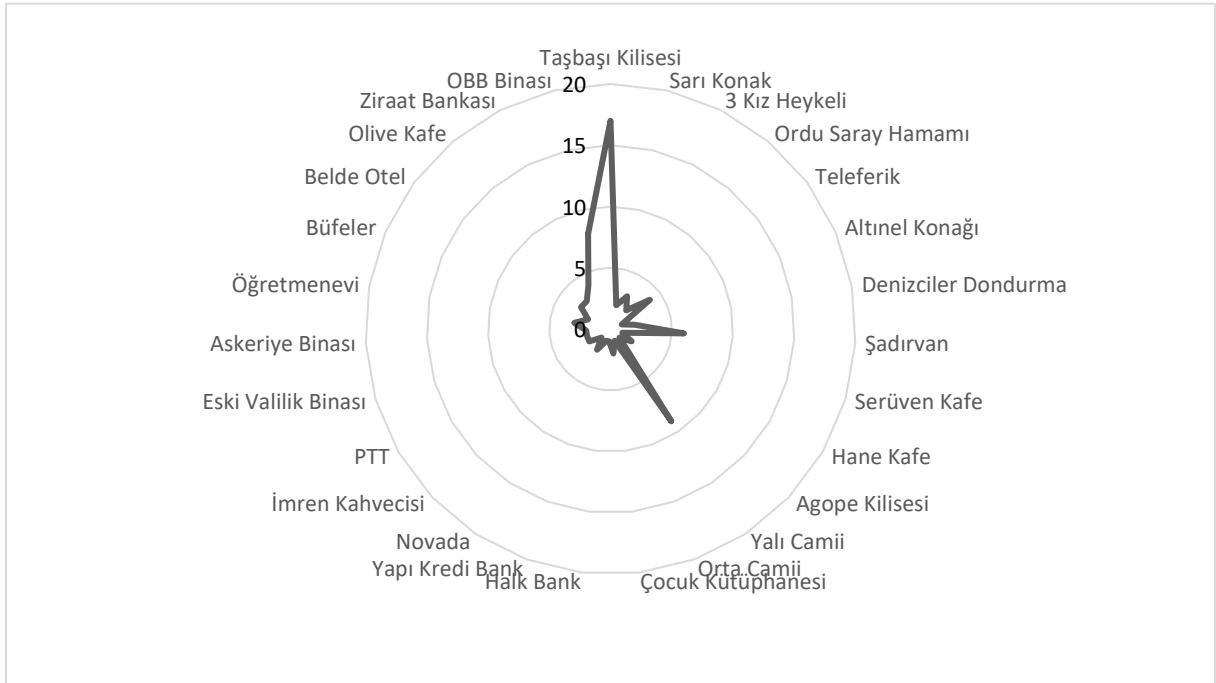
**Şekil 10.** Zihin haritalarında algılanan odak noktaları örnekleri



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Çizilen zihin haritalarında katılımcıların işaret öğelerini çizme sıklıkları Şekil 11’de yer almaktadır. Buna göre katılımcıların %77,3’ü Taşbaşı Kilisesi’ni, %41’i Yalı Camii’ni, %36,4’ü Ordu Büyükşehir Belediye Binası, %27,3 Şadırvan, %18’i Ziraat Bankası, %18’i teleferik, %13,6’sı Üç Kız Heykeli, %13,6’sı Denizciler Dondurmacısı, %13,6’sı Öğretmenevi, %13,6’sı büfeler, %13,6’sı Sinema Otel, %13,6’sı Olive Kafe, %9’u Sarı Konak, %9’u Saray Hamamı, %9’u Altinel Konak, %9’u Hane Kafe, %9’u Çocuk Kütüphanesi, %9’u Novada Alışveriş Merkezi, %9’u PTT, %9’u Eski Valilik binası, %9’u Askeriye Binası, %9’u Belde Otel, %4,5’i Serüven Kafe, %4,5’i Agope Kilisesi, %4,5’i Orta Camii, %4,5’i Halk Bank, %4,5’i Yapı Kredi, %4,5’i ise İmren Kahvecisini işaret öğesi olarak algıladıkları görülmüştür.



Şekil 11. İşaret öğelerinin çizilme sıklığı

Katılımcıların çalışma alanına ilişkin algıladıkları işaret öğeleri Şekil 12’de gösterilmiştir.





**Şekil 12.** Zihin haritalarında algılanan işaret öğeleri örnekleri

Zihin haritalarında 20 farklı işaret ögesinin 92, 9 farklı yolun 69 ve 13 farklı odak noktasının 27 kez tekrar ettiği tespit edilmiştir. Bu durumda katılımcıların en çok işaret öğeleri, ardından yolları, ardından odak noktalarını algıladığı görülmüştür. Zihin haritalarında Taşbaşı Kilisesi'nin 17, Yalı Camii'nin 9, Şadırvan'ın 6, Atatürk Bulvarı'nın 18 ve Ordu Büyükşehir Belediye Binası'nın 8 kez tekrar ettiği saptanmıştır. Bu durumda kentin kimliği ile bütünleşen önemli sayıda ziyaretçi alan Taşbaşı Kilisesi, Yalı Camii, Şadırvan, Atatürk Bulvarı ile Ordu Büyükşehir Belediye Binası öğeleri öne çıkan unsurlar olarak tespit edilmiştir.

### **SONUÇ ve ÖNERİLER**

Kent kimliği ve marka kent olma, günümüz modern kent planlamasında ve yönetiminde giderek daha fazla önem kazanan kavramlardır. Kent kimliği, bir kentin benzersiz özellikleri, tarihi, kültürel mirası, zihinlerde bıraktığı iz ve toplumsal yapısıyla ilişkilendirilen tanınabilir bir karakterdir. Bu kimlik, bir kenti diğerlerinden ayıran ve insanlara özgü bir deneyim sunan özellikleri içerir. Marka kenti olma ise, bir kentin kendisini sadece fiziksel yapısıyla değil, aynı zamanda yaşam tarzı, kültür, ekonomi ve inovasyon gibi unsurlarla da tanımlayarak ulusal ve uluslararası arenada kendine özgü bir konum edinmesini de ifade eder. Kent kimliği ve marka kenti olma, bir kentin sürdürülebilir kalkınma, turizm, iş fırsatları ve yaşam kalitesi gibi



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

**October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus**

faktörlerdeki başarısını etkileyebilmekte ve bu nedenle kent yöneticileri için stratejik bir öneme sahip olabilmektedir.

Bu çalışmada öne çıkan öğeler kentin Belediye Meydanı, Hükümet Caddesi, Sırrı Paşa Caddesi gibi yoğun kullanım alanları ve Taşbaşı Kilisesi, Yalı Camii, Şadırvan, Altınel Konak gibi çoğunlukla miras değeri taşıyan öğeler olduğu tespit edilmiştir. Bu bağlamda kente ilişkin algıyı güçlendiren bu yapıların korunması ve kentte yapılacak çeşitli kültür sanat etkinlikleriyle mekanların değerlendirilmesi ve tanıtımı kent kimliği oluşturma ve kentin cazibe merkezi olması yönünde önemli bir adım olacaktır.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXAMINING THE ALTERATIONS CAUSED BY IMMIGRATION IN RURAL HERITAGE AREAS; AS A CASE STUDY YENICE VILLAGE, MUĞLA

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#### **ABSTRACT**

Rural settlements and houses have provided access to regions' different life habits and cultures. Most rural dwellings nowadays have either been abandoned or run the risk of losing their character. Therefore, the preservation of rural areas must document and evaluate rural dwellings' planning features and construction methods. Depending on regional characteristics, several threats exist to the rural historical context. The population of rural areas has been progressively declining; nevertheless, there has been a recent increase in the number of immigrants moving to tourist-oriented rural areas of metropolitan regions. According to the needs of the residents, the immigrants or the owners changed their dwellings. This study aims to assess the impacts of interventions on rural houses in Yenice Village, Muğla. Yenice is a village in the Northwest Aegean Area, not far from the tourist towns of the Muğla province. Immigration has started growing in the village, notably from the major cities. Interventions were made in older dwellings with open sofas in the town in response to the demands of newcomers. The impact of alterations on the architectural and spatial features of the houses was examined. As a result, based on international preservation standards and charters, evaluation criteria for interventions on rural heritage were established. It has been noted that immigrant housing has undergone substantial changes, losing much of its original layout and construction. On the other hand, reversible changes are made in the locals' dwellings.

**Keywords:** Rural Heritage, Intervention, Conservation, Immigration.



## INTRODUCTION

The culture of the locals is reflected in the rural heritage, as is how they interact with their surroundings (Icomos, 1999). Rural communities serve as an example of their surroundings' topographical, climatic, economic, social, and ecological characteristics. These characteristics lead to variations in settlement morphology, location, plan types, construction methods, and material usage. The first stages in ensuring the sustainability of the rural heritage are research and documentation. Study and documentation of settlement characteristics, building groups, and traditional construction processes are thus required (Icomos, 1999).

The distinctiveness of each rural area is emphasized by documenting its peculiarities. Most studies (Fuentes, 2010; ECOVAST, 1996; Ruda, 1998) concentrated on settlement features. Research on vernacular or rural houses has long been conducted in various regions of the world using multiple perspectives on the built environment in rural communities. Several studies focus on the types of habitation and settlement in particular areas (Dickinson, 1949; Enhayat, 1952; Kaushik, 2020). According to studies (Vissilia, 2009; Cardinale et al., 2013; Quintana et al., 2022), rural villages and houses are environmentally sustainable. Another popular research topic is the construction methods and material consumption in rural houses (Ngowi, 1997; Delgado & Guerrero, 2006; Ottoni & Borghi, 2016). There are also many studies about reusing rural houses (Fuentes, 2010; Alcindor and Coq-Huelva, 2020; Philips, 1993; Gonzales, 2017). Research about rural houses in Turkish towns, cities, and regions occurs. Towns in Marmara Regions were studied by Postalıcı-Altınkaya, et al (2011) and İner & Erdoğan (2007); towns and cities in the Aegean Region were studied by Akış et al. (2013), Akyüz-Levi & Taşçı (2017), Deniz (1992), Etlacakuş & Turan (2016), Başoğlan-Avşar (2016), İşcanı & Eres (2017), Koca (2019). Dağ-Gürcan (2017), Kurtuluş & Güçhan (2015), Kavas (2011) studied Mediterranean Region. Villages in the Eastern Black Sea, including Samsun, Trabzon, Artvin, and Giresun, were investigated for their rural architecture by Özgüner (1970), Batur (2005), and Zorlu & Faiz (2012). In 1949, Kafesçioğlu examined the structural traits of rural houses in the Middle Anatolia cities of Eskişehir, Ankara, and Kayseri. There aren't many studies concerning construction techniques, notably in rural houses (Eriç, 1979; Batur & Gür, 2005; Sarıoğlu, 2017). The environmental performance of rural houses has also been studied (Yüksek and Esin, 2013; Hasgül et al., 2021).

Rural houses have been facing various difficulties in the past few decades. Traditional family structures and lifestyles have significantly changed because of advancements in transportation



technology, migration to larger cities, improved financial resources, and more purchasing power. Additionally, the number of qualified craftsmen capable of building rural houses has steadily decreased, making it more challenging to maintain this practice and preserve cultural heritage (Var & Kobayashi 2019).

The population of rural areas has been progressively declining; nevertheless, there has been a recent increase in the number of immigrants moving to tourist-oriented rural areas from metropolitan cities. According to the needs of the residents, the immigrants or the owners changed their dwellings. Therefore, this study aims to determine the interventions on rural houses in Yenice Village, Muğla. The impact of alterations on the architectural and spatial features of the houses was examined. The reasons for these interventions will also be discussed. Yenice village is in the Northwest Aegean Area of Turkey, not far from the tourist towns of the Muğla province.

### **Case Study Area**

Yenice Village is located in the southwest of Muğla City center, eighteen km from Akyaka town, a famous tourist place. The village is surrounded by tourist towns such as Marmaris, Bodrum, and Milas. This situation has recently affected the village's characteristics (Figure 1)..



**Figure 1.** Location of the case study area (Revised from Yandex Map)

Rural residents who work in agriculture, mainly tobacco production or vegetable gardening and animal husbandry, have houses that include rooms and all the exterior open and enclosed spaces where they can carry out their rural occupations. Most of the houses were constructed in the middle of the 20th century. The residential area comprises a house, barn, warehouse, store,

lavatory, and garden. Establishing regions for productive agriculture has been possible by placing the houses along the land boundary. Most people enter the land from the street (Figure 2).



**Figure 2.** Examples of rural houses

The houses are single-story, with an open sofa, and the rooms and kitchen are entered from the sofa. They are modest scale houses. The latrines of the houses are located outside. There is a bedding closet (*yüklük*), an ablution basin (*gusülhane*) in the closet, and a fireplace, *serpenç*, *elmalık* and lamp niche in each room.



**Figure 3.** Architectural elements of the rural houses



The foundation of the houses was probably constructed with rubble stone. The inner and outer walls of the houses were built with rubble stone masonry with adobe or lime mortar, while the floors and roofs are timber framed systems. Timber pillars support the roof of the open sofa. Most architectural elements such as cupboards, shelves, serpenç, elmalık, and floor and ceiling coverings were timber; the fireplaces were stone (Figure 3).

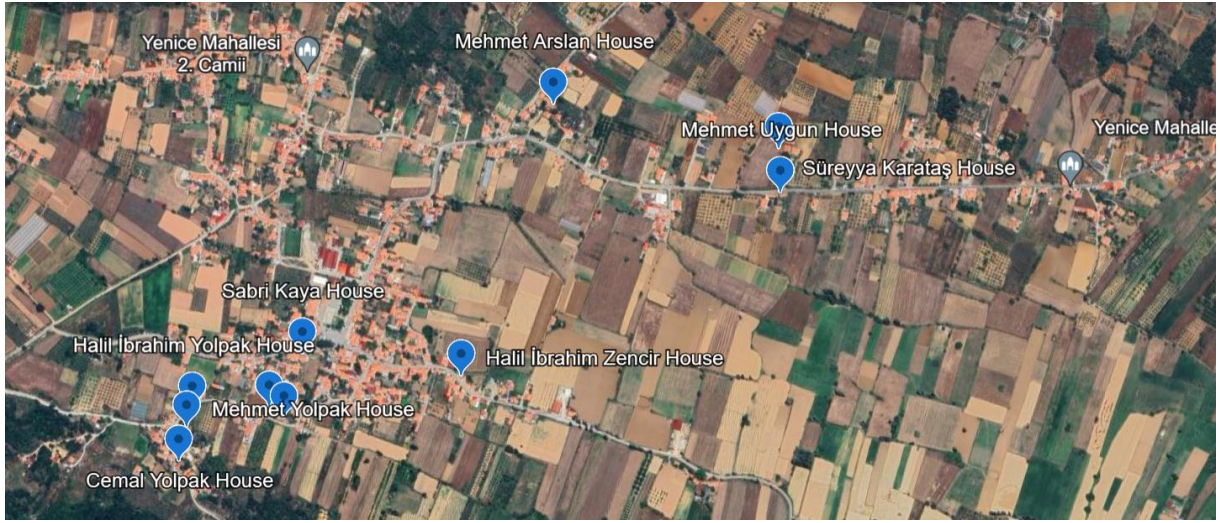
The village population changed over time. The rural houses were constructed between 1950 and 1960. The dwellings were primarily modest scale composed of a sofa with two rooms and a kitchen not to occupy agricultural areas. The young population left the village to study or work in Muğla city center or large cities between the 1980s and 90s. The family structure started to change. The local people constructed new concrete houses near their rural dwellings (1980-90). Rural dwellings remained empty and were used as warehouses and common areas for agricultural activities such as lining up tobacco leaves (1990-2000). As tobacco production decreased after the 1990s, houses were emptied, neglected, and demolished (2000-2015) (Başođlan-Avşar, 2016). With the beginning of the migration from the big cities to the rural areas after 2015, the village received immigration due to its proximity to tourist areas. Homeowners started renting, repairing, and expanding their houses.

#### **MATERIALS and METHODS**

The research is mainly based on documentation of the position of houses, plan organizations, and façade characteristics. Visual observations were made to determine the houses' construction techniques and material usage. Materials of both construction techniques and architectural elements were analyzed. Visual analysis, photographic recording, and traditional measuring procedures were used in documenting the houses. Conventional techniques were used for the measurement of the plans. Steel tapes and survey rods were the traditional instruments used.

The data about the original spatial and facade characteristics of the houses were gathered from old photographs and oral sources. The alterations were determined by comparing the houses with the drawings based on older photos and oral sources. Ten rural houses were analyzed in the village (Figure 4).





**Figure 4.** Position of the demolished, abandoned and altered Yenice rural houses (Revised from Yandex Map)

## **FINDINGS and DISCUSSION**

60% of the houses have sustained their original features; however, 20 % of the houses are abandoned, and 20 % have lost their original plan characteristics and architectural elements. The level of change and the type of changes in the houses are identified. Three levels are determined. Under each level, changes are grouped, such as functional, morphological, structural, and material changes, or both.

**First Level: Abandoned Houses or Houses used as a Storage**

The house sustained its original plan and structural characteristics but has structural failures and material deterioration. The lack of maintenance makes the homes vulnerable to environmental impacts. First, due to climatic factors, timber materials and structures decay, and when the roof is damaged, the system is left vulnerable to external factors (Figure 5)

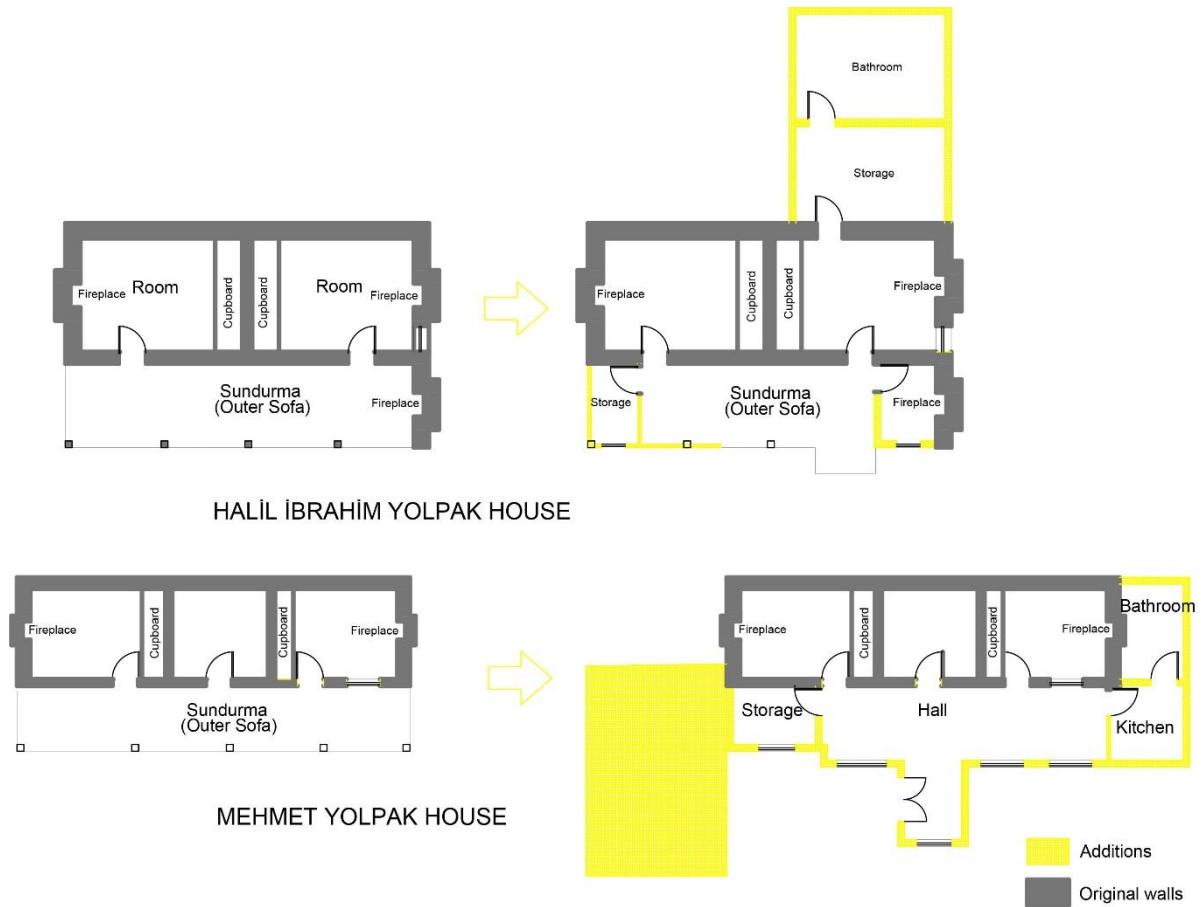


**Figure 5.** Mehmet Uygun House used as a storage

Second Level: The houses with simple additions

This type of houses was shaped depending on the basic needs of the local people. The open sofas of the houses were generally covered with simple linoleum or brick, and kitchen and storage areas were added to the sofas. The bedding, closets, and niches in the houses are still used. Bathrooms that can be accessed from the house are constructed by adding a mass near the house (Figure 6).

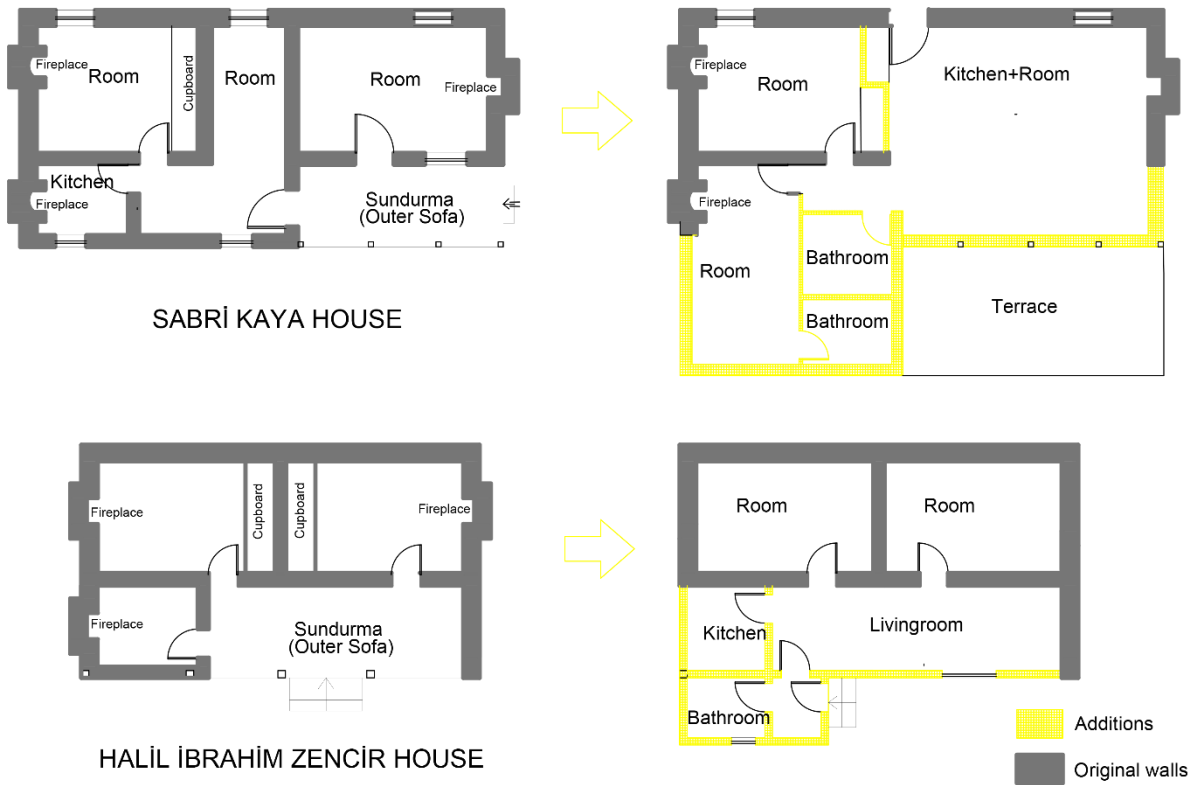




**Figure 6.** The houses with simple additions

*Third Level: The houses that have lost plan characteristics*

The houses sustained their original function, but the spatial organization changed. Partially, the walls of the houses were preserved, but the houses were expanded towards the garden or courtyard to create a bathroom, kitchen, and a large living room area in the houses. It was even seen that some houses had double bathrooms, and the architectural elements in the houses were completely removed. Open sofas disappeared and turned into interior living spaces (Figure 7). Cancellation of the fireplace, removal of cupboards, niches, and new materials for the window frames and doors, and different sizes of the openings were common changes (Figures 7 and 8).



**Figure 7.** The houses that have lost original plan organization



**Figure 8.** The houses that have lost original façade organization



## **CONCLUSION and RECOMMENDATIONS**

Rural settlements and houses have provided access to regions' different life habits and cultures. Today, most rural houses in Yenice preserve their original characteristics with simple alterations; however, in recent years, the houses were changed based on the request of the immigrants. They have lost their original features completely.

The tendency for housing demand to spread to the countryside in Muğla city center, especially in Istanbul, has made Yenice and the surrounding villages a center of attraction. However, this caused the original qualities of the houses to be lost. Most of the households wanted to rent their houses. The houses were repaired based on the requirements of the renters. All the morphological features of the houses changed. The sofas were removed, and it became a room; the bathrooms were added, and the houses was transformed into an apartment space with a hall and the rooms opening to the hall.

The local people who continue their lives in these houses have preserved the architectural elements. However, constructing with the same techniques and details is impossible since experienced craftsmen are limited. Changes in lifestyle and expectations of the residents caused additions and the usage of open spaces to change, and it is closed.

Documentation and analysis of settlement, plan characteristics, and construction techniques of rural houses are critical to conserving the data about rural regions. Local people should be made aware of cultural heritage.

### **Thanks and Information Note**

I would like to express my deepest appreciation to my father Hasan Uygun for the site survey.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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**IV-International Rural Areas and Ecology Congress  
Within The Framework of Sustainable Development**  
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### VERNAKÜLER MIMARININ TASARIM PRENSİPLERİNİ ANLAMAK: GELENEKSEL SAFRANBOLU EVLERİNİN MEKAN ANALIZI

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#### ÖZET

Hızla değişen ve evrenselleşen dünyada, sürdürülebilirlik bağlamında yerel dinamiklerin önemi giderek artmaktadır. Fiziksel çevreye ve toplumsal yaşama etki eden, devinim halindeki mimari kültürün gelişimi ve yorumlanarak miras bırakılması açısından bu dinamiklerin referans alınması önemlidir. Bu bağlamda, Safranbolu geleneksel evleri Türk evinin karma tekniklerle inşa edilmiş başarılı bölgesel örneklerindedir. Günümüzde kentsel sit alanı olan üç ayrı bölgede inşa edilmiş evlerin meydana getirdiği eski şehir 'Dünya Miras Alanı' statüsündedir. Her biri farklı özellikteki sitler üzerine yapılan bu çalışmada; evi meydana getiren mimari tektoniklerin (unsurların) birbiri ile kurduğu ilişkiler ve bu ilişkileri etkileyen yere dair verilerin mekânda nasıl somutlaştığı gösterilmektedir. Daha önceki birçok çalışmanın konusu olan, bu anonim mimarlık ürünlerini anlamak çok boyutlu incelemeler yapmayı gerekli kılmaktadır. Bu amaçla çalışmada vaziyet ölçeğindeki analizler parsel ve yapısal bazlı olarak iki başlık altında belirtilmiştir. Evin yapıldığı tasarım arazisini ifade eden parsel bazında; Parsel-Yön, Parsel-Eğim, Parsel-Sokak, Parsel-Manzara gibi ilişkilere değinen analizler yapılmıştır. Evin iç mekân organizasyonunu açıklayan yapısal bazda ise; Parselde Yapı Taban Alanının Konumlanma İlişkisi, Yapı-Komşu Yapı İlişkisi, Yapı Kat Sayısı, Yapıda Eğim Kullanımı, Parsel Girişi – Yapı Girişi İlişkisi, Yapı Girişi Sayısı, Çıkmaların Yönü ve Sayısı başlıklarına göre irdelemeler yapılmıştır. Kentsel sitlerden seçilen tipik evlerin yakın çevreyle ilişkili plan ve kesitleri üzerinden yapılan mekâna dair çıkarımlar ile sitler etrafındaki yeni yapı tasarımları için bağlamı bir veri kabul ederek tasarımlara dahil eden yaklaşımların özendirilmesi hedeflenmiştir. Bu çalışmanın katkıları tarihi alanları korurken mekânı meydana getiren dinamikleri derinlemesine irdeleme ihtiyacına dikkat çekmek, elde edilen mekânsal verileri nasıl yorumlamak gerektiğine dair temel yaklaşım önerileri belirlemek olarak özetlenmiştir.

**Anahtar Kelimeler:** Vernaküler Mimari, Tasarım Prensipleri, Geleneksel Safranbolu Evleri, Mekân Analizi.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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### UNDERSTANDING THE DESIGN PRINCIPLES OF VERNACULAR ARCHITECTURE: SPATIAL ANALYSIS OF TRADITIONAL SAFRANBOLU HOUSES

#### ABSTRACT

In a rapidly changing and globalizing world, the importance of local dynamics in the context of sustainability is increasing. It is crucial to take these dynamics as a reference for architectural culture to develop and to be interpreted and left as a heritage. In this context, Safranbolu houses are regional examples of Turkish residential built with mixed techniques that are worth examining. The old city of Safranbolu, consisting of houses built in three separate regions, which are now urban sites, has the status of a 'World Heritage Site'. This study is about these sites with their different characteristics and it shows how the architectural tectonics that make up the house are related to each other and how the knowledge about the place that affects these relations is embodied in space. Understanding these anonymous architectural products, which has also been the subject of many previous studies, requires multi-dimensional investigations. For this purpose, the site-scale analyses are presented under two topics: parcel and building basis. Based on the parcel, analyses were conducted about relations such as parcel-direction, parcel-slope, parcel-street, and parcel-view. Building analyses concerned with spatial organization principles were carried out with titles like building location types on the parcel, the relationships between the building and its neighbours, the number of storeys, the use of slope, the relationships of site entrance-building entrance, and the numbers of the building entrances, and the cantilevers. By spatial inferences from the plans and sections of typical houses, it is aimed to encourage approaches taking care of the contextual knowledge and including it in the new designs in urban sites. The contributions of this study are summarized as drawing attention to the deep analysis required on the spatial dynamics while preserving historical areas and determining basic approach suggestions on how to interpret the spatial pieces of knowledge obtained.

**Keywords:** Vernacular Architecture, Design Principles, Traditional Safranbolu Houses, Spatial Analysis.

## 1. GİRİŞ

Tarihi çevrelerde meydana gelen değişimler izlendiğinde; geleneksel kent kurgusunu irdeleyen ve bu kurguyu yorumlayarak yaşatan tasarımlara ihtiyaç duyulduğu sonucuna varılmıştır. Tarihi bir yerde yeni bir yapı inşa ederken çevredeki yapı kültürünü incelemek tasarımlar için oldukça yönlendiricidir. Böylece tasarım arazisine ilişkin somut ürünler değerlendirilir, güçlü ve zayıf yönler belirlenir ve yeniden yorumlanır. Bu sayede yerin mimari kültürüne katkı sağlanır.

Safranbolu tarihi kentinde var olan bilinçsiz ve referanssız yapılaşma kültürüne dikkat çekilen 2016 yılında tamamlanan yüksek lisans tezinde geleneksel yapılardaki işlevsel mimari elemanların bir dekor olarak yeni yapı cephelerinde sıkça yer aldığı tespit edilmiştir (Yetiş, 2016). Bu tasarım anlayışı maalesef yerel yönetim ve koruma bölge müdürlüğü tarafından özendirilmektedir. Sonuçta Şekil 1’de görülen uyumsuz yapı grupları ile eski yerleşim alanlarının kentsel silueti olumsuz etkilenmektedir.



**Şekil 1.** Safranbolu’da Komşu Olduğu Tescilli Yapıyı Yok Sayan Yapılaşma Örneği, Kıranköy (Şahin, 2016-2017)

Bu çalışmada Safranbolu’daki yerel mimarlık örneklerini irdelemenin ve çıkarılacak derslerin önemine vurgu yapılmaktadır. Tarihi çevreleri korumak ve yaşatmak bu çevreleri meydana getiren yapıları her yönüyle incelemek gerekmektedir. Bu amaçla Safranbolu tarihi çevresinin tarihsel gelişimine kısaca değinilmiş ve ardından geleneksel evlerin karakteristik özellikleri mekânsal analizler ile ifade edilmiştir.

## 2. YÖNTEM

Bu çalışmanın hazırlık aşamasında tarihi Safranbolu kentini meydana getiren Bağlar, Kıranköy ve Şehir kentsel sit alanından seçilen 52 ev incelenmiştir. Her biri özgün olan bu evlerin vaziyet yaklaşımları ortak tasarım prensiplerine sahiptir. Ancak ihtiyaç programı ve işlevsel kullanım farklarından doğan iç mekân çözümleri çeşitlilik göstermektedir. Bu benzerlik ve farklılıklar plan ve kesitler üzerinden mekânsal analizler ile gösterilmiştir. Öncelikle ortak bir dil oluşturmak amacı ile tüm evler parsel özelliklerine göre sınıflandırılmıştır. Farklı parsel



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

tiplerindeki mekân çözümlerini göstermek, amacıyla bu çalışma kapsamında Bağlar'dan 5, Karaköy'den 3 ve Şehir 'den 8 ev olmak üzere 16 geleneksel ev sunulmuştur.

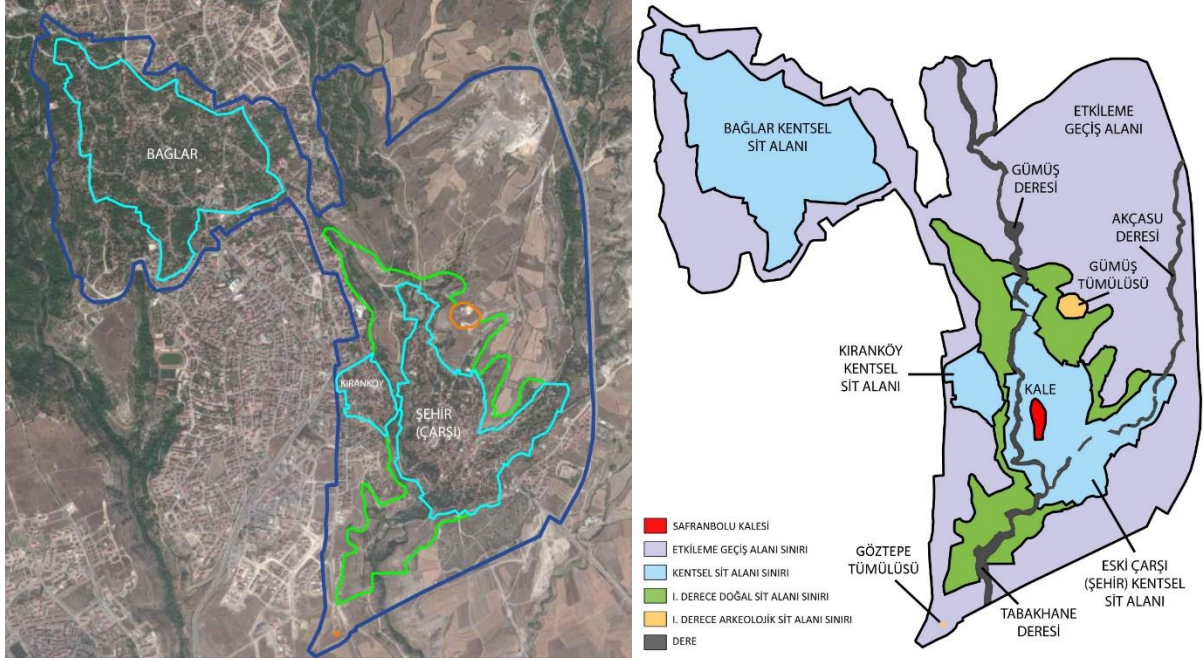
### 3. Tarihsel ve Fiziksel Bağlam

Safranbolu ve çevresi çok eski zamanlardan itibaren yerleşim yeri olarak kullanılmıştır. Dünya Miras Alanı ilan edilen tarihi bölge Osmanlı döneminden kalan geleneksel evlerden oluşmaktadır. Türkler' den hemen önce Bizans ve Selçuklu devleti bölgeye hâkim olmuştur. 1196 yılında Safranbolu'nun fethine kadar kent sakinleri kale içinde yaşamıştır. Bu tarihten sonra bu küçük savunma mevki büyümuş, Türkler kale dışına pek çok kamusal ve sivil eser yapmıştır. Böylece günümüze ulaşan Safranbolu meydana gelmiştir (Yazıcıoğlu, 2001).

Kalenin bulunduğu alan Şehir (Çarşı) kentsel sitindedir ve burası en eski yerleşim yeridir. Fetihden sonra gayrimüslimlerin yaşadığı yer Kıranköy kentsel sitidir. Yörenin Osmanlı döneminde kalkınması ile ikinci bir konut alanı gelişmiş, Bağlar mevki yerleşik hale gelmiştir. Bu sitte bağ evleri vardır. Bununla birlikte Safranbolu'nun doğal güzellikleri ve tümülüsler de sit alanı ilan edilerek koruma altına alınmıştır (Okyay, 1990). Şekil 2'de görülen sit alanlarının etrafındaki 'Etkileme Geçiş Alanı' ise eski kent silüetinin korunması için belirlenmiş bir tampon bölgedir (Abad, 2010). Kentsel sitler yapısal bakımdan oldukça zengindir. Geleneksel Safranbolu evleri; Şehir evi, Rum evi, Bağ evi, Havuzlu konak/köşk/oda gibi değişik tiplerde inşa edilmiştir.

Şehir 'de Gümüş ve Akçasu deresinin oluşturduğu vadiler boyunca evler sıralanır. Hiçbir ev komşusu olduğu evin gün ışığını ve manzarasını engellemez (Şekil 3). Arkalarında kayalıklar bir duvar gibi yükselir ve evleri kışın sert rüzgârlarından korur. Bu sıkışık ve eğimli yerde bahçesiz evler görülebilir. Evlerin çeşitli sebeplerle sokağa doğru çıkmalar yaparak uzandığı görülmektedir (Günay, 1981). Şehir kentsel sitindeki evler geleneksel Safranbolu evi karakteristiğini yansıtmaktadır. Aynı kotlarda yer alan Kıranköy ile Şehir, Gümüş deresinin oluşturduğu kanyonlar ile doğal olarak ayrılmaktadır. Gayrimüslim evlerinin zemin katlarında ticari faaliyetlerin yapıldığı mekânsal birimler yer almaktadır. Eğimli parsellerdeki evlerin bodrum katında mahzenler inşa edildiği görülmektedir. Daha yukarıda güneşe bakan eğimli yaylalarda yazın oturulmaktadır. Burası küçük ölçekli bağ evleri ve daha büyük evlerin yer aldığı Bağlar kentsel sitidir. Safranbolu'nun oldukça değişken eğimli arazi yapısı burada düz ve geniş parsellere dönüşmektedir. Evler büyük bahçeler içinde yapılmıştır.





Şekil 2. Safranbolu'nun Genel Yerleşimi Üzerinde Etkileme Geçiş ve Sit Alanı Sınırları (googlemaps haritası ve 2010 tarihli imar planından düzenlenmiştir. Şahin, 2016-2023)



Şekil 3. Şehir Kentsel Sitinin Eski Bir Görünümü (Safranbolu Belediyesi)

#### 4. Geleneksel Safranbolu Evlerinin Mekân Analizi

Bu çalışmada Safranbolu evinin kurulduğu parsel tipleri incelenmiş, parsel de yapıların konumlanma çeşitleri belirlenmiştir. Parselin sokak ile ilişkisinin yapının konumlanmasını ve iç mekânda odalar veya sofaların sokağı görmesini nasıl etkilediği, parselde yön ve eğimin nasıl

çeşitlilik sağladığı analiz edilmiştir. Parselin sokağa göre durumu incelendiğinde 4 tip parcel ortaya çıkmaktadır;

- Bir sokağa bitişik parcel (S1)
- İki sokağa bitişik parcel (Köşe) (S2)
- Karşılıklı iki sokağa bitişik parcel (KS2)
- Üç sokağa bitişik parcel (S3)

Yapının parseldeki konumu incelendiğinde 4 tip konumlanma görülmektedir;

- Bir sokağa bitişik yapı
- İki sokağa bitişik yapı
- Üç sokağa bitişik yapı
- Parselde konumlanmış yapı

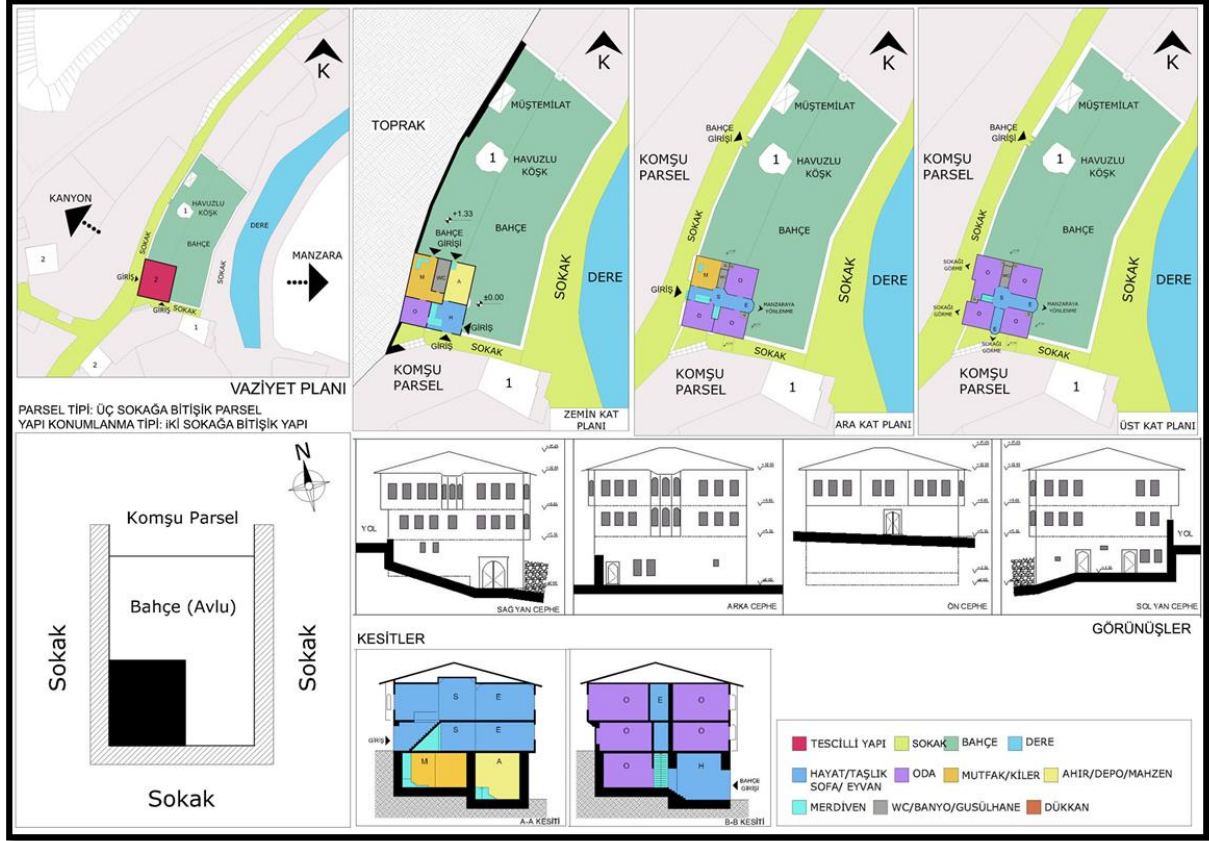
Her bir parcel tipinde yapı konumlanma durumları farklılık göstermektedir. Örneğin Bir sokağa bitişik parcel (S1)'de yapı ya bir sokağa bitişiktir ya da parselde konumlanmıştır. İki sokağa bitişik parselde (Köşe) (S2) ise yapı bir-iki sokağa bitişik ya da parselde konumlanmış şekilde olabilir. Karşılıklı iki sokağa bitişik parselde (KS2) bir sokağa bitişik ya da parselde konumlanmış yapılara rastlanabilir. Üç sokağa bitişik parselde (S3) ise yapı konumlanma tiplerinin hepsine örnek evler vardır (Şekil 4).

PARSEL TİPLERİ	Boş Parcel	P	PARSELDE YAPİ KONUMLANMA TİPLERİ					
			Bir Sokağa Bitişik Yapı	İki Sokağa Bitişik Yapı	Üç Sokağa Bitişik Yapı	Parselde Konumlanmış Yapı		
Bir Sokağa Bitişik Parcel (S1)		S1A		S1A1			S1A4	
İki Sokağa Bitişik Parcel (Köşe) (S2)		S2A		S2A1		S2A2		S2A4
Karşılıklı İki Sokağa Bitişik Parcel (KS2)		KS2A		KS2A1				KS2A4
Üç Sokağa Bitişik Parcel (S3)		S3A		S3B1		S3A2		S3A4

**Şekil 4.** Parcel Tipleri ve Yapının Parselde Konumlanma Tipleri (Şahin, 2023)

Çalışma kapsamında evlerin parcel tiplerine göre sunulması amacıyla parsellerde görülen geleneksel yapılaşma eğilimlerini örnekleyen 16 ev sunulmuştur. Bu evlerin mekânsal değerlendirmelerini yapmak, tasarım kararlarını etkileyen faktörleri sistematik biçimde ifade

etmek için örnek bir ev üzerinden belirlenen yapı inceleme yaklaşımı şekil 5’te gösterilmektedir (Şekil 5).



Şekil 5. Geleneksel Safranbolu Evi Mekân Analizi Örneği (Şahin, 2023)

Türk evinin yalnızca kat planları üzerinden değerlendirilmesinin kısıtlı bilgi aktarımına neden olacağını belirten Petruccioli, bu konuda şimdiye dek ele alınan çalışmaların derinleştirilmesi gerektiğine işaret etmektedir (Petruccioli, 2008). Bu amaçla Safranbolu evlerinin yerleşim kararları sorgulanmış ve mekânsal ilişkiler ifade edilmiştir. Yerleşim ölçeğinde tasarımı etkileyen faktörler evin plan, kesit ve cephe tasarımını oldukça etkilemekte, ana tasarım kararları vaziyet değerlendirmeleri ile ortaya çıkmaktadır. Buna göre evin yakın çevresi ile kurduğu ilişkilerin incelendiği analiz aşamaları şöyle özetlenmektedir;

- Parsel ölçeğinde analizler

- Parsel-yön ilişkisi
- Parsel-eğim ilişkisi
- Parsel-sokak ilişkisi
- Parsel-manzara ilişkisi





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### - Yapı ölçeğinde analizler

- Parselde yapının konumlanma ilişkisi
- Yapı-komşu yapı ilişkisi,
- Yapı kat sayısı,
- Yapıda eğim kullanımı
- Parsel girişi-yapı girişi ilişkisi
- Yapı girişi sayısı
- Çıkımların yönü ve sayısı

Evin iç mekân dinamikleri parselin yönlenmesi, sokağın durumu, eğim kullanımı ve manzara gibi doğal faktörlerin birbirine göre durumlarını etkin bir biçimde tasarıma katmak üzerine gelişmektedir. Bu yaklaşım ev içinde mekanların yerleşimini de oldukça etkilemektedir. Sıralanan tasarım faktörlerine göre Şekil 5'te ifade edilen evin mekânsal okuması yapılmıştır. Parselin kuzey-güney doğrultusunda ve oldukça eğimli olduğu görülmektedir (parsel içi kot farkı 7 metredir). Parselin batısında kanyon manzarası, doğrusunda dere vardır ve hâkim manzara yönü bu taraftadır. Parsele bitişik 3 sokağın ise her biri farklı kottadır. Söz edilen çevresel veriler ile yapı en yukarıdaki iki sokakla ilişki kuracak şekilde konumlanmıştır. Böylece hem manzaradan faydalanılacak hem de evin güneşlenme süresi oldukça uzun tutulacaktır. Farklı kotlardaki iki sokak ise eve farklı katlardan ulaşarak mahremiyet ihtiyacını karşılamış olacaktır. Parselin düşük kotundaki iki sokak başında bir komşu yapı olması nedeni ile yine parselin düşük kotuna yaklaşılmamıştır. Yapı Safranbolu sakinlerinin ağırlıklı tercihinine göre üç katlı inşa edilmiştir. Oda sayısı ve diğer mekânsal kullanımlar hâkim yaşama biçime göre düşünülmüştür. Toprağa oturan zemin kata ana sirkülasyon birimi hayata açılan haremlik kapısı ile ulaşılmaktadır ve burada hizmet birimleri; mutfak ve ahır, ıslak hacim yer almaktadır. Ev bu katta çeşitli kotlardaki girişlerle bahçe ile ilişki kurmaktadır. Mutfak ve hayattan üst katın mutfak ve sofasına ulaşan iki merdiven ile ara kata düşey bağlantı sağlanmıştır. Parselin en yüksek kotundaki sokakta yer alan selamlık kapısı ile ara katın sofasına ulaşılmaktadır. Selamlık kapısının tam karşısındaki merdivenler gelen misafirleri üst kata yönlendirerek mahremiyet sağlamaktadır. Evin sokaklarla doğrudan ilişki kurması nedeni ile bahçeye ayrı bir giriş düşünülmüştür. Bahçe kapısı selamlık girişinin olduğu sokakta, daha ilerdedir. Bu bahçe girişi ile eve gelen misafirlerin eve uğramadan ağırlandığı bir havuzlu köşke ulaşılmaktadır. Yapının sokak durumundan dolayı giriş sayısı haremlik ve selamlık olmak üzere ikidir. Ancak hayat, mutfak ve ahırdan olmak üzere 3 farklı bahçe girişi de vardır. Zemin kat



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

planı incelendiğinde hayatın güneye ve sokağın olduğu parsel kenarına yerleştirildiği görülmektedir. Mutfak ve bir oda yapının toprağa gömülen kenarındadır. Mutfak parselin kuzeye bakan kısmında, toprak altındadır, böylece ahır yapının hava alan kuzey kenarına yerleştirilmiştir. Her iki birim arasında yine kuzeye bakan yapı kenarında bir ıslak hacim yer almaktadır. Ara katın genel değerlendirmesi yapıldığında hayattan çıkılan merdiven ile ulaşılan sofanın doğudaki odaları ayıran eyvan kısmında kapalı çıkma ile manzaraya yönlendiği görülmektedir. Sofanın batı kısmı ise selamlık girişini sağlamaktadır. Bu katta mutfak ve ıslak hacim zemin kattaki mutfak ve ıslak hacmin tam üzerinde, kuzeydedir. Odalar kuzeydoğu, güneydoğu ve güneybatıya yerleştirilmiştir. Kuzeydoğudaki odanın ıslak hacimle ortak duvarında bir gusülhane yer almaktadır. Güneydoğudaki odada ise bahçeye doğru bir gusülhane vardır. Güneybatıdaki oda ve mutfağın sokağa bakan cephesinde mahremiyeti ve güvenliği sağlamak için pencere olmadığı görülmektedir. Selamlık kapısının karşısındaki merdiven ile üst katın sofasına ulaşılmaktadır. Bu kattaki dört odanın hane içi mahremiyeti de sağlamak amacı ile ıslak hacim, iki eyvan ve merdiven ile birbirinden ayrıldığı görülmektedir. Eyvanlardan biri doğuda manzarayı izlemeyi, güneydeki bir diğeri ise sokağı görmeyi sağlamaktadır. Islak hacim diğer iki kattaki gibi kuzey cephededir. Odaların hepsinde birer gusülhane vardır ve ara kat gusülhaneleri ile düşey süreklilik gösterecek şekilde yerleştirilmiştir. Batıdaki iki odanın sokağı göreceği şekilde kapalı çıkma ile sokağa uzandığı görülmektedir. Evin adım adım özetlenen tasarım mantığına göre evi oluşturan mekanlar plan-kesit-cephe düzeyinde birbiri ve çevresi ile ilişkiler kurmaktadır. Planlama her bir analiz başlığına göre ortaya çıkan sonuçların izin verdiği en etkin mekân kullanımını sağlamaktadır. Burada amaç, manzaradan, eğimden, gün ışığından olabildiğince çok faydalanmaktır. Örnek evin planlama mantığı ile çalışma kapsamında 16 ev incelenerek tablolaştırılmış, böylece kentsel sitler kendi arasında karşılaştırılmıştır.

Tablo 1'deki bağ evlerinin genel özellikleri değerlendirildiğinde; zemin katlarda hayat/taşlık ve ahırlar vardır. Ahırların kuzeye yönlendiği, sokakla kurulan ilişkiye göre bu durumun değiştiği gözlenmektedir. Ara katlarda sofa etrafına dizilmiş odalar, mutfak ve ıslak hacimler yer alır. Son katlar ise daha yüksek mekanlardır ve yazın yoğun olarak kullanılmıştır. Ara kat ve son kat birbirine benzemektedir. Islak hacimlerin kuzeye yönlendiği, imkân yoksa parselin kullanışsız tarafına ya da varsa komşu yapı ya da komşu parsel tarafına yerleştirildiği göze çarpmaktadır. Kapalı çıkmaların sokağa ya da manzaraya yönlendiği, açık çıkmaların ise güneşi en çok alan cepheye yerleştirildiği görülmektedir. Bağlardaki evlerde parsellerin düz olması





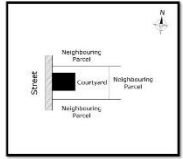
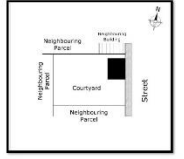
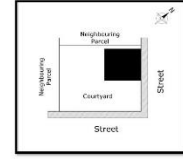
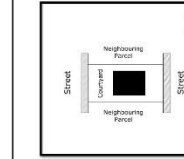
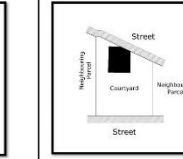
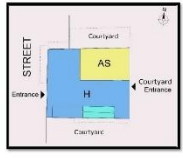
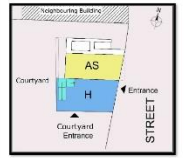
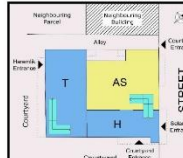
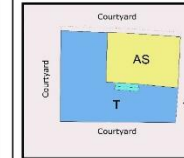
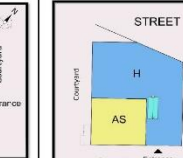
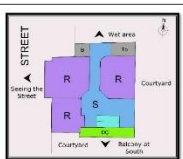
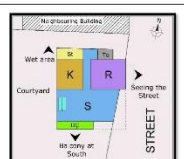
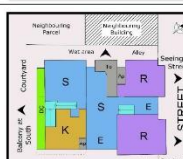
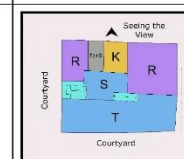
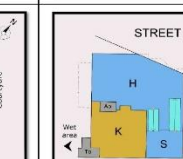
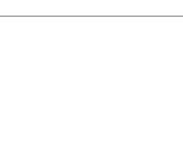
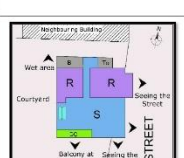
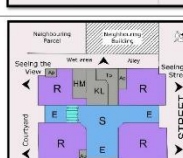
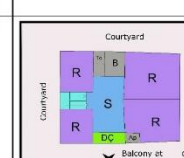
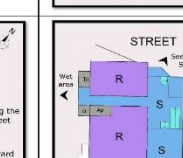
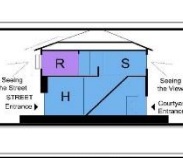
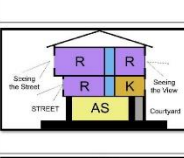
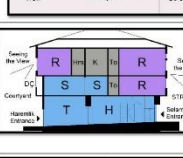
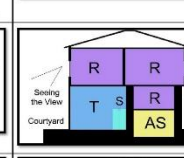
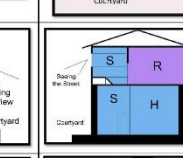
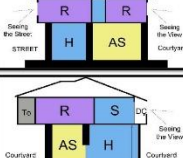
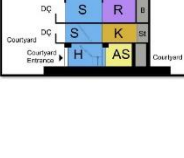
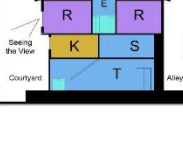
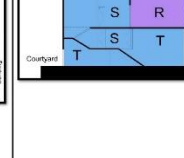
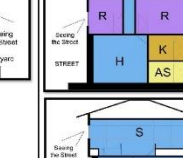
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

nedeniyle eğim kullanımı yoktur. Mahremiyet sağlamak amacı ile harem ve selam girişleri istenen durumlarda örneğin, Asmazlar Bağ Evi'nde zemin katın farklı cephelerinden girişler verilmiştir. Her girişten bir merdiven ile üst kata ulaşılmakta, zemin kattaki taşlık ile hayat, ara kattaki sofalar kapılar ile birbirinden ayrılmaktadır (Tablo 1).

Kıranköy kentsel sitinden seçilen 3 ev Tablo 2'de sunulmuştur. Zemin katlarda hayat/taşlık, ahır, mahzen, mağaza gibi birimler yer almaktadır. Hayat/taşlık ve ahırlar bu katta bir mağaza olup olmamasına göre yerleşmektedir. Sokakla doğrudan ilişki kuran mağaza varsa kuzeye ahır yerleştirilen örnekler bulunmaktadır. Ara katlar bazen zemin katın devamı şeklinde bazen ise üst katın benzeri şeklinde düşünülmüştür. Sofa etrafına sokak ya da manzarayı görececek şekilde odalar yerleştirilmiştir. Islak hacimler kuzeye, komşu yapıya ya da kullanışsız cepheye yerleştirilmiştir. Kapalı çıkmaların sokağa ya da manzaraya yönlendiği, açık çıkmaların ise güneş alan cepheye yerleştirildiği görülmektedir. Kıranköyde diğer sitlerden farklı olarak hem düz hem de oldukça eğimli parseller yer almaktadır. Parselde eğimin olmadığı durumlarda bile yöre sakinlerinin soğuk depo ihtiyacını karşılamak amacıyla toprak altında kısmi bodrumlar yapıldığı ve buraların mahzen olarak değerlendirildiği tespit edilmiştir (Tablo 2).

**Tablo 1. Bağlar Kentsel Sitinden İncelenen Evler (Şahin, 2023)**

PARSEL TİPİ	Parsel Bir Sokağa Bitişik		Parsel İki Sokağa Bitişik	Parsel Karşılıklı İki Sokağa Bitişik	
	S1A1	S1B1	S2B1	KS2A5	KS2B1
PARSEL KODU	Yapı Bir Sokağa Bitişik		Yapı Bir Sokağa Bitişik	Yapı Parselde Konumlanmış	Yapı Bir Sokağa Bitişik
YAPININ SOKAĞA GÖRE DURUMU	İki Katlı: Zemin+Üst		Üç Katlı: Zemin+Ara+Üst	Üç Katlı: Zemin+Ara+Üst	Üç Katlı: Zemin+Ara+Üst
YAPI KAT ADEDİ	2		3	2	8
YAPI ADI	Selahattin Avcı-Emine Köleoğlu Evi		Asmazlar Bağ Evi	Emir Hocaşade Ahmet Beyler Bağ Evi	Kabağçılar Bağ Evi
YAPI NO	12		1821	1634	8
YAPIM YILI	-		-	-	-
VAZİYET PLANI					
ZEMİN KAT					
BİRİNCİ KAT					
İKİNCİ KAT					
ENİNE KESİT					
BOYUNA KESİT					

■ TESCİLLİ YAPI	■ SOKAK	■ BAHÇE	■ DERE
■ HAYAT/TAŞLIK SOFA/ EYVAN	■ ODA	■ MUTFAK/KİLER	■ AHIR/DEPO/MAHZEN
■ MERDİVEN	■ WC/BANYO/GÜSÜLHANE	■ DÜKKAN	

**Tablo 2. Kıranköy Kentsel Sitinden İncelenen Evler (Şahin, 2023)**

PARSEL TİPİ	Parsel Bir Sokağa Bitişik	Parsel İki Sokağa Bitişik	Parsel Üç Sokağa Bitişik
PARSEL KODU	S1B1	S2B2	S3D4
YAPININ SOKAĞA GÖRE DURUMU	Yapı Bir Sokağa Bitişik	Yapı İki Sokağa Bitişik	Yapı Üç Sokağa Bitişik
YAPI KAT ADEDİ	Ç 4 Katlı: Zemin/Zemin Ara+Ara+Üst	Ç 4 Katlı: Zemin/Zemin Ara+Ara+Üst	Ç 4 Katlı: Bodrum/Zemin+Üst
YAPI ADI	Gülen Konak	Kadife Damkacı Evi	Üzeyirler (Ahmet Can) Evi
YAPININ NO	17	21	20
YAPIM YILI	-	-	1885-1886
VAZİYET PLANI			
BODRUM KAT			
ZEMİN KAT			
ZEMİN ARA KAT			
BİRİNCİ KAT			
İKİNCİ KAT			
ENİNE KESİT			
BOYUNA KESİT			

**Tablo 3. Şehir (Çarşı) Kentsel Sitinden İncelenen Evler (Şahin, 2023)**

PARSEL NO	Parsel Bir Sokakla Bitişik		Parsel İki Sokakla Bitişik (Köşe)		Parsel Karşılıklı İki Sokakla Bitişik		Parsel Üç Sokakla Bitişik	
	SS45	SIB1	SS41	SSC2	KS41	KS2B5	SSA2	SSC3
YAPILANIMININ ÖZELLİKLERİ	Yapı Parçaları Komünalması	Yapı Bir Sokakla Bitişik	Yapı Bir Sokakla Bitişik	Yapı İki Sokakla Bitişik	Yapı Bir Sokakla Bitişik	Yapı Parçaları Komünalması	Yapı İki Sokakla Bitişik	Yapı İki Sokakla Bitişik
YAPILANIMIN ÖZELLİKLERİ	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik	4 Sokakla Bitişik
YAPILANIMIN ÖZELLİKLERİ	Arkap Binalar Evi	Evler Üstü Evi	Mutfağı Katın Evi	Öneri Katın Evi	Nevresli Katın Evi	Aile Evi Evi	Halkla Ortak Katın Evi	Alınabilir Evi
YAPILANIMIN ÖZELLİKLERİ	31	26	36	29	44	54	36	35
YAPILANIMIN ÖZELLİKLERİ	18/17	18/17	18/17	2/1	18/17	18/17	18/17	18/17
VALİYET PLANI								
BOYUN KATI								
ZEMİN KATI								
ZEMİN ARA KATI								
BİRİNCİ KATI								
İKİNCİ KATI								
ÜÇÜNCÜ KATI								
DOYUNAN KATI								

Şehir (Çarşı) kentsel siti değişken eğimli topografyasından dolayı imar parselinin kıymetli olduğu bir yerleşimdir. Bu sitte parsel tipleri ve yapı konumlanma tipleri çeşitlilik arz etmektedir. Büyük-küçük-bahçesiz evler farklı büyüklükteki parsellere göre ortaya çıkan mekân çözümleridir. Şehirde diğer siteler ile benzer şekilde yönlenme, sokakla ilişki kurma mantığı vardır. Parselle ilişki kuran sokak sayısı arttıkça yapının bu durumdan etkilendiği, eğimli parsellerde eve farklı katlardan girişler verildiği gözlenmiştir. Böylece harem-selam girişleri sağlanmış, ev bölümlere ayrılmıştır. Zemin katlarda hayat/taşlık ve ahırlar yer almaktadır. Ahırların kuzeye yönlendiği, depo ya da oda gibi birimlerin yanında mutfakın olduğu evler de görülmektedir (Tablo 3). Ara ve üst katlar genel olarak benzemektedir. Ara kat kışın daha çok kullanılmıştır. Ahır üzerinde gelen oda daha sıcak olduğundan kışlık oda olarak isimlendirilmiştir. Yazın kat yüksekliği daha fazla olan üst katlarda oturulmuştur. Plan şemaları ağırlıklı olarak bir sofa etrafına dizilmiş dört odalı simetrik tipte ya da sofayı çevreleyen üç odalı tipte gelişmektedir. Sofanın bir kenarında dizilen iki odalı örneklere de rastlanmaktadır (Bakınız 44 ve 54 nolu evler).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 5. SONUÇ ve ÖNERİLER

Safranbolu koruma amaçlı imar planı özelinde ve Türkiye genelinde hâkim olan sit alanlarındaki yeni yapıların eski yapılara benzetilmesi yaklaşımı giderek cephesel kopyalar üretmeye dönüşmüştür. Özellikle tescillenmiş bir tarihi bir yapının yanında yapılan yeni binalar için dikkate alınan parsel alanı, yapı saçak kotu, yapı gabarisi, pencere ebattı gibi hususların yeterli olmadığı sonucuna varılmıştır. Bunun nedeni yapının tüm dinamiklerini değerlendirmeden, yapıyı sadece görsel bir veri olarak kabul etmek ve tarihi çevre ile bu bağlamda ilişki kurmaktır. Bu anlayışın değişmesi, geleneksel evlerin yakın çevresi ile kurduğu ilişkileri detaylıca irdeleyip, yorumlayacak referanslar bulmakla mümkündür. Safranbolu geleneksel mimarisini sitler üzerinden irdeleyen bu çalışmada; geleneksel kentlerdeki bir sokak üzerinde yer alan yapıların, komşu parsel ve komşu yapıların varlığını dikkate alarak uzak-yakın ilişkisi ile konumlandığı gözlenmektedir. Birbirine bakan komşu yapılarda ise sağır cepheler ile mahremiyet sağlanmıştır. Bu tasarım anlayışı tescilli bir yapı komşuluğundaki ya da kentsel sit alanı sınırı kabul edilen bir sokakta yer alan parselde inşa edilecek yapılar için yorumlamaya uygun bir yaklaşımdır. Mimarsız mimari olarak tanımlanan bu çevrelerin barındırdığı mimari kültürün araştırıldıkça zenginleşen bir kaynağa dönüştüğünü söylemek mümkündür. Bu nedenle tarihi yerleşimlerde inşa edilecek yeni yapılar için çok detaylı ve titiz bir analiz aşamasından sonra tasarımlara yön verilmesi gerekmektedir. Bu yaklaşımın göz ardı edildiği bir anlayışla inşa edilen yapıların ortaya çıkardığı kentler kültürel kimliğimizi tehdit etmektedir. Çalışma boyunca incelenen sokak, manzara ile doğal ilişki kurma, gün ışığından etkin faydalanma (yönlenme), eğim kullanarak katlara farklı girişler verme, komşu yapıların manzara ve gün ışığını kesmeme, komşu yapıya cephe vermeme gibi arazi kullanımı yaklaşımları ile tarihi yapıyı tekrar etmeyen ancak tasarım ilkeleri mantığını anlayıp, geliştiren binaların inşa edilmesinin daha uyumlu çevreler oluşturacağı kanısına varılmıştır. Böyle bir duyarlılıkla hazırlanan koruma amaçlı imar planları ve plan notları ile yapı yapma kültürü, gelecek nesillere yorumlanıp, geliştirilerek miras bırakılmış olacaktır.

#### **Bilgi Notu**

Bu bildiri Rüveyda ŞAHİN tarafından hazırlanan, Karabük Üniversitesi, Fen Bilimleri Enstitüsü, Mimarlık Anabilim Dalında devam eden Doktora Tezinin bir bölümünden üretilmiştir. Çalışma bulgularına çizimleri ile katkı veren Mimar Elif Hacıoğlu'na teşekkür ederiz.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RE-EVALUATING A IN TERMS OF SUSTAINABILITY PRINCIPLES IN ITS 17<sup>TH</sup> ANNIVERSARY OF “RURAL AREA SPATIAL DESIGN PROJECT” IMPLEMENTED IN TEKİRDAĞ

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#### ABSTRACT

This declaration summarizes the application of 315 wooden houses carried out between “2006-2007” in the expansion area of Sefaalan Village, Saray District, Tekirdağ, under the name of the "Sincap Evler, Istranca Project." This practice is evaluated under three main headings in terms of architectural design, sustainability, and the multifaceted interactions between nature and humans: 1-The multifaceted sensitive role of the architect in regulating the relationship between nature and humans: Sustainability.2-Socio-cultural importance of rural area planning and the most appropriate approaches of architectural design principles to nature. 3-The Indispensable integrity of these principles and the best approaches and criteria to nature. The design, development, contributions, and results of this project, which has been followed for 17 years, are summarized based on five basic evaluation principles: 1-Architectural design, which initially "started with the desire to live in nature," evolved into a "natural life culture and rural area spatial design project." Were the original design principles preserved in this process, or did users influence their environment? 2-What important design data can be obtained from these results, depending on the goals of architectural design? 3-Have these principles defined at the beginning changed the daily lives of users so far? 4-Can the positives and negatives that were initially defined depending on the design goals but emerged over time be used as data for a future rural area planning system? 5-Can new definitions be made regarding the behaviour of architectural design in the face of sustainability, which has been developing for 17 years? As a result, the main topics of the research to be carried out in the 20th year of the project were determined as follows: 1-"Escape to Nature Syndrome" and Sustainability. 2-Human-Nature Relationship: Possibilities and limits of harmony with nature. 3-Sociological and Economic Costs. 4-Language of Nature. 5-Sustaining Local Nature Culture. 6-Preservation of rural life culture.

**Keywords:** Rural area planning, sustainability, rural areas spatial design,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

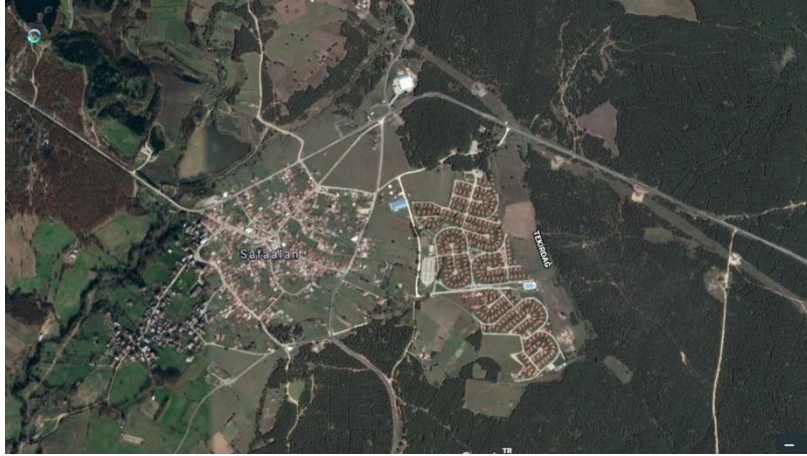
Rural areas are defined as multifaceted spaces encompassing natural areas outside of cities, where local communities typically engage in agricultural activities and family life, contributing to social and economic benefits within the national context (Çubuk,1985). Additionally, the concept of rural areas also includes settlements that preserve and pass down societal norms, lifestyles, traditional values, and material and spiritual cultural assets from the past to future generations.

Rurality is defined as the relationships and life experiences between nature and living spaces. This definition precisely explains the interest and fascination urban dwellers have for rural areas. Sometimes, the mystery of a settlement hidden among the trees in a secluded valley or the pastoral beauty of a village spread across a vast plain entices people. Experiences with close contact with nature and rural life remind individuals that they are a part of nature. The lifestyle in rural areas, free from the problems of urban life, is viewed as a healthy alternative, and the interaction between rurality and human life is gaining importance.

The way of life maintained in rural settlements is referred to as "rural life." In rural life, people carry out their vital activities interconnected with each other and the natural environment, with strong social bonds. The accumulation of knowledge that forms the essence of the nature-oriented rural lifestyle is the "rural life culture" knowledge.

Intangible cultural elements diversify rural life culture, influenced by the geography, climate, and natural resources of rural areas, and create a "local cultural identity." This identity is passed down from generation to generation, forming traditional and unwritten culture (Özçatalbaş, 2020).

According to all these definitions, there is a close relationship between rural areas and rural life culture, tradition, and rural heritage. Particularly in developed countries, the population living in rural areas has fallen below 5%, leading to a decrease in the prevalence of rural life. Therefore, the concepts of preserving local values and rural heritage have gained importance and have entered the socio-economic and rural development agendas of many countries in recent years. The European Union has highlighted the issue of "preserving rural heritage" as one of the key areas of its common agricultural policy (IEEP, 2001). This subject has become important not only environmentally and economically but also in terms of passing down and preserving the values, the community possesses for future generations and ensuring sustainability (Özçatalbaş, 2020).



**Figure 1.** Project Settlement Aerial Photograph (Edirne, 2012)

### **3. MATERIALS and METHODS**

#### **Kırsal Yaşam Kültürü ve Kırsal Konut Mimarisi**

According to the global definition of the architectural profession, rural architecture encompasses "all homes and other structures built by the people." These structures are typically constructed using materials found in the environment and often employ techniques passed down from generation to generation, usually by local craftsmen or family members. Since the principles of rural architecture are primarily aimed at meeting specific basic needs, they carry traces of all aspects of rural life culture (ÇEKÜL,2012:5).

In rural life culture, housing is also referred to as local architecture, rural architecture, ethnic architecture, and similar titles, which encompass structures constructed based on knowledge rooted in experience and experimentation.

Rural housing architecture, which has evolved over centuries, is the most significant physical manifestation reflecting the culture and way of life of the region's inhabitants (Güler ve Bilge, 2013). Today, rural housing architecture continues to exist in rural areas due to its reliance on local materials and construction techniques (Bayraktar, 2020). Traditional houses, which are the most important product of rural life culture in Turkey, reflect the worldview, lifestyle, and societal norms of the people living in rural areas (Turgut, 1990; Çahantimur, 1997).

Furthermore, since the early years of the Republic of Turkey, there has been a focus on rural and agricultural development, with numerous research and scientific studies conducted in this regard (T.C. Kalkınma Bakanlığı, 2019).

Policies aimed at finding solutions to the problems brought about by urbanization have contributed to the weakening of rural areas. This situation has sparked discussions about the need for balanced and sustainable development policies related to rural-urban relationships,

emphasizing the necessity for changes in policies targeting rural areas. These discussions have concluded that diversity, increased services, environmental preservation, and improved quality of living spaces should also be taken into account in rural economies (Yenigül, 2017).

The primary goals of developments related to rural and urban areas include achieving a balanced settlement structure, enhanced accessibility, economic diversity, and the preservation and development of natural resources and cultural heritage, all of which should be prioritized in economic development strategies (Davoudi ve Stead, 2003; Panahi, 2015).

However, despite the policies, implemented, regional development disparities have often persisted, and the migration from rural to urban areas could not be halted. As a result, the increasing urban population has begun to pose a threat to rural regions. The unplanned expansion of cities towards rural areas, driven by non-conservationist and non-environmentally friendly policies, has led to the destruction and disappearance of rural areas. The deterioration of the quality of life due to unchecked urban overcrowding and physical growth has fuelled the desire of urban dwellers to acquire second homes in rural areas.

In conclusion, this rapid and increasing demand represents a new threat to rural areas.



**Figure 2.** “Sincap Evler, Istranca” Project 2006 (Edirne, 2012)

#### **4. FINDINGS and DISCUSSION**

##### **A New Design and Implementation Model for Local Architectural Identity in Rural Living Areas**

The subject of this presentation is the “Sincap Evler, Istranca” (Squirrel Houses) Project, which encompasses approximately 300 acres of land and consists of 315 wooden houses, social facilities, and recreational areas, designed as a rural living settlement. To ensure that the implementation of the project aligns with the characteristics of the local cultural identity, various studies were conducted before the project, during the construction process, and after the commencement of life in the settlement.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The “Sincap Evler, Istranca” Project, have become a model where rural living experiences are observed as a result of the ongoing efforts by the project designer, contractor, homeowners, and site management throughout the design, construction, and post-occupancy phases of the project.

The key objectives of the project include:

- Preserving Local Culture through Productization
- Design in Harmony with Ecological Architectural Principles
- Design Compatible with Environmental Data of Rural Areas
- Design in Harmony with Local Identity and Rural Life Culture
- Design that Ensures the Continuation of Traditional Neighbourly Relations

The Fundamental Principle of Architectural Design: "Single House" and Personalized Natural Environment

Housing is the most tangible reflection of a society's cultural heritage on geography (Gür, 2000). Housing, as a product of the cultural heritage possessed by communities, is manifested even in the smallest and most essential building component, the individual house, which is the main element of the “Sincap Evler, Istranca” Project. The specific house designed within this project is called the ‘Squirrel House’.

The main idea behind the design of the house is to preserve and sustain the distinctive rural architectural qualities of the region in today's context and to ensure the preservation and continuation of the fundamental values of culture through housing. Therefore, the ‘Squirrel House’ is a manifestation of the spatial structure of the traditional Turkish house blended with the unique rural lifestyle identity.

The ‘House’ consists of a single floor and an attic, with a ground floor area of approximately 66 m<sup>2</sup>, situated on a reinforced concrete foundation. Its structure is in the form of a wooden post-and-beam frame system. The panels that make up the walls of the house are semi-prefabricated in a workshop environment and then assembled on-site.

The ‘Squirrel House’ is a rural dwelling that embodies rural life culture through its simple design and addresses the need for experiencing natural living. It is shaped using local and natural materials to serve concepts such as outdoor living, getting acquainted with natural life and passing on a love for nature. Contemporary aesthetics and innovative construction methods come together in this design, providing an interpretation of rural life culture.

Through the analysis and standardization of values inherited from traditional houses, the design of the ‘Squirrel House’ was completed to offer a compact living space. The ‘Squirrel House’

features a plan type that allows for flexibility in functions and usage diversity without losing its character, adapting to the diversity of users. With its small, modest, self-sufficient, and nature-respecting design, which aligns with the increasing popularity of the idea of living in harmony with nature, the ‘Squirrel House’ serves as a model for preserving cultural values and local identity.



**Figure 3.** “Sincap Ev” 2006 (Edirne, 2012)

### **Architectural Design Creating Multi-Layered Ecological Features Using Wood**

In the “Sincap Evler, Istranca” Project, various application methods have been explored in material and production, following the principle of using renewable or recyclable resources. Wood as a material has been used not only in traditional construction methods but also in modern applications. The manufacturing techniques, production line, assembly, and finishing work have all been studied in a laboratory setting to examine both the technical production and post-construction usage processes.

### **Contributions of Traditional Architecture Preserving Local Identity to Rural Landscape**

Today, due to the insufficient emphasis on an environmentally friendly and locally respectful architectural character in newly established rural settlements, rural life culture is facing the risk of disappearing. Uncontrolled construction has reduced the use of original materials and forms in rural areas, leading to architectural identity loss.

However, it is evident that traditional buildings that reflect this identity contribute to the visual value of the rural landscape. Moreover, such architecture, representing a particular architectural identity, is a fundamental source of visual richness and cultural sustainability. This way, the unique settlement character of rural life makes rural areas appealing. In the “Sincap Evler, Istranca” Project, the architecture of the house and other structures serving various functions within the project aims to preserve the relationship between the local identity, traditional architecture, and the rural culture-environment through a contemporary interpretation.



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **Contributions to the Sustainable Preservation of Rural Areas**

Many homeowners and their children, growing up in the natural environment of the “Sincap Evler, Istranca” Project, have had the opportunity to understand, recognize, and experience the characteristics offered by this natural environment. They are willingly committed to passing on their love for the natural environment and rural life to future generations. Thus, the love for nature and rural life, to be passed down through generations, will grow like a snowball effect and contribute to sustainability. This goal is evident from homeowners' verbal and social media notifications and presentations of life activities, leading to the spontaneous creation of awareness.

### **Contributions to Socioeconomic and Socio-Cultural Transformation of the Project**

The “Sincap Evler, Istranca” Project are a densely populated village with approximately 950 residents, consisting of 315 households, social facilities, and a boutique hotel with 12 rooms, all situated on a 300-acre land. Following the principle of the just distribution of resources embedded in the project's main idea, the local residents of the surrounding villages and project residents have found common ground in the philosophy of preserving natural life. Despite differences in education, culture, and income levels, the resulting socio-economic transformation has fostered socio-cultural harmony.

The cooperation of various sectors has played a significant role in the project's success. Beginning as an example of social entrepreneurship, the project has received support from local residents, local authorities, and central government agencies alike.

The project was designed as an example to develop renewal-revitalization policies for rural settlements through new zoning planning on the village expansion border. In this regard, it is noteworthy for its compliance with the principles of rural economic development. It has accelerated conservation and improvement efforts, contributing positively to development. New job opportunities have contributed to increased prosperity in the region and promoted a culture of transformation focused on preserving rural life.



**Figure 4.** Hava Fotoğrafi 2008 (Edirne, 2012)

### **Contributions of Rural Settlements to the Diversification of Economic Realities**

In recent years, new urbanization policies in rural areas have been among the critical environmental issues. The importance of settlement character in terms of local differences and cultural sustainability, contributes to the increase in rural development and employment opportunities. The subject of this study, the “Sincap Evler, Istranca” Project, stands out in terms of its alignment with the principles of developing rural economy as a product of this approach. The project was designed as an example to facilitate the development of renewal-revitalization policies for rural settlements and the determination of a conservation-oriented legal framework with the new urban planning carried out at the village expansion boundary. In this regard, the collaboration of various sectors has played a significant role in the success of this project. Starting as an example of social entrepreneurship, the project has received support from various entities, including the local community, local governments, and central administration.

An architectural project model has been presented where rural life culture takes centre stage, and sustainability is achieved through the reconciliation of rural and urban areas.

In this paper, significant experimental data that emerged during the design and implementation process and subsequent research questions for the future have been evaluated regarding the “Sincap Evler, Istranca” Project, which was designed in 2006 and implemented in 2007.

### **1. CONCLUSION and RECOMMENDATIONS**

**This Application is Evaluated Under Three Main Headings Today:**

#### **1-Sustainability: The Multifaceted and Delicate Role of Architecture in Regulating the Relationship Between Nature and Humanity**

The Project implemented in the expansion area of Sefaalan village is actually born out of the need and desire for a way of life that is in harmony with nature, which is essentially a philosophy



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

of life. The “Sincap Evler, Istranca” Project, which is in a sense an experimental project but has been realized, is also designed as a model of cultural sustainability. Developments and results over time, as it approaches its 20th year, will be tracked as valuable data for designers.

### **The Integration of Rural Area Planning with Architectural Design Principles: The Socio-Cultural Significance of the Most Suitable Approaches to Nature.**

This project, born out of this philosophy of life and quest for solutions, initially began with the idea of creating an individual way of life and evolved into a social entrepreneurship experiment, leading to rural spatial planning and implementation based on development, conservation, and sustainability. Subsequently, it transformed into efforts to create a socio-economic model and design framework.

### **The "Indispensable" Values of These Principles: The Most Appropriate Approaches and Criteria for Nature.**

Rural life culture also contributes to creating rich experiences and effects as a culture through people's understanding and learning of nature. These experiences are assimilated with a love for nature and a sense of conservation, forming a cultural heritage that can be sustained.

### **Assessment of 17 Years of Real Impressions Based on Design Goals: Five Principles Followed for Evaluation**

An architectural design that initially started with a "Desire for Living in Nature" has transformed into a project of "natural life culture and rural spatial design." Before assessing the design, development, contributions, and results of this project observed over 17 years, the following questions arise:

1. Have the initial design principles been sustained throughout this process, or have users influenced their surroundings?
2. What important design data can be obtained from the outcomes experienced in line with the architectural design goals?
3. Have the principles initially defined made a difference in users' daily lives up to the present day?
4. Can the positive and negative aspects initially defined in alignment with Design Goals but emerging over time be used as data for a rural area planning system for the future?
5. Can new definitions be made regarding the behaviors of architectural design in the face of sustainability that has evolved over 17 years?





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

As a result of this paper, the ways to follow in a research to be conducted on the project's 20th year are determined as follows:

1. "Nature Retreat Syndrome" and Sustainability: Examining the challenges of sustainability brought about by the longing for nature.
2. Human-Nature Relationship: Exploring the possibilities and limits of harmony with nature.
3. Sociological, Physical, and Economic Costs: Defining the multifaceted costs of embracing nature.
4. The Language of Nature: Discovering how to communicate with and learn from nature.
5. Cultural Preservation: Identifying and preserving cultural heritage and messages in nature.
6. Sustaining Local Nature Cultures: Researching strategies for sustaining local nature cultures.

This project and its implementation gain importance in terms of evaluating a realized spatial experience regarding the complex dynamics between architecture, nature, and sustainability, with the goal of being reviewed in 2026.

### **Thanks and Information Note**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### YAĞMUR BAHÇELERİ; ÇEVRE, ŞEHİRCİLİK VE İKLİM DEĞİŞİKLİĞİ BAKANLIĞI ÖRNEĞİ

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#### ÖZET

Bugün, küresel ısınma, kuraklık, iklim değişiklikleri, tarımsal faaliyetler, nüfus artışı gibi nedenlerle temiz içme suyu kaynakları azalmakta ve suya ulaşım zorlaşmaktadır. Dünya nüfusu her geçen gün artmakta ve bunun sonucunda, gıda ihtiyacı dolayısı ile tarımda kullanılan su miktarı çoğalmakta, sanayileşme, enerji ihtiyaçları, kentleşme ve evsel kullanımlar su tüketiminin kontrolsüz bir şekilde artmasına neden olmaktadır. Hızlı kentleşme, iklim değişikliği ve su kaynaklarının tükenmesi gibi güncel küresel sorunlar nedeni ile, kentlerde sürdürülebilir su yönetimi politikaları oluşturulmaya ve su etkin tasarımlar yapılmaya başlanmıştır. Bugün bu soruna çözüm alternatifi olacak su hasadı yöntemleri gündeme gelmektedir. Özellikle su tüketiminin yoğun olduğu kentsel alanlarda su kaynaklarının sürdürülebilirliğinin sağlanması, su kalitesinin artırılması için su hasadı yöntemleri küresel ölçekte yaygınlaşmaktadır. Bu su hasadı yöntemlerinden biri de yağmur bahçesi uygulamalarıdır. Yağmur bahçeleri ya da biyolojik tutma alanları; yağmur sularının geçirimsiz yüzeylerden toplanarak, bitkiler ve toprak yardımı ile yer altı sularına iletilmesine yardımcı olan çöküntü alanlarıdır. Yağmur bahçeleri; kentsel alanlarda kontrolsüz yüzey akışının önüne geçilmesine, yer altı sularının beslenmesine, su kalitesinin ve biyolojik çeşitliliğin artırılmasına yardımcı olan uygulamalardır. Yağmur bahçeleri üstünde bitkilerin yetiştiği yağmur suyu süzme ve depolama alanlarıdır. Yağmur bahçeleri, bugün küresel ölçekte yaygınlaşmakla birlikte Türkiye'de halen uygulaması az olan bir yöntemdir. Türkiye'de de yağmur bahçeleri uygulamalarının yaygınlaştırılması ve bir örnek teşkil etmesi amacı ile 2018 yılında Çevre, Şehircilik ve İklim Değişikliği Bakanlığı bahçesinde yağmur bahçesi ve geçirimsiz beton uygulaması yapılmıştır. Çalışma kapsamında; Çevre, Şehircilik ve İklim Değişikliği Bakanlığı (ÇŞİDB) bahçesinde uygulanan yağmur bahçesinin; tasarım, uygulama süreçleri ve çalışma prensipleri hakkında bilgi verilecektir. Ayrıca yağmur bahçelerinin faydaları ve uygulama aşamaları da çalışma kapsamında irdelenecektir.

**Anahtar Kelimeler:** Yağmur bahçeleri, biyolojik tutma alanları, yağmur suyu hasadı, peyzaj tasarımı



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **RAIN GARDENS; THE EXAMPLE OF THE MINISTRY OF ENVIRONMENT, URBANIZATION AND CLIMATE CHANGE**

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#### **ABSTRACT**

Today, due to global warming, drought, climate changes, agricultural activities, and population growth, clean drinking water resources are decreasing and access to water is becoming more difficult. The world population is increasing day by day and as a result of this, the amount of water used in agriculture is increasing due to the need for food and industrialization, energy needs, urbanization, and domestic uses causing an uncontrolled increase in water consumption. Due to current global problems such as rapid urbanization, climate change, and depletion of water resources, sustainable water management policies have been established in cities and water-efficient designs have been started. Today, water harvesting methods that can be a solution to this problem are on the agenda. Especially in urban areas where water consumption is intense, water harvesting methods are becoming widespread on a global scale to ensure the sustainability of water resources and to improve water quality. One of these water harvesting methods is rain garden applications. Rain gardens or bioretention areas are sedimentation areas that help to collect rainwater from impermeable surfaces and transfer it to groundwater with the help of plants and soil. Rain gardens are applications that help to prevent uncontrolled surface runoff in urban areas, to recharge groundwater aquifers, and to improve water quality and biodiversity. Rain gardens are rainwater filtration and storage areas where plants grow on them. Although rain gardens are becoming widespread globally today, it is still a method that has little application area in Turkey. To spread the rain gardens applications in Turkey and to set an example, in 2018, a rain garden and permeable concrete application was made in the garden of the Ministry of Environment, Urbanization and Climate Change. Within the scope of the paper, information will be given about the design, application processes, and working principles of the rain garden implemented in the garden of the Ministry of Environment, Urbanization, and Climate Change. In addition, the benefits and construction stages of rain gardens will be examined.

**Keywords:** Rain gardens, bioretention areas, rainwater harvesting, landscape design



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. GİRİŞ

Bugün küresel ölçekte su kıtlığı artmakta, kontrolsüz ve aşırı su tüketimi nedeni ile yeraltı suyu seviyesi düşmekte, su kalitesi azalmakta ve bunların sonucunda da kuraklık, toprak yapısının bozulması, erozyon gibi etkiler meydana gelmektedir (İbrahim, Rasul, Hamid, Ali, & Dewana, 2019). Ayrıca küresel iklim değişikliği sebebi ile dünya gün geçtikçe ısınmakta, az ve/ veya aşırı yağışlar nedeni ile ekosistem üzerinde yıkıcı bir etkiye sahip olan kuraklık ve sel gibi felaketlerin riski artmaktadır. Bu riskleri etkin bir şekilde yönetmek için bugün sürdürülebilir teknoloji ve fikirleri içeren küresel ölçekte yağmur suyu yöntemi uygulamaları gündeme gelmekte ve uygulanmaktadır. Bugün kontrolsüz yüzey akışlarının önüne geçmek, içme sularının kirlenmesini engellemek ve yeraltı sularını beslemek için farklı yağmur suyu hasadı yöntemleri bulunmakta olup bunlar;

- Yağmur bahçeleri,
- Çatı bahçeleri,
- Yağmur tabağı (rainsaucer),
- Yağmur suyu hendekleri (bioswale),
- Yapılandırılmış sulak alanlar,
- Geçirimli döşemeler,
- Kuru dereler,
- Su sarnıçları/ tanklarıdır.

Çatı bahçeleri üzerinde bitkilerin yetiştiği yağmur sularının toplanıp bir su deposuna ya da doğrudan toprağa yönlendirildiği uygulamalardır (Şekil 1). Çatı bahçeleri güncel sürdürülebilir ve uygulanabilir su hasadı yöntemlerindedir.

Yağmur tabağı (rain saucer) uygulamaları; ters şemsiye şeklindeki sistemler yardımıyla yağmur sularının toplandığı uygulamalardır (Şekil 1). Bu sistemlerde yağmursuyu kirleticilere maruz kalmadan direkt yakalanmakta ve depolanmaktadır.

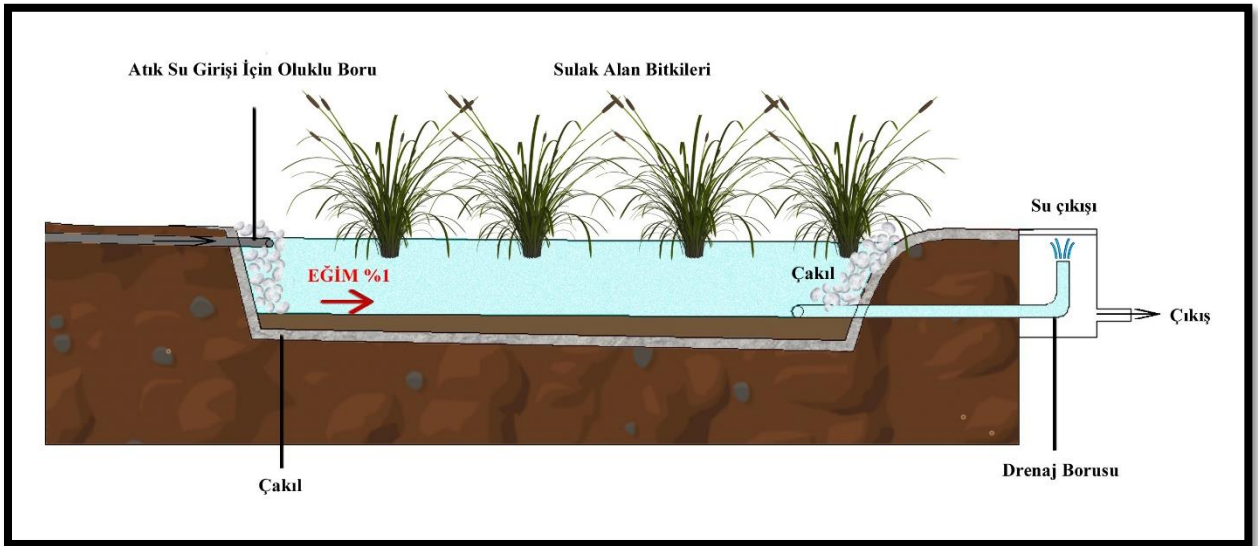
Yağmur suyu hendekleri (bioswale); genellikle yol kenarlarında uygulanan doğrusal yapıda, yağmur sularını ve yüzey akışından gelen suları toplamaya, süzemeye, depolamaya ve/ veya altyapı sistemlerine, akarsulara iletmeye yarayan bitkisel çöküntü alanlarıdır.





Şekil 1 Yeşil çatı ve yağmur tabağı uygulaması (Stone, 2017)  
(<https://tr.pinterest.com/pin/rainsaucers-an-open-letter-to-the-residents-of-flint--462463455482076677/>)

Yapılandırılmış sulak alanlar, insan eli ile oluşturulan su arıtmak için tasarlanmış, zemininde kum, toprak ve/ veya çakıl bulunan, üstünde bitkilerin yetiştiği, kirli suların bir uçtan girip savak yardımı ile bir uçtan boşaltıldığı sığ sulak alanlardır (Omondi & Navalía, 2021)(Şekil 2). Yapılandırılmış sulak alanlar yardımıyla atık sular temizlenmektedir.



Şekil 2 Yapılandırılmış sulak alan çalışma prensibi (Orijinal 2022)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Geçirimli döşemelerin gözenekli yapıları sayesinde yağmur sularının doğrudan toprağa iletilmesi sağlanmaktadır. Böylece yeraltı suları da beslenmektedir. Bazı geçirimli döşeme uygulamalarında ise geçirimli döşemelerin altına drenaj kanalları döşenerek yağmur suları alt yapı sistemlerine ya da depolama alanlarına iletilebilmektedir. Geçirimli döşemelerin uygulama detaylarında geçirimsiz olan beton gibi malzemeler yerinde mıcır, kum gibi malzemeler kullanarak yağmur suyunun yeraltı sularına iletilmesi sağlanabilmektedir.

Kuru dereler genellikle drenaj sorunu olan alanlarda, drenajı sağlamak, yeraltı sularını beslemek ve yağmur sularını yönlendirmek için tasarlanmış taşlardan, kayalardan ve çakıllardan oluşan uygulamalardır (Şekil 3). Kuru dereler ile doğal akarsular; taşlar, kayalar ve çakıllar yardımı ile taklit edilmektedir.

Su sarnıçları/ tankları; yağmur sularının toplandığı, bahçe sulamasında, filtrelendiği zaman içme suyu olarak veya gri su olarak evlerde kullanılmasını sağlayan sistemlerdir (Şekil 4). Su tankları genellikle yapılara yakın alanlarda tasarlanmaktadır. Çatılarda biriken yağmur sularının drenaj boruları yardımı ile su tanklarına iletilmekte ve tanklarda depolanan su filtrelenerek kullanıcı ihtiyaçlarına göre kullanılmaktadır.

Kentsel alanlarda kaliteli içme suyu kaynakları, gün geçtikçe azalmakta ve içme suyu maliyetleri de artmaktadır. Bu soruna çözüm olarak bugün ekolojik uygulamalar gün geçtikçe yaygınlaşmaktadır. Kentsel alanlarda yağmur suyu hasadı yöntemleri farklılık gösterse de hepsinde ana amaç; yeraltı sularını beslemek, içme suyu kaynaklarının kirleticilere maruz kalmasını önleyerek, sürdürülebilir ve ekolojik yağmur suyu hasadı yapmaktır. Yağmur bahçeleri de bu ekolojik, ekonomik ve estetik uygulamalardan biridir.





**Şekil 3 Kuru dere uygulaması (Zavinski, 2018)**

**Şekil 4 Su tankı örneği (Kagabika & Kankuyu, 2021)**

## **2. MATERYAL ve YÖNTEM**

Çalışmanın ana materyalini Ankara ili Çankaya ilçesi Mustafa Kemal Mahallesi'nde bulunan T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı yerleşkesinin bahçesi oluşturmaktadır. Bakanlık, birçok kamu kurumu ve iş ofisinin bulunduğu merkezi bir konumdadır. Bakanlık yerleşkesi yaklaşık 43.028 m<sup>2</sup> alana sahiptir. Çalışma alanı; bakanlık yerleşkesinin ana girişinde bulunan güvenlik kulübesinin doğu ve batısında yer alan açık yeşil alanı kapsamaktadır (Şekil 5).



**Şekil 5 Çalışma alanı (Google Earth görüntüsü, 2023)**



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Araştırma materyalinin incelenmesinde veri kaynaklarının toplanması ve yorumlanması yöntemi kullanılmıştır. Araştırmanın yöntemi üç aşamadan oluşmaktadır. İlk aşamada sürdürülebilir yağmur suyu hasadı kapsamında yağmur bahçeleri ile ilgili ulusal ve uluslararası literatür taramaları yapılmış, her türlü yazılı ve görsel kaynaktan yararlanılmıştır. İkinci aşamada ise tasarım, uygulama ve saha araştırması yapılarak alana ilişkin veriler toplanmıştır. Çalışmanın son aşamasında ise birinci ve ikinci aşamada elde edilen bilgi ve bulgular kullanılarak bakanlık bahçesinde uygulanan yağmur bahçelerinin peyzaj tasarım ve uygulama süreçleri değerlendirilmiş ve bu kapsamda yağmur bahçelerinin uygulama aşamaları ortaya konulmuştur.

### 3. Yağmur bahçeleri

Yağmur bahçeleri, düşük etkili geliştirme (low impact development-LID) adı verilen yağmur suyu yönetimine yönelik yeni bir yaklaşımda çok yönlü ve etkili araçlardan biridir (Washington State University, 2007). Düşük etkili geliştirme; sürdürülebilir, yenilenebilir kaynaklara dayalı ve biyolojik çeşitliliği artırılmasına katkı sağlayan ve çevreye zarar vermeyen uygulamaları kapsamaktadır. Bu kapsamda yağmur bahçeleri de sürdürülebilir özellikte olmaları çevreye zarar vermeyen doğal yapıda olmaları ve biyolojik çeşitliliği artırmaları nedeni düşük etkili geliştirme uygulamalarındandır.

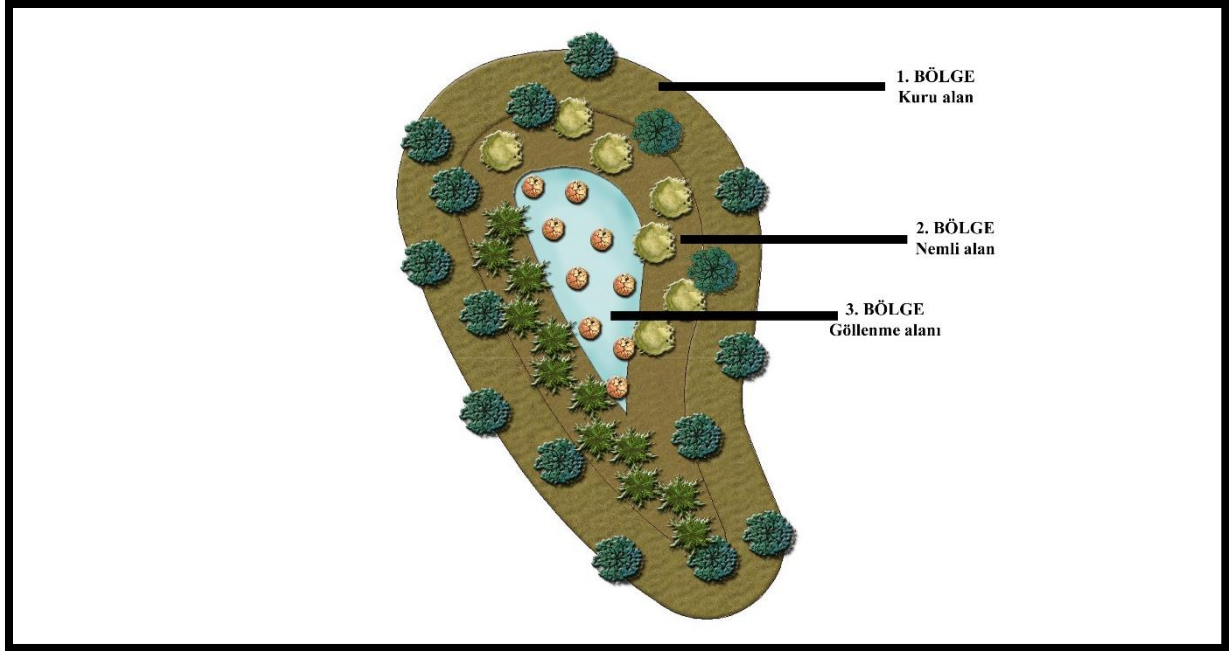
Yağmur bahçeleri bir diğer adı ile biyolojik tutma alanları kentsel alanlarda geçirimsiz yüzeylerden yüzey akışı ile gelen suların tutulmasını ve depolanmasını sağlayan bitkisel çöküntü alanlarıdır. Yağmur bahçeleri çukur formlu, üzerinde bitkilerin yetiştiği, toprağın üstünün malç tabakası ile örtülü olduğu su tutma, filtreleme ve süzme alanlarıdır. Bir yağmur bahçesinin ana işlevi, yağmur suyu akışından kaynaklanan kirleticileri toplayıp filtreleyerek, yer altı sularını beslemektir.

Yağmur bahçelerinin uygulama maliyeti diğer yağmur suyu hasadı yöntemlerine göre daha düşük olup aynı zamanda diğer yöntemlere göre daha uygulanabilir. Yağmur bahçeleri kentsel alanlara (uygun bitki seçimi ile) kolay adapte olan ve estetik alanlar oluşturulmasına katkı sağlayan uygulamalardır.

Yağmur bahçelerinde; en alt tabakada bitkisel toprak, toprağın üstünde bitkiler ve en üstte de malç tabakası bulunmaktadır. Ayrıca bazı yağmur bahçelerinde fazla suyu tahliye etmek ve yağmur sularını bahçeye iletmek için drenaj boruları da kullanılabilir.

Yağmur bahçeleri üç bölgeden oluşmakta olup bunlar;

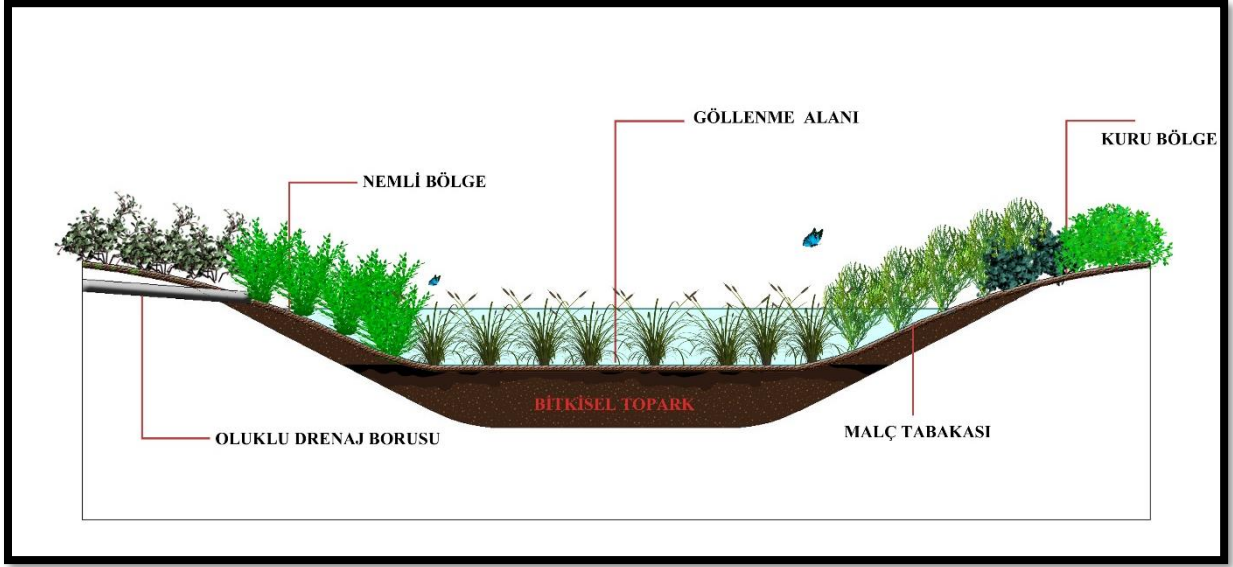
- Gölleme bölgesi,
- Nemli bölge,
- Kuru bölgedir (Şekil 6).



**Şekil 6 Yağmur bahçesinin bölgeleri (Orijinal 2022)**

Gölleme bölgesi yağmur bahçesinin çukur kısmını oluşturan suların toplandığı ve drene edildiği alandır (Şekil 7). Gölleme bölgesinde fazla yağmurlarda su birikintisi olacağı için suya dayanıklı bitkilerin seçilmesi gerekmektedir. Nemli bölge; yağmur bahçesinin eğimli bölgesini kapsayan alandır. Kuru alan ise yağmur bahçesinin suya en az maruz kalan ve en üst kotunda bulunan bölgedir. Kuru bölgede seçilen bitkilerin kuraklığa toleranslı türlerden seçilmesi gerekmektedir.





Şekil 7 Yağmur bahçesi kesiti (Orijinal 2022)

Yağmur bahçeleri açık yeşil alanlarda uygulanan; kentsel hidrolojiye ve kentsel ekosisteme birçok katkısı bulunan düşük etkili geliştirme yöntemlerinden biridir. Bu kapsamda yağmur bahçelerinin insanlara, flora ve faunaya yani tüm canlılara faydaları bulunmakta olup bunlar;

- Estetik alanlar oluşturulmasına yardımcı olmak,
- Flora ve faunaya yeni yaşam ve besin alanları oluşturulması,
- Yeraltı sularının beslenmesi,
- Yüzeysel akışından kaynaklanan kirliliğin önüne geçilmesi,
- Drenaj sorunlarının düzeltilmesi,
- Daha temiz çevreler oluşturulması,
- Bakım ihtiyacı az olması,
- Kontrolsüz yüzey akışlarının önüne geçilerek erozyon kontrolüne katkı sağlanması,
- Bahçe sulaması için harcanan su miktarının azalması,
- Su kalitesinin artırılması,
- Tozlaşmanın artırılmasına katkı sağlanması ile biyolojik çeşitliliğin artırılması,
- Maliyeti az ve uygulaması kolay olmasıdır.



#### **4. Yağmur Bahçeleri Uygulama Aşamaları**

Yağmur bahçesi uygulamaları, yer seçimi, geçirimsiz yüzeylerin tespiti, toprak analizi, tasarım yapılması, alana uygun bitki seçimi, tasarımın alana aplikasyonu, çukur açılması, çakıl serilmesi (opsiyonel), bahçenin eğiminin yapılması, drenaj borularının uygulanması (su girişi ve çıkışı için), toprak özelliğine göre bitkisel toprak serimi, bitkilerin dikilmesi ve malç uygulaması aşamalarından oluşmaktadır. Ayrıca yağmur bahçesi tasarımı; eğim, akış potansiyeli, geçirimsiz yüzeyler (yüzey akışı kaynakları), toprak yapısı, bitki örtüsü ve alan drenajı gibi çeşitli parametreleri kapsamaktadır.

Yağmur bahçesi tasarım ve uygulamasında ilk önce geçirimsiz yüzeylerin belirlenmesi gerekmektedir. Geçirimsiz yüzeylerden toplanan yağmur sular eğim ve drenaj boruları yardımı ile yağmur bahçesine iletilmektedir. Bu nedenle de geçirimsiz yüzeylere yakın alanlarda yağmur bahçeleri tasarlanması gerekmektedir. Ayrıca hâlihazırda drenaj sıkıntısı olan, su birikintisi olan alanlarda da doğal çöktürmeler oluşturularak yağmur bahçeleri tasarlanabilmektedir.

Yer seçiminde alt yapı sistemlerinin (su hatları, elektrik ve kanalizasyon hatları gibi) yerinin tespit edilmesi ve bu sistemlere yakın alanlarda yağmur bahçesi yapılmaması gerekmektedir.

Yağmur bahçeleri yer seçiminde;

- Toprak su seviyesinin yüksek olmamasına,
- Dik yamaçlar ya da fazla eğimli arazilerin olmamasına,
- Temele en az 3 metre uzaklıkta (ideal olarak ise 12 metre uzakta) olmasına (Carpenter, 2007),
- Geçirimsiz yüzeylere (suyun toplanacağı alanlara) yakın olmasına,
- Suyun toplanacağı alanlardan daha yüksekte olmamasına,
- Erozyon olan alanlarda yapılamamasına,
- Kayalık ve sığ alanlar olmamasına,
- Yeni tasarlanacak yağmur bahçelerinde ağaç altlarında uygulama yapılmaması (ağaçların köklerine zarar verilebileceği için) gibi unsurlara dikkat edilmelidir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Yağmur bahçesinin yeri seçildikten sonra yağmur bahçesi boyutlarının belirlenmesi gerekmektedir. Yağmur bahçesi boyutu belirlenirken;

- Yağmur bahçesini besleyecek geçirimsiz yüzeylerin m<sup>2</sup>'si,
- Toprak türü,
- Yağış miktarı,
- Bahçe eğimi faktörlerinin dikkate alınması gerekmektedir.

Suyun toplanacağı geçirimsiz yüzeyler; çatı, kaldırım, taşıt yolu, gibi yüzeylerin m<sup>2</sup>'si hesaplanarak yağmur bahçesinin büyüklüğü belirlenmelidir. Suyun toplanacağı geçirimsiz yüzeyler tespit edildikten sonra çok fazla eğimli olmayan ve suyun toplanacağı yüzeylerden daha üst kotta bulunmayan bir açık yeşil alan seçilmelidir. Seçilen alanda toprak değerlendirilmeli ve gerekiyorsa bahçe için yeni bitkisel toprak getirilmesi gerekmektedir. Kil oranı fazla olan topraklar suyu tutarken; kumlu toprak suyu siltli ve killi bir toprağa göre daha hızlı boşaltmaktadır. Toprak tipi, yağmur sularının ne kadar süre tutulacağını ve süzülmenin kaç saatte yapılacağını ekileceği için önemli bir faktördür. Yağmur bahçelerinde göllenme alanında biriken suyun en fazla 48 saat içinde (ideal olarak 24 saat) boşalması gerekmektedir (McMaine & Agouridis, 2013). Daha uzun süreli su tutumunda, bitkiler zarar görecektir, bahçede sivrisinekler ve koku oluşacaktır. Ayrıca yağmur bahçeleri, hâlihazırda durgun su alanları olmayıp; geçici su tutma alanıdır. Yağmur bahçesi oluşturulurken kum (%30-40), üst toprak (%30-40) ve kompost (%20-30) tercih edilmesi ile uygun süzme ve su tutma kapasitesi elde edilebilmektedir. Hâlihazırdaki toprak tercih edilecekse de sızma testi yapılması (gözleme dayalı veya ölçü çubuğu ile) ve bunun sonucuna göre de göllenme derinliğinin belirlenmesi ya da toprağın süzme durumuna göre yeni toprak getirilmesi gerekmektedir

Yağmur bahçesi uygulamalarında alanın eğimi bahçenin derinliğini etkileyen faktörlerdendir. Yağmur bahçesinin eğimi göllenme alanını etkileyeceği için yağmur bahçesinin m<sup>2</sup>'sini de etkilemektedir. Ayrıca drenajın düzgün bir şekilde sağlanması için göllenme alanının düz olması gerekmektedir. Bu kapsamda göllenme derinliği hesaplanırken;

- %5'in altındaki eğimlerde derinlik 12 cm olmalıdır.
- %5 ile %7 arasındaki eğimler için derinlik 15 cm olmalıdır.
- %7 ile %12 arasındaki eğimler için derinlik yaklaşık 20 cm olmalıdır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- %12'den daha büyük eğimler için yağmur bahçesi için uygun olmayacaktır (Bell, Brantley, Sweeney, & Pitts, 2021).

Yağmur bahçelerinde kazı derinliği 45-75 cm arasında olması gerekmektedir (Washington State University, 2007). Sığ derinliklerde göllenme alanı derinliği de az olacağı için taşmalar meydana gelebilmektedir.

Geçirimsiz yüzeylerin alanı, yağış miktarı ile çarpılıp, bahçe derinliğine bölünmesi ile yağmur bahçesi m<sup>2</sup>'si hesaplanabilmektedir (Bell, Brantley, Sweeney, & Pitts, 2021).

Yağmur bahçeleri yapılırken en üst bölgede taşma engelleme sınırı da yapılması gerekmektedir. Bu sınır toprağa hafif bombe verilerek yapılmakta olup fazla yağışlarda yağmur suyunun taşmasını engellemek için yapılan bir seddedir.

Geçirimsiz yüzeylerin tespiti, yer seçimi ve bahçe boyutu belirlendikten sonra yağmur bahçesi tasarımı yapılmaktadır. Yağmur bahçesi tasarımında genellikle formal şekiller yerine amorf şekiller tercih edilmektedir. Oval, böbrek gibi doğal formlu tasarımlar daha çok tercih edilmekle birlikte uygulamada, uygun eğim ve derinlik verilebilecek her formda tasarım yapılabilmektedir.

Yağmur bahçesinde; yerli türlerden bitkilerin seçilmesi daha kolay uyum sağlamaları daha az su ve bakıma ihtiyaç duymaları nedeni ile daha uygun olacaktır. Ancak yerli olmayan bitkiler, istilacı olmadıkları, haşere, hasatlık içermedikleri ve alan şartlarına uygun oldukları sürece kullanılabilirler. Yağmur bahçesinin bölgelerine göre bitki seçilmesi gerekmektedir. Göllenme alanında suyu toleranslı türler seçilirken, kuru bölgede kuraklığa dayanıklı türlerin seçilmesi gerekmektedir.

Yağmur bahçesi tasarımı alana aplikasyonu yapıldıktan sonra çukur açılmaktadır. Çukur duruma göre el aletleri ya da kepçe ile açılabilir. Açılan çukura drenajı sağlamak için gerekli durumlarda mıcır- çakıl serilebilir. Çukur açıldıktan sonra, bitkisel toprak eğime uygun bir şekilde serilerek, silindir yardımı ile toprağın tesviyesi yapılmaktadır. Toprak; göllenme alanında düz ve nemli bölgede eğimli olacak şekilde kademeli olarak serilmelidir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

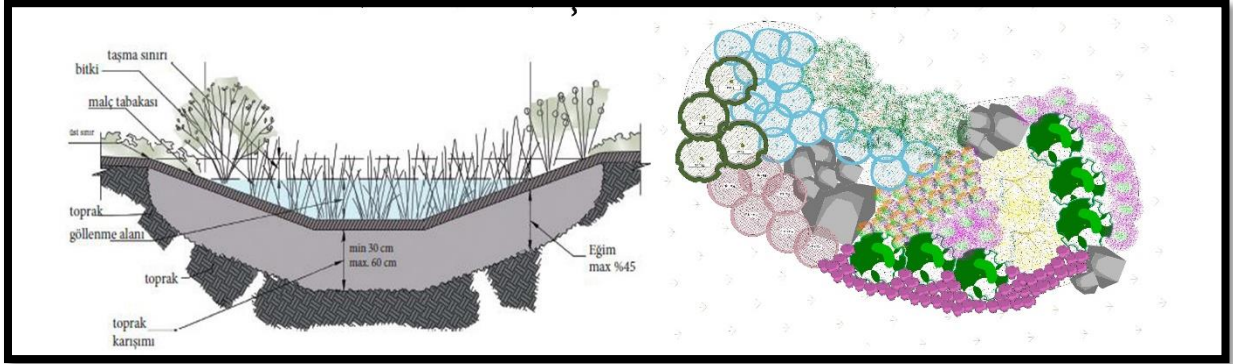
Yağmur bahçesinin nemli bölgesine geçirimsiz yüzeylerden drenaj boruları yardımı ile toplanan yağmur suları verilmelidir. Drenaj borularının ağız kısımlarına gerekiyorsa filtrelenmelidir. Böylece yüzey akışı ile gelen büyük tortuların bahçeye gelmesi engellenmiş olacaktır.

Yağmur bahçesinin kademelendirilmesi yapıldıktan sonra tasarım aşamasında seçilen bitkiler dikilmektedir. Daha sonra da toprağın üstüne malç uygulanmaktadır. Malç tabakası bitkileri kışın donlara karşı korunması, yazın yağışsız günlerde toprağın nemli tutulmasının sağlanması, erozyonu önlemesi ve bahçenin yabancı otlardan korunması için önemli bir uygulama aşamasıdır. Malç seçilirken yapraklar, ibreler gibi hafif malçlar yerine ağaç kabuğu, dal, kozalak gibi ağır malçlar seçilmesi gerekmektedir. Bunun nedeni ise hafif malçlar yağmur yağdığı zaman alandan uzaklaşacak, suyun üzerinde yüzecek ve kirliliğe sebep olacaktır. Ayrıca hafif malçlar, yağmur bahçesinde bulunan drenaj kanallarının da tıkanmasına neden olabilmektedirler. Yağmur bahçelerinde uygulanacak malç tabakası 5-8 cm derinliği arasında olmalıdır (Washington State University, 2007).

### 5. Bakanlık Örneği

T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı bahçesine 2018 yılında iki adet yağmur bahçesi uygulaması yapılmıştır. Uygulama yapılmadan önce suların toplanacağı geçirimsiz yüzeyler tespit edilmiştir. Hâlihazırda Bakanlığın çatısında toplanan sular sifonik sisteme iletilerek tuvaletlerdeki sifonlarda kullanılmakta olup su hasadı yapılmaktadır. Bakanlıkta bulunan en büyük geçirimsiz yüzeylerden birinde (çatı) yağmur hasadı yapılması nedeni ile diğer geçirimsiz yüzeyler tespit edilmiştir. Bakanlığın girişinde bulunan güvenlik kulübesi ve beton kaldırımlar geçirimsiz yüzeyler olarak tespit edilmiştir. Güvenlik kulübesinin doğu ve batısında bulunan bitkisel alan, geçirimsiz yüzeylere yakın olması, bakanlığa gelen ziyaretçilerin göreceği bir konumda olması nedeni ile yağmur bahçeleri için uygun görülmüştür. Hâlihazırda alanda bitkisel toprağın bulunması ve alanda drenaj sorunu bulunmaması nedeni ile toprak analizi yaptırılmamıştır. Daha sonra tasarım aşamasına geçilmiş ve alan için fasulye- böbrek şeklinde bir tasarım yapılmıştır (Şekil 8). Tasarım aşaması bittikten sonra yağmur bahçelerinin alana aplikasyonu gerçekleştirilmiştir. Sprey boya ve kreç tozu yardımı alana aplikasyonu yapılan tasarım kepçe yardımı ile kazılmıştır. Kazı alanının tabanına drenaj için mıcır serilmiş olup üstüne kazıda çıkan bitkisel toprak serilmiştir.





Şekil 8 Yağmur bahçesi kesit ve plan (ÇŞİDB, 2018)

Güvenlik kulübesinin çatısından gelen drenaj borusu yağmur bahçesine kadar uzatılmıştır. Drenaj boruları toprak altına gizlenmiştir. Eğim yardımı ile yağmur bahçesinin nemli bölgesine drenaj borularının çıkışı verilmiştir. Drenaj borularının ağız kısmına filtre konularak büyük tortu ve pisliklerin bahçede birikmesinin önüne geçilmiştir. Bakanlık bahçesinde bulunan kaldırımlar geçirimli beton yapılarak yenilenmiştir (Şekil 9). Geçirimli betondan süzülen yağmur sularını yağmur bahçesine iletmek için drenaj boruları döşeme altında uygulanmıştır. Bu drenaj boruları toprağın altından eğimle yağmur bahçesine getirilmiştir. Oluklu drenaj borusu yağmur bahçesinin nemli bölgesine gelecek şekilde uygulanmıştır. Böylece yağmur yağdığı zaman geçirimli betondan gelen yağmur suları drenaj boruları yardımı ile yağmur bahçesine iletilecek ve göllenme alanında biriken sular süzülerek yeraltı sularını besleyecektir.



Şekil 9 Geçirimli beton ve drenaj borusu uygulaması (Orijinal, 2022-2018)

Uygulamanın diğer aşamasında; bitkisel toprak yağmur bahçesinin üç kademesine göre eğim verilerek serilmiştir. Daha sonra el silindiri yardımı ile toprağın tesviyesi yapılmıştır (Şekil 10).



Şekil 10 Yağmur bahçesi uygulaması (ÇŞİDB, 2018)

Tesviye edilen toprak üzerine seçilen bitkiler dikilmiştir. Yağmur bahçesi için Ankara şartlarına uygun ve uyum sağlamış türlerden bitkiler seçilmiştir. Yağmur bahçesi için seçilen bitkiler; *Berberis thunbergii* 'Atropurpurea Nana' (kırmızı yapraklı bodur kadın tuzluğu), *Carex sp.* (kareks), *Centaurea tchihatcheffii* (sevgi çiçeği), *Cerastium tomentosum* (beyaz çiçekli fare kulağı), *Chrysanthemum sp.* (kasımpatı), *Festuca glauca* (mavi çim), *Lamium sp.* (ballıbaba), *Lavandula sp.* (lavanta), *Nandina domestica* (cennet bambusu), *Picea pungens* 'Glauc globosa nana' (bodur mavi ladin), *Pinus mugo* (bodur çam) ve *Salvia rosmarinus* dur (biberiyedir) (Şekil 11).

Kuru bölgede; *Berberis thunbergii* 'Atropurpurea Nana' (kırmızı yapraklı bodur kadın tuzluğu), *Festuca glauca* (mavi çim), *Picea pungens* 'Glauc globosa nana' (bodur mavi ladin) ve *Pinus mugo* (bodur çam) bitkileri kullanılmıştır.

Nemli bölgede; *Cerastium tomentosum* (beyaz çiçekli farekulağı), *Chrysanthemum sp.* (kasımpatı), *Lavandula sp.* (lavanta), *Nandina domestica* (cennet bambusu) ve *Salvia rosmarinus* (biberiye) bitkileri kullanılmıştır. Ayrıca, Gölbaşı için endemik olan *Centaurea tchihatcheffii* (sevgi çiçeği) nemli- eğimli bölgede kullanılmıştır.



*Carex sp.* (kareks) bitkisi, sulak alanlarda bataklık alanlarında yetişmesi ve Ankara şartlarına dayanıklı olması nedeni ile göllenme alanı için seçilmiştir. *Lamium sp.* (ballıbabası) nemli toprakları sevmesi nedeni ile göllenme alanında uygulanmıştır.

En son aşamada ise malç olarak ağaç kabuğu yağmur bahçesi yüzeyine serilmiştir. Ağaç kabuğunun malç olarak seçilmesinin nedeni; yoğun yapıda olması ve bitki yaprakları gibi hafif malzeme olmaması nedeni ile suda yüzmemesi ve drenaj borularını tıkamamasıdır. Ayrıca serilen malç yardımı ile toprak nemli tutularak bitkilerin su ihtiyacı azalması, bahçe yabancı otların baskısına karşı ve kışın da donlara karşı bitkilerin korunması hedeflenmiştir.



**Şekil 11 Çevre, Şehircilik ve İklim Değişikliği Bakanlığı bahçesinde yağmur bahçesi uygulaması (ÇŞİDB, 2018)**

Yağmur bahçesinin sınırlarını belirlemek ve estetik bir görüntü oluşturmak için yağmur bahçesinin dış çerçevesi boyunca dolomit taşı uygulanmıştır. Yine bu alanda dolomit taşlarının aralarına *Festuca glauca* (mavi çim) uygulanmıştır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bahçeye sırası ile; 15 cm çakıl, 60 cm bitkisel bahçe toprağı ve 5 cm ağaç kabuğı uygulanmıştır. Yağmur bahçelerinin her birinin alanı 15.5 m<sup>2</sup> olup ikisi toplam 31 m<sup>2</sup> alan üzerinde uygulanmıştır. Yağmur suyunun toplandığı güvenlik kulübesinin alanı 95 m<sup>2</sup>'dir. Geçirimli beton uygulanan kaldırım alanı yaklaşık 130 m<sup>2</sup>'dir. Ankara' da yıllık yağış miktarı 392 mm olup yağmur bahçelerinin kapasitesini aşan bir yağış miktarı bulunmamaktadır (MGM, 2022).

### 6. SONUÇ

Kentsel alanlarda su döngüsünün sağlıklı bir şekilde işlemesi, yağmur sularının filtrelenerek yeraltı sularına iletilmesi ve yağmur suyu hasadı uygulamalarına ekolojik bir alternatif olarak yağmur bahçeleri uygulamaları bugün birçok ülkede yaygınlaşmaktadır. Sığ çöküntülerden oluşan bitkisel alanlar olan yağmur bahçeleri yağmur sularını süzmeye yarayan ve yüzey akışından gelen suları yeraltı sularına ileten düşük etkili geliştirme alanlarıdır. Bu nedenle de yağmur bahçeleri geçirimsiz yüzeylerin fazla olduğu kentsel açık yeşil alanlarda uygulanabilir, basit, sürdürülebilir, ekolojik ve estetik yağmur suyu hasadı yöntemlerindedir. Ayrıca kentlerde yağmur bahçeleri ile bölgesel su kaynakları korunurken, flora ve fauna için de yaşam alanları oluşturulmaktadır.

T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı bahçesinde uygulanan iki adet yağmur bahçesi hem Ankara'da hem de Türkiye genelinde uygulanan ilk örneklerden biridir. Bakanlıkça uygulanan yağmur bahçeleri ile hem kamusal alanlarda hem de özel mülkiyet alanlarında (ev, site bahçeleri gibi) yağmur bahçelerinin yaygınlaştırılması ve ülkesel ölçekte tanıtılmasının sağlanması hedeflenmiştir. Ayrıca bakanlıkta sürdürülebilir yağmur suyu yönetimi yapılması da hedeflenmiştir. Küçük ölçekli bahçelerden büyük ölçekli açık yeşil alanlara kadar birçok uygulama alanı olan yağmur bahçeleri yaygınlaştırılması gereken önemli bir su hasadı yöntemidir. Bütüncül bir bakış açısı ile kentsel açık yeşil alanlarda yağmur bahçelerinin yaygınlaştırılması ile; su kirliliğı ve kontrolsüz yüzey akışını azalacak, yüzey akışından kaynaklanan erozyon ve drenaj sorunlarının önüne geçilecektir. Yağmur bahçeleri ile kentlerde sürdürülebilir, etkili ve ekolojik yağmur suyu hasadı yapılacaktır. Bu kapsamda da bakanlık örneğı Türkiye çapında, ekolojik su hasadı yöntemi olan yağmur bahçelerinin yaygınlaştırılması için etkili bir uygulama olmuştur.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DISTRIBUTION OF BUNGALOW TYPE ACCOMMODATION FACILITIES IN THE FIRTINA BASIN ACCORDING TO LAND CHARACTERISTICS AND THEIR POSSIBLE EFFECTS ON THE ECOSYSTEM

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#### ABSTRACT

One of the methods used to utilize natural resources in rural areas is nature-based tourism activities. In order for nature-based tourism activities to be carried out to the desired level and to provide economic contribution to the local people in the area where the activities are carried out, it is very important for tourists to be able to stay close to the areas where activities are carried out. Therefore, bungalow type houses, one of the eco accommodation facilities, have become very popular in recent years. The aim of this study is to determine the distribution of bungalows used in tourism activities in Fırtına Valley according to the land characteristics by using of Google earth and GIS programs and to examine the environmental problems they may cause. For this purpose, the distribution of bungalow type accommodation facilities in the Fırtına basin was determined using the Google earth program, and with the help of the GIS program, the distribution and density of bungalows were determined according to land characteristics. According to the results of the research, the number of bungalows identified in the Fırtına basin is 226. According to altitude levels, the highest number of bungalows is 158 unit (69.91%) between 48-500m altitudes, while the lowest number of bungalows is 2 (0.88%) between 1001-1500m altitudes in the study area. It has been determined that the average floor area of the bungalows varies between 30-60 m and the intensive use area of the bungalows varies between 50-100 m, and in most of the bungalows, the floor of the usage area is concreted.

**Keywords:** Bungalow house, ecotourism, Fırtına, GIS



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1.INTRODUCTION

Developments in the field of tourism are parallel to changes in users' expectations. With the emergence of alternative tourism types and the diversification of tourism, tourists have turned to different types of tourism (Boz, 2019). Tourism businesses must meet expectations, satisfy tourists and provide quality service. Accommodation businesses, which have a significant share in tourism, are important in terms of creating competitive advantage (Chen and Tsai, 2007).

When ecotourism, which includes many social and cultural activities, was expressed academically in the 1980s, it was not thought that it would be so important in the tourism sector in the following years (Weaver and Lawton, 2007; Erdoğan, 2014). Today; It has gained an important place in rural development by rising with the principles of minimum impact and maximum respect to culture and environment, maximum benefit to the local economy and maximum experience for tourists (Kılıç Bakan, 2006; Akoğlu, 2018). Therefore, nature-based tourism activities can offer great opportunities for the development of the people in areas that do not have the chance of industrialization, such as the Fırtına basin. However, these opportunities may include different approaches and practices than the nature-based tourism-based rural development models and principles carried out in rural areas in different geographies. However, all different approaches and practices must comply with ecotourism principles. Therefore, in such development practices, not only the economic principles or gains, but also the ecological effects of the activities to be carried out should be carefully evaluated and included in the plans. It is because if we are to talk about a sustainable tourism activity, it is necessary to ensure a balanced development in economic, social and environmental terms (Ceylan, 2001; Korkmaz and Başkalkan, 2011). However, during field studies carried out in rural areas, it was observed that many of the activities carried out in the name of tourism in the Fırtına Basin, were carried out haphazardly and without planning and without taking into account ecotourism principles. These practices continue to increase every year in the Fırtına Basin, which has a very rich resource value on a national and international scale. Bungalow house facilities built as alternative tourism accommodation facilities in the basin are one of them. The natural charm of the region is effective in the choice of bungalow houses (Kara and Karakaya, 2018; Ceylan, 2019; Düzgün, 2021; Kivılcım and Aydın, 2022). Although bungalow houses, which have become popular recently, constitute an alternative for nature tourism, they were in high demand by people who wanted to have a holiday, be isolated and stay away from crowded communities during the Covid-19 epidemic period (4). (Taşçıoğlu and Yıldırkan,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

2023). Fırtına Valley is an area of natural beauty that meets these needs. With the opening of Rize-Artvin airport, transportation to the valley has become faster and easier, causing the bed capacity in the facilities in the valley and its surroundings to be unable to respond to the increasing visitor traffic. This facility gap has been tried to be solved by building bungalow type accommodation facilities in areas with different land characteristics (elevation, slope, aspect, etc.). As a result, the construction of these facilities is faster and less costly than other accommodation facilities, which has led to a very rapid and unplanned increase in the basin. Undoubtedly, bungalow type accommodation facilities can meet the accommodation demands of visitors to a certain extent and provide a significant economic contribution to the local people. However, unplanned and random bungalow type accommodation practices cause serious problems. The aim of this study is to determine the distribution of bungalow-type accommodation facilities, which are stated to be used for eco-accommodation in the Fırtına basin, according to land characteristics, with the help of the ArcGIS program, and to examine the effects that bungalow-type accommodation may have on the ecosystem.

## 2. MATERIAL and METHOD

### Research Area Introduction

The research area is 45 km east of Rize province and 10.81 km away from Rize-Artvin airport. The research area is located at an altitude of 3937 m above sea level. The research area is among the world's 200 important terrestrial ecological regions of ecological importance (Yüksek et al., 2021). The area of the Fırtına basin, formed by the merger of Fırtına and Durak sub-basins, is 117350 ha (Yüksek et al., 2017), and the annual water yield of the basin reaches 1564 million m<sup>3</sup> (Kurdoğlu, 2022). According to the Thornthwaite method, the climate type of the Fırtına basin (A B'1 r a') has very humid, medium temperature (mesothermal) maritime climate characteristics with little or no water shortage (Yüksek, 2017). During the year, the most rainfall occurs in October and the least rainfall occurs in April. The annual average temperature throughout the basin is 13.91 °C, and the lowest monthly temperature is in February with -1.89 °C.

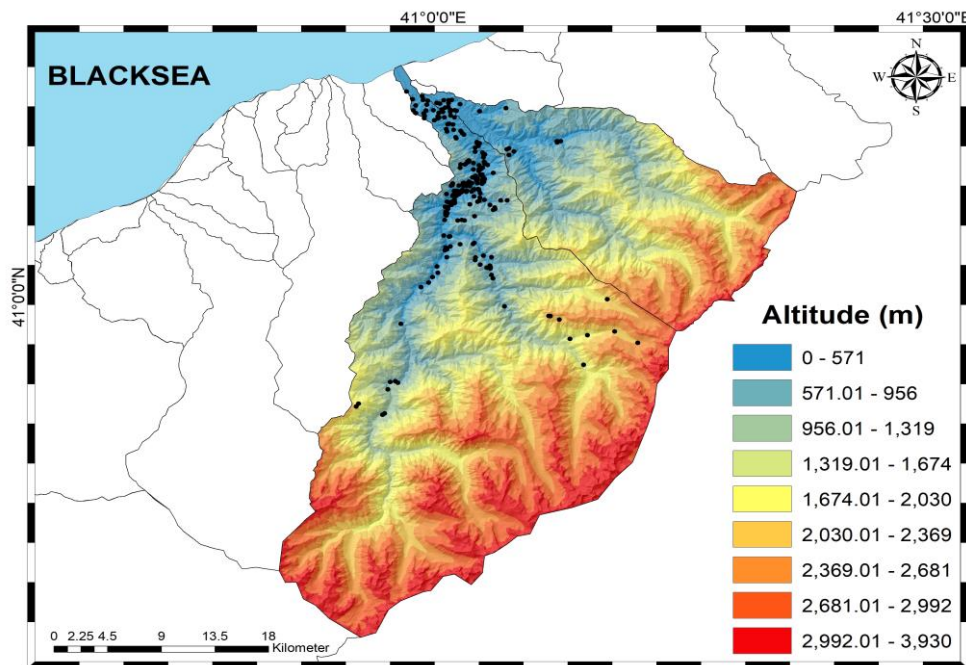
### Method

In this study, bungalow type tourism businesses in the Fırtına basin, Google Earth Pro and ARGIS software were used. In line with the research objectives, first the boundaries of the Fırtına basin were first determined in the Google Earth Pro program. Then, the locations of the bungalows within the basin borders and identified with the help of the relevant program were

marked. Finally, in the created data set, the distribution and density of bungalows according to elevation levels, aspect and slope groups were determined with the help of ARCGIS software.

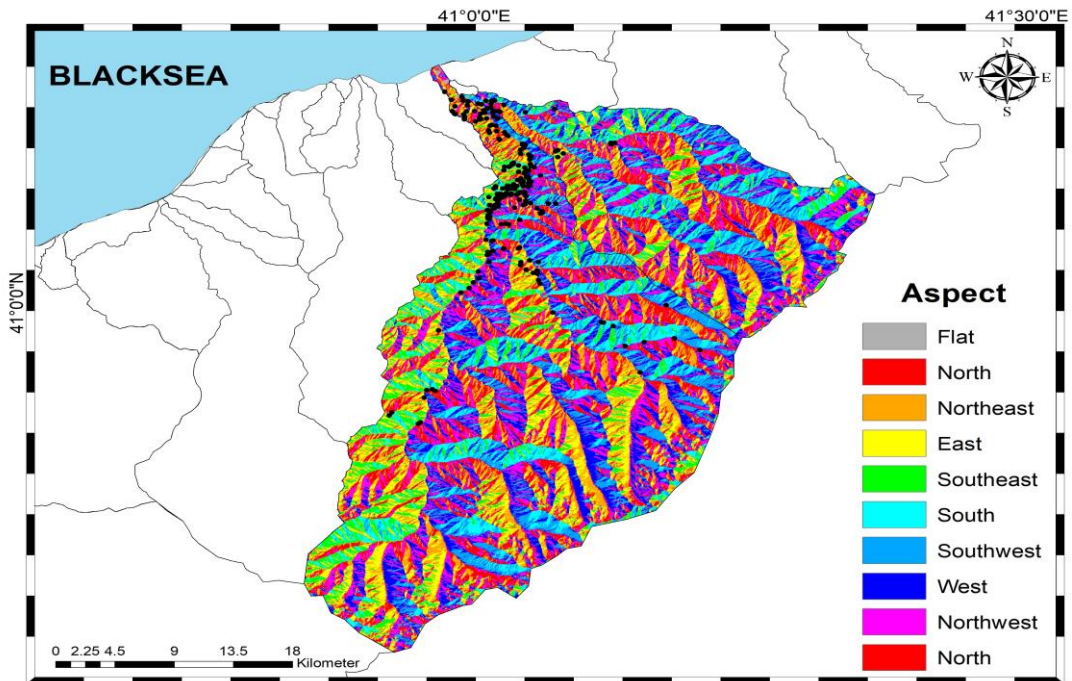
### 3. FINDINGS

The number of bungalows detected throughout the Fırtına basin with the help of the Google Earth program is 226. According to the altitude levels, the highest number of bungalows throughout the basin is 158 (69.91%), are between 48-500 m altitudes, and the least number of bungalows is 2 (0.88%), are between 1001-1500 m altitudes (Figure 1). According to the aspect, the highest number of bungalows are on the east side is 37 (17.26%). Throughout the basin, 117 (51.77%) of the bungalows are on shady views. In the sunny aspect group, the most bungalows are in the southeast (31) and west (31) views (Figure 2).



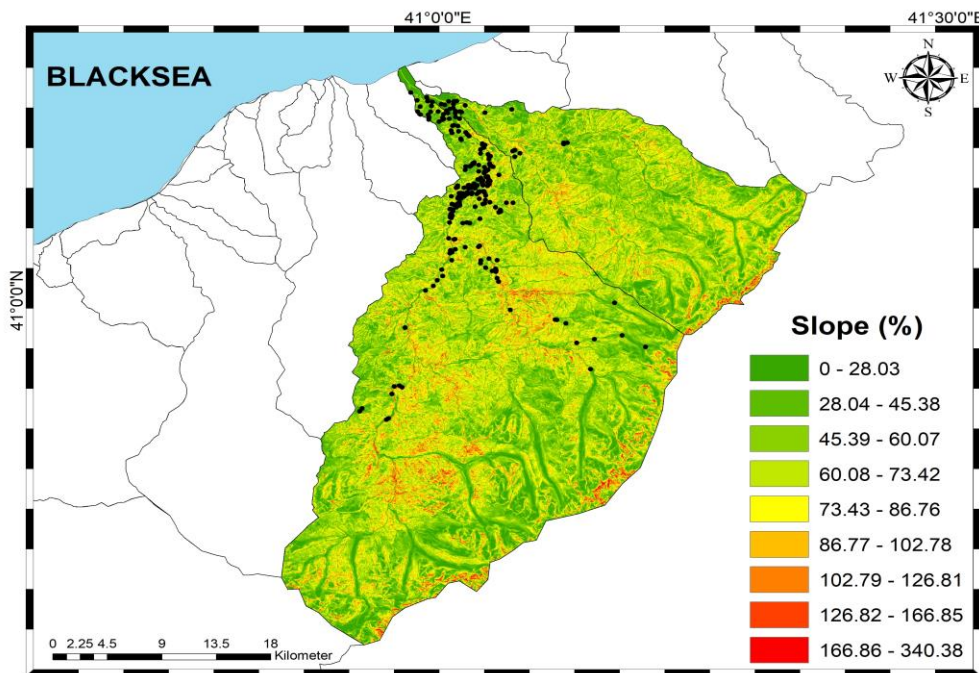
**Figure 1:** Distribution of bungalows in the Fırtına basin according to elevation levels





**Figure 2:** Distribution of bungalows in the Firtina basin according to aspect

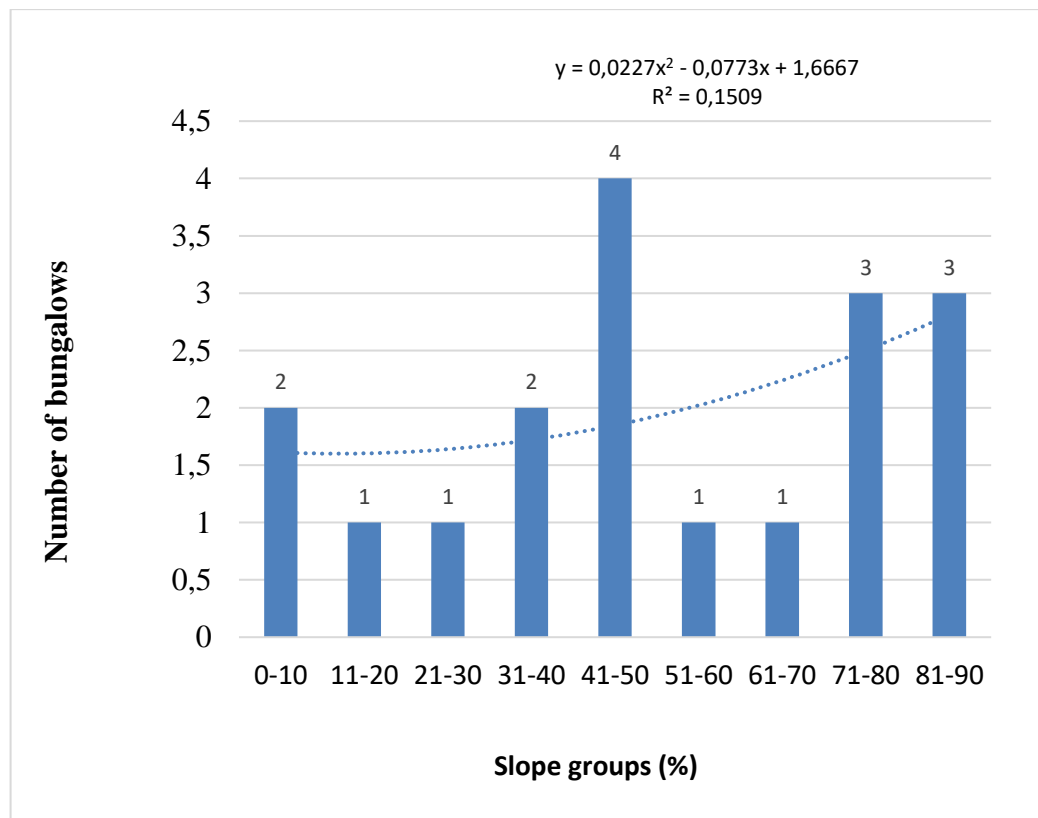
According to the slope groups of bungalows throughout the basin, the highest number of bungalows has been found in the 51-60% slope group to be 44 (19.47%), while the lowest number of bungalows has been found in the 101-110% slope group to be 5 (2.21%) (Figure 3).



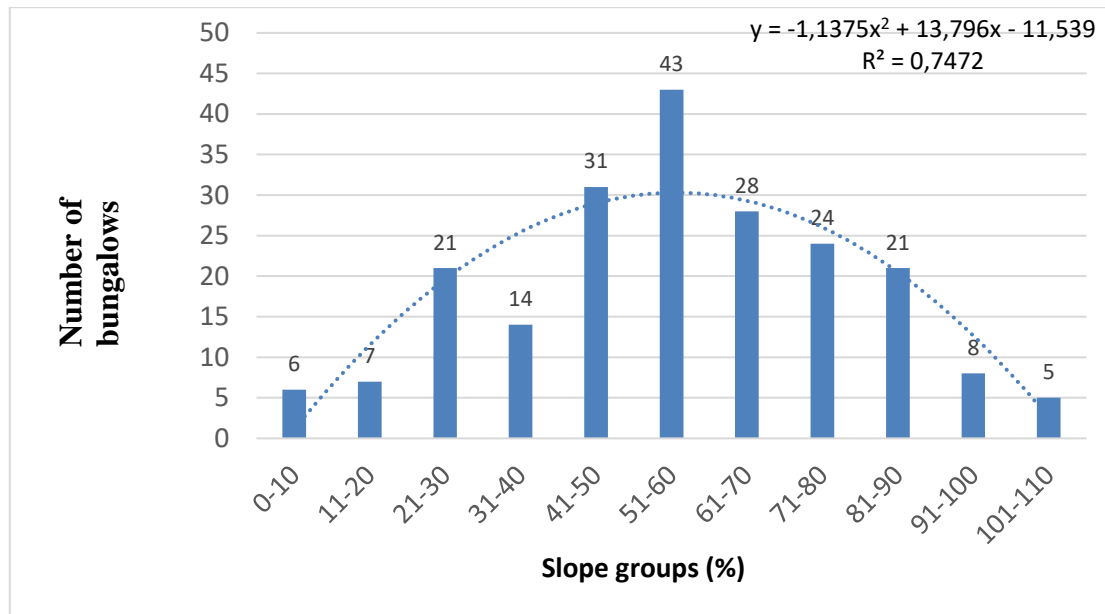
**Figure 3:** Distribution of bungalows in the Firtina basin according to slope groups



According to the sub-basins, the highest number of bungalows is 208 (92.04%) in the Firtina sub-basin, while 18 of the bungalows (7.96%) are in the Durak sub-basin (Figure 4). In the Durak sub-basin, highest number of bungalows is in the 41-50% slope group with 4 bungalows; in the Firtina sub-basin, the highest number of bungalows is in the 51-60% slope group with 44 bungalows. 172 (76%) of the bungalows in the Firtina basin are placed in the 40% and above slope group. While there are no bungalows at slopes of 90% or above in the Durak sub-basin (Figure 5), 13 bungalows have been identified in 90-110% slope groups in the Firtina sub-basin.



**Figure 4:** Distribution of bungalows in the Durak sub-basin according to slope groups



**Figure 5:** Distribution of bungalows in the Firtina sub-basin according to slope groups

#### 4. DISCUSSION

Accommodation problems may occur in many different places where rural tourism activities are carried out. Different searches continue to increase in order to solve these problems. There is no doubt that bungalow type accommodation facilities will make great contributions to the solution of the rural accommodation problem. However, the real problem here is that these types of accommodation facilities are built in an unplanned way, and the negative effects they may have on the environment are not taken into account. Bungalows are on different elevations, slopes and aspects throughout the basin. The road is being re-opened for some bungalows. The constructed roads are either used as stabilized soil or concreted. The use of roads as soil causes significant surface runoff in these areas after rainfall, and soil is carried away by erosion. Concrete roads causes these areas to warm up and cool down faster, and ultimately increasing the effects of global climate change.

Studies have shown that excessive road density in rural areas causes serious habitat fragmentation, extinction of living creatures in fragmented habitats, and disruption of ecosystem services (Yüksek et al., 2008; Yüksek et al., 2010; Yüksek, 2011; Yüksek et al., 2012). . It should not be forgotten that concrete roads built on sloping high lands act like a fast-flowing stream after rainfall and cause floods. It is stated that land destruction and increase in rural road density increase flood damages (Yüksek and Yüksek, 2014; Yüksek and Yüksek 2015; Yüksek and Yüksek, 2016). Another important issue is the emergence of serious habitat fragmentation in very rapid and large areas throughout the basin, along with the bungalows. It



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

is stated that habitats are fragmented and ecosystem services are deteriorated as a result of the increase in dispersed settlement density in rural areas (Yüksek et al., 2008; Yüksek et al., 2010; Yüksek and Yüksek, 2015; Yüksek et al., 2016; Yüksek et al., 2017). The fact that most of the bungalows are unplanned and unregistered causes tax losses for the state. Another important problem in bungalows built and used without planning is that serious risks and threats occur in terms of security during the use of bungalows. Another important issue is the risks of excessive water consumption in unplanned bungalows (especially in bungalows with jacuzzies with a capacity of 150-200 liters), pollution of soil and water resources as a result of the discharge of used waste water into the environment (soil or side streams), and the risk of bad odor and disease. Another important problem is the collection and disposal of domestic waste generated in bungalow accommodation facilities. However, it is not possible to say that these wastes are collected and disposed of in accordance with waste collection principles. Therefore, these wastes are brutally abandoned to nature. This causes serious environmental problems and risks. It is stated that domestic wastewater and garbage generated due to dispersed settlement in rural areas lead to pollution of soil and water resources as a result of wild storage in the environment (Yüksek et al., 2010; Yüksek et al., 2012).

### 5. RECOMMENDATIONS

Nature-based tourism activities must be carried out in a planned manner to ensure that the pressures they may create on the environment are below a level that will not disrupt the ecological balance. For this purpose, suitable areas for bungalow accommodation must be determined urgently, taking into account the natural resource value of the Firtına basin, and planning and project work covering sample applications must be carried out urgently by teams that are experts in the field. Applications can be made to reduce the environmental impact value of unplanned bungalows. For example, household waste can be recycled and turned into compost and fertilizer. Domestic wastewater can be treated with biopurification facilities to be established outside homes and treated in a way that does not pose a threat to nature. Problems or risks caused by vehicles can be reduced by accessing areas where bungalows are located by vehicles with low carbon emissions.

Local people can contribute to their economic income by utilizing non-wood forest products in the area and selling them to bungalow users.

The following suggestions can be presented for bungalow designs to be made in Rize province;



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- All kinds of bungalow investments and applications to be made in Rize province must be suitable for the ecosystem and ecosystem services in the valley.
- Land characteristics should be taken into consideration when choosing areas for bungalows. It should not be allowed to go beyond the standard by developing bungalow types suitable for the land characteristics. Clustering at certain points should be prevented, and a balanced distribution should be ensured.
- Bungalow building type standards should be introduced, and its operation should be carried out by people with authorized certificates in the field.
- When choosing the area, the usage areas of the local people should be taken into account, and the environment should not be harmed.
- Increasing interest in bungalows should not increase the risk of construction, necessary precautions should be taken, and illegal construction should be prevented.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### WINTER COVER CROPS AS GREEN MANURE IN MEDITERRANEAN CONDITIONS: THE EFFECTS ON YIELD OF SILAGE MAIZE

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#### ABSTRACT

Green manure is evaluated in terms of improving soil structure, increasing its quality and being a source of mineral matter and organic matter in main crop plant cultivation. Due to the negative developments in the use of chemical fertilizers, sustainable agricultural practices have gained importance. In this respect, winter cover crops were evaluated as green manure for the main crop summer silage maize in Büyük Menderes basin with a Mediterranean climate. The experiment was conducted between 2021-2022. In November, fodder peas, barley and oats were sown as green manure. In order to see the effectiveness of green manure, the control plot where fertilization was applied under normal conditions was added to the experiment. For all treatments, 10% flowering time of fodder peas was preferred for mixing into the soil at the same time. After mixing the soil with the help of a rotatiller, silage maize was sown. After emergence, irrigation was applied to increase soil water capacity. Some yield and yield components such as SPAD chlorophyll measurements (in 3 phenological stages), plant height, stem diameter, number of leaves, fresh forage yield, and herbage yield were examined. SPAD values were very important in terms of observing the effectiveness of green manures. It was observed that the values were high in the treatments in which fodder peas were considered green manure in all 3 phenological periods. Although barley and the control treatment showed similar values, oat showed lower values than the others. When examined in terms of yield, the plots where normal mineral fertilization conditions were applied as control treatment had higher values. However, it was observed that fodder peas were close to the control group in terms of yield. Although it is thought that grasses do not contribute to soil yield in the short term, it is thought that they can contribute to soil organic matter in the long term. In terms of sustainable use of soil, long-term crop rotation and green manure studies will contribute to crop pattern and fertilization programs in similar ecologies.

**Keywords:** green manure, sustainable agriculture, silage maize, SPAD, winter cover crop



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Conventional agricultural production activities place a heavy burden on soils around the world. With the global climate change, this situation has started to be felt more clearly. Especially in basins where year-round production activities take place, producers grow the same product continuously in order to obtain the highest yield with minimum expenditure per unit area and leave the soil partially fallow for the rest of the time. This situation leads to deterioration of the balance of plant nutrients in the soil and may also negatively affect the water balance in the soil. At the same time, soil compaction over time has negative effects on plant growth. This situation is seen as a threat to sustainable agriculture by the European Union agricultural commissions. This can be a more environmentally friendly and economical solution through different production systems and roots instead of monoculture production (Ren et al. 2019). The most obvious example is the maize-maize and cotton-cotton production systems in the Aydın / Büyük Menderes basin. Modern agricultural production in Mediterranean countries is largely based on monoculture production systems to maximize producer profit (Karyoti et al. 2018). In these systems, which consume a lot of water, there is also impoverishment in terms of nutrients in the soil due to the lack of crop rotation. The solution to this situation can actually be seen as quite simple. The use of mineral fertilizers can close this gap quickly and easily. However, the recent sudden increase in mineral fertilizer prices, the fact that the raw materials of these fertilizers are imported and the energy used in production is quite costly have revealed that this use is not sustainable. In addition, the use of high amounts of mineral fertilizers will cause pollution of groundwater (Hu et al. 2023). Although a decrease in yield is predicted with reduced mineral fertilizer use, in some cases, on the contrary, it can increase yields by 14-23% (Karyoti et al. 2021). In the long term, the gains in terms of sustainability and stability will reach a balance. Many studies have been conducted on the use of other organic resources. These studies include the use of winter cover forage crops as green manure or as a source of quality roughage for animal production (De Boets et al. 2011; Caporali et al. 2004). In the USA and EU, it has also been reported that the use of these green manures in the cultivation of summer main crop such as maize, sorghum and cotton will increase productivity in sustainable production systems (Choi and Daimon, 2008; Sainju et al. 2005; Duiker and Hortwig, 2004). These plants, which are considered as green manure, constitute a critical crop pattern for adaptation to global climate change. In particular, legumes, with the free nitrogen they bind through bacteria (Wortman et al. 2012; Choi and Daimon, 2008), can provide nitrogen to the



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

plant to be grown as the main crop, as well as prevent erosion while providing soil water conservation if mixed into the soil at the right time (Povinato et al. 2017; Hunter et al. 2021; Bavougian et al. 2019). Among these species, peas have a very important place (Karyoti et al. 2018). In addition to peas, common vetch does not seem to have much effect, but it has the effect of increasing the main crop yield (Dubeab et al. 2013; Büchi et al. 2020). These species can contribute to soil organic matter and are also valuable for weed control. They can contribute to sustainable agriculture with less herbicide use (Büchi et al. 2020; Caporali et al. 2004). It can also facilitate access to water by opening root canals for the main crop maize or sorghum. This may lead to the plant being less affected by drought stress. Rapid mineralization of green manure residues with low C/N ratio can also provide a quick source of nitrogen to the main crop under drought (Hunter et al. 2021).

While organic fertilizers can contain weed seeds, heavy metals and soil contaminants that can make them risky, the fact that green manure is a cultivated species that only exists in the soil gives it positive effects for sustainability and economic production (Povinato et al. 2017).

In the 21st century, the biggest challenge for agriculture will be to increase food production with minimal environmental impact (Vojnov et al. 2022). Sustainability concerns and the lack of sufficient number of similar studies in the ecology where the study was conducted create a lack of information on the effects of green manures. In the study conducted for this purpose, winter cover forage crops grown in the region were evaluated as green manure, while silage maize was evaluated as the main crop.

Water is a commodity whose scarcity will be a major concern in the years to come. Restrictions on the use of water will lead to restrictions in agricultural production and changes in production patterns. Especially sudden droughts, wars, global pandemics have proven the importance of this. For this reason, our agricultural production patterns with alternative and new methodologies with minimum losses should be included in the inventory. This study will provide answers to these predictions and will provide information on which type of green manure is the most suitable for the producers in the region.

## 2. MATERIALS and METHODS

### Field site characteristics

The research conducted in the fields of Aydın Adnan Menderes University Faculty of Agriculture Research and Application Farm (37° 45' 43" N, 27° 45' 31" D, 28 m altitude) under





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

the ecological conditions of Aydın province. The land where the research is located has loamy texture in terms of soil properties. The land is weak in terms of organic matter (1,10%) and alkaline (8,10%). The soil has a high content of P (35 ppm), K (320 ppm), Ca (3218 ppm), N (240 ppm), Fe (10,62 ppm) plant nutrients and a very high content of Mg (413 ppm).

### **Material**

The materials used as green manure in the experiment were barley (cv. Hilal, ETAE), oats (cv. Sarı, ETAE) and fodder pea (cv. Ürünlü). Silage maize (DKC7240, Dekalb, Bayer), which is one of the species with the highest summer production in the region, was used as the main crop.

### **Method**

The land was prepared for planting in November 2021 for the application of 3 different green manures (barley, oats, fodder peas) before planting the main crop silage maize. Then, each plot size was 7x2.8 m (19.6 m<sup>2</sup>) and winter forage crops were planted with a row spacing of 20 cm. The experiment was sown in 3 replications with a sowing norm of 20 kg da<sup>-1</sup> barley, 20 kg da<sup>-1</sup> oats, 12 kg da<sup>-1</sup> fodder pea. The experiment was carried out according to the split plots experimental design in randomized blocks.

At the beginning of flowering in fodder pea, the plant applications evaluated for green manure purposes were buried in the soil by means of plot-type tractor-back rotatiller. After these applications, the soil was made ready for planting with surface tillage tools.

Silage maize sowing was carried out on May 16, 2022 with the help of a seeder (Gaspardo, Italy) with 70 cm between rows and 13 cm above rows. After sowing, the maize rows on top of the green manure were surrounded to represent the lower plot of green manure. No base fertilizer was applied to avoid any difference between treatments. Mineral fertilizer was not applied in order to avoid differences in soil nitrogen balance.

### **Characteristics examined in silage maize cultivation after green manure application**

SPAD Chlorophyll amount was measured with SPAD 502 Chlorophyll Meter (Konica Minolta Inc., Osaka, Japan) between 10.00-14.30 h under full sunlight in 3 different phenological periods (5-leaf stage, cob tying, milking stage) (Edwards, 2009) with emergence. For the measurement, 10 plants were randomly selected homogeneously in the plot and all leaves of each plant were measured and averaged (Jia et al. 2018). After weighing all plants except for 2 rows next to the plot and 1 m distance from the plot heads as a side effect in maize mowed at the beginning of the grain milking period, fresh forage yield per decare was calculated. Five plants taken homogeneously from each plot were shredded by SAM-400 Stalk-Chaff shredder



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

(ÖSA Makine, Sakarya, Türkiye), weighed and dried at 70 C for 48 hours in an oven at Mikrotest-MST (Ankara, Türkiye). After the dried samples were weighed, the hay yield was obtained by proportioning together with the fresh forage yield according to the percentage obtained. For plant height, stem diameter and number of leaves, 10 randomly selected plants from each plot were measured before harvest.

The data obtained from the experiment will be analyzed by one-way analysis of variance (ANOVA) and the comparison of means was done by means of LSD test ( $p < 0.05$ ) using "agricolae" package in R Studio program.

### 3. FINDINGS

According to the SPAD data obtained from the experiment, fodder pea green manure provided higher values in silage maize in all 3 phenological periods. Since fodder pea is a legume, it increased the presence of nitrogen in the soil, which showed its effect on silage maize from the early stages. While there was no statistical difference between wheatgrasses, it can be thought that they may have positive effects on the presence of organic matter in the soil. When the SPAD values obtained in all three phenological periods were examined, the SPAD values obtained in the 3rd period were observed with the highest values in all 3 green manures (Table 1.).

**Table 1.** SPAD Chlorophyll content of silage maize ad affected by green manures

<b>Green Manure</b>	<b>SPAD -1</b>	<b>SPAD -2</b>	<b>SPAD -3</b>	<b>Mean</b>
Fodder Pea	48.30	49.40	50.00	49.23
Oat	38.60	39.00	40.10	39.23
Barley	39.00	39.20	39.30	39.17
<b>Mean</b>	41.97	42.53	43.13	

Among the plant height values, fodder pea had the highest value with 242 cm. It was followed by oat green manure treatment with 217.6 cm. In stem diameter and number of leaves values, fodder pea had the highest value while there was no difference between wheatgrasses. Fodder pea was again prominent for wet herbage yield, which was 8432.1 kg da (Table 2.).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 2.** Agronomic features of silage maize ad affected by green manures

Green Manure	Plant height (cm)	Stem diameter (mm)	Number of leaves (plant <sup>-1</sup> )	Fresh Forage Yield (kg da <sup>-1</sup> )	Hay Yield (kg da <sup>-1</sup> )
Fodder Pea	242.0	21.23	16.3	8432.1	2325.3
Oat	217.6	19.54	14.7	7432.3	1890.2
Barley	212.3	19.23	14.6	7211.1	1867.2
<b>Mean</b>	223,9	20.00	15.2	7691.8	2027.5

Hay yield was the highest in fodder pea with 2325.3 kg da, similar to wet herbage yield (Table 2).

#### 4. CONCLUSION and RECOMMENDATIONS

With the increase in mineral fertilizer costs, organic fertilizer sources have a higher importance today and different types of sources are used for these purposes. In addition to sources such as animal manure and vermicompost, legume and wheat green manure, which have the potential to bind nitrogen to the soil and have many positive properties besides increasing the amount of soil organic matter, are used in the agricultural sector. In this experiment carried out in line with this information, annual legume and grass forage crops were used as green manure in order to increase crop diversity in agricultural lands with maize-maize or cotton-cotton production system. Among these manures, fodder pea had a higher effect on all parameters measured in the experiment. However, considering the fact that no mineral fertilizer was given in the experiment, it was concluded that especially the evaluation of wheat forage crops as green manure may have positive effects on the main product silage maize.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EARLY PERIOD FEATURES OF SILAGE SORGHUM AS AFFECTED BY DEFICIT IRRIGATION AND NITROGEN FERTILIZER

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#### ABSTRACT

Drought stress is a serious environmental factor that has significant effects on plant growth and agricultural productivity. Drought stress refers to the condition of water deficiency experienced by plants due to insufficient or irregular distribution of water resources. At the same time, the interaction of drought stress and some other applications brings about very different responses in plants. For this purpose, water deficit -nitrogen relationship was investigated in sorghum, which has high water use efficiency in summer months and has a reaction to nitrogen fertilization in Aydın ecological conditions where summer months are dry. The experiment was conducted in the summer of 2023 in a split-plot experimental design in randomised blocks. Sorghum (*Sorghum bicolor* L. (cv. Tonka)) was used as the experimental material. Sorghum was sown as a second crop at the end of June and 4 different limited irrigation (25%, 50%, 75%, 100% full irrigation) was applied by drip irrigation method. Pre-sowing fertilization was kept the same for all treatments. Three different nitrogen doses were applied as top dressing. Early seedling development characteristics were examined in sorghum growing in 2 different phenological periods before and after top dressing. In this respect, SPAD chlorophyll value, plant height, stem diameter and number of leaves were measured. According to the values obtained, no significant differences were detected in seedling development before top dressing. However, SPAD values decreased due to drought and nitrogen deficiency in the low-dose nitrogen application with 25% irrigation after top dressing. The highest nitrogen dose in 75% and 100% full irrigation had similar characteristics in terms of all parameters and had the highest values. The values obtained showed that the water deficit-mineral fertilizer interaction was also very important in early development.

**Keywords:** water deficit, early development, sorghum, SPAD, nitrogen fertilizer



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Sorghum, is a versatile and drought-resistant crop that has been cultivated for thousands of years. This hardy grain plant is native to Africa but has become a staple food source in many parts of the world. Sorghum is known for its ability to thrive in hot, arid regions where other crops might struggle. It's a critical crop for regions facing water scarcity and challenging growing conditions, as it requires significantly less water than maize. Sorghum is not only a source of food but also used for animal feed, biofuels. Its adaptability and resilience make it an essential crop in the face of changing climate patterns and increasing global food demand. With ongoing research and development, sorghum's importance is likely to grow, both as a food source and a sustainable option for farmers in diverse agricultural landscapes.

Sorghum, a summer forage crop, faces significant challenges when cultivated under deficit irrigation conditions. Deficit irrigation refers to a strategy where water resources are deliberately limited during the crop's growing season to maximize water use efficiency. While this approach can help conserve water resources, it poses specific challenges for sorghum production. Sorghum is highly sensitive to water stress, and even brief periods of inadequate moisture can lead to reduced yields and poor crop quality. Under deficit irrigation, sorghum plants often struggle to access sufficient water, which can result in stunted growth, lower grain production, and increased susceptibility to pests and diseases. Proper management, including careful timing and monitoring of irrigation, selection of drought-tolerant sorghum varieties, and soil moisture conservation techniques, is essential to minimize the negative impacts of deficit irrigation on sorghum production. Additionally, ongoing research and development efforts are focused on developing improved sorghum varieties with greater resilience to water stress, helping to ensure food security in regions where deficit irrigation is a necessity (Farre and Faci, 2006; Klocke et. al., 2012 ; Bhattarai et. al. 2020).

Nitrogen fertilization significantly influences both the yield and quality of the silage sorghum. Adequate nitrogen application can promote vigorous plant growth, resulting in higher biomass production and, consequently, greater silage yield (Hussein and Elva, 2014). Moreover, nitrogen contributes to the protein content of the forage, enhancing its nutritional value for livestock. However, it is essential to carefully manage nitrogen application to balance yield and quality, as excessive nitrogen can lead to decreased forage quality and potential environmental issues. Proper timing and dosage of nitrogen fertilization are key factors in optimizing silage sorghum production for livestock forage (Almondare et. al., 2009).



In line with this information, this study provides preliminary information on the cultivation of sorghum in summer cultivation in terms of water use efficiency.

## **2. MATERIAL and METHODS**

### **Field site characteristics**

The research will be conducted in the lands of Aydın Adnan Menderes University Faculty of Agriculture Research and Application Farm (37° 45' 43" N, 27° 45' 31" D, 28 m altitude) under the ecological conditions of Aydın province. The land where the research is located has loamy texture in terms of soil properties. The land is weak in terms of organic matter (1,10%) and alkaline (8,10%). The soil has a high content of P (35 ppm), K (320 ppm), Ca (3218 ppm), N (240 ppm), Fe (10,62 ppm) plant nutrients and a very high content of Mg (413 ppm).

### **Material**

In the experiment, Tonka variety of *Sorghum bicolor* x *Sorghum sudanense* cross was used as material.

### **Method**

The experiment was conducted in May 2023 with 3 replications with plots of 0.70x6 m. Two fertilizations were applied as base fertilizer and top fertilizer application. In the experiment, 3 nitrogen doses (8,12,16 kg/da N) were applied. Drip irrigation method was used for irrigation. Irrigation applied to the plots was calculated based on the cumulative evaporation amount from the class A evaporation container multiplied by different coefficients. 4 irrigation doses (100% Field Capacity, 75%, 50%, 25%) were determined, in which different levels of cumulative evaporation were applied.

Full irrigation (100%) water applied for 7 days as much as possible for the cumulative evaporation measured with a screened US Weather Bureau Class A pan located at the meteorological station near the experimental field. Deficit irrigations were established that irrigation water was applied deficit irrigation.

The equation given in was utilized to apply to the plots.

$$I = K_{pc} \cdot E_p \cdot P \cdot A$$

I = amount of irrigation water to be applied to the plot (L);  $K_{pc}$  = evaporation container coefficient 100%;  $E_p$  = cumulative evaporation amount (mm); P = Plant cover (%); and A = Plot area (m<sup>2</sup>) and drip irrigation method was used (Efetha et.al, 2011).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

SPAD Chlorophyll, plant height (cm), stem diameter (mm) were measured in 2 different periods after irrigation. SPAD Chlorophyll amount was measured with SPAD 502 Chlorophyll Meter (Konica Minolta Inc., Osaka, Japan) between 10.00-14.30 h under full sunlight in 2 different time with emergence.

The data obtained from the experiment will be analyzed by one-way analysis of variance (ANOVA) and the comparison of means was done by means of LSD test ( $p < 0.05$ ) using "agricolae" package in R Studio..

### 3. FINDINGS

When the early period data obtained from the experiment were examined, it was determined that the other irrigation doses had similar values except 25% irrigation in the first SPAD values. In terms of nitrogen doses, no difference was detected due to the early period of the experiment (Table 1.).

**Table 1.** SPAD chlorophyll measurements at 4-leaf stage in sorghum under restricted irrigation and different nitrogen doses

	SPAD 1			
	N1	N2	N3	MEAN
25%	41,20	41,40	41,60	41,40
50%	45,30	46,20	46,70	46,07
75%	46,10	46,40	47,30	46,60
100%	47,40	47,50	47,30	47,40
MEAN	45,00	45,38	45,73	

When the second SPAD measurements were analyzed, the difference between the irrigation regimes became clearer. While the values were high in fully irrigated plots, the values were low in 50% and 25% irrigation treatments. There were no statistically significant differences between the values in terms of nitrogen doses (Table 2.).

**Table 2.** SPAD chlorophyll measurements after top dressing in sorghum under restricted irrigation and different nitrogen doses

	SPAD 2			
	N1	N2	N3	MEAN
25%	32,10	34,20	36,40	34,23
50%	36,40	36,90	37,50	36,93
75%	48,20	48,30	49,00	48,50
100%	49,30	50,00	50,70	50,00
MEAN	41,50	42,35	43,40	

According to the plant height averages, no significant differences were detected in terms of irrigation and nitrogen treatments in the first measurement, while 100% and 75% irrigation treatments had the highest values in the second measurement. In terms of nitrogen doses, it was determined that the higher dose had higher plant height (Table 3.;4.).

**Table 3.** Plant height measurements at 4-leaf stage of sorghum under restricted irrigation and different nitrogen doses

	Plant Height 1			
	N1	N2	N3	MEAN
25%	41,20	41,10	41,30	41,20
50%	41,30	41,40	42,00	41,57
75%	42,40	43,00	43,00	42,80
100%	43,20	43,50	44,60	43,77
MEAN	42,03	42,25	42,73	

**Table 4.** Plant height measurements of sorghum under restricted irrigation and different nitrogen doses after top dressing

	Plant height 2			
	N1	N2	N3	MEAN
25%	65,00	64,30	66,00	65,10
50%	69,00	68,40	70,00	69,13
75%	80,00	81,40	83,80	81,73
100%	81,50	82,00	84,50	82,67
MEAN	73,88	74,03	76,08	

According to the stem diameter averages, there was no statistical difference in terms of irrigation and nitrogen treatments in the first measurement, but in the second measurement, it was observed that 100% and 75% irrigation treatments had higher values. Similar to the first measurement, there was no significant difference in terms of nitrogen doses (Table 5.;6.).

**Table 5.** Stem diameter measurements taken at 4-leaf stage of sorghum under restricted irrigation and different nitrogen doses

	Stem Diameter 1			
	N1	N2	N3	MEAN
25%	13,20	13,30	13,00	13,17
50%	13,40	14,30	14,40	14,03
75%	14,30	14,20	14,50	14,33
100%	14,50	14,30	14,60	14,47
MEAN	13,85	14,03	14,13	





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 6.** Stem diameter measurements of sorghum under restricted irrigation and different nitrogen doses after top dressing

	Stem Diameter 2			
	N1	N2	N3	MEAN
25%	18,90	19,20	19,20	19,10
50%	21,00	21,30	21,40	21,23
75%	24,00	24,50	24,60	24,37
100%	24,30	24,60	24,80	24,57
MEAN	22,05	22,40	22,50	

#### 4. CONCLUSION and RECOMMENDATIONS

In today's world where water use is very important, economical production is indispensable in summer crops. Sorghum is a species that has a higher yield potential with less irrigation compared to corn grown in the same period. Likewise, the increase in the cost of nitrogen fertilization and the increasing inefficiency of our soils have brought about the search for certain ways of reducing nitrogen fertilization. In this study, the effects of limited irrigation and nitrogen doses on the early development of sorghum were investigated. The results obtained indicated that irrigation is necessary despite the early stage. However, it was observed that irrigation of 50% and higher irrigation rate showed clearer results after top dressing. Long-term examination of all aspects of the study will provide clear results in terms of yield and quality..



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DOĞAL ÇEVREDE İŞARET OLARAK HEYKEL

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#### ÖZET

Sanat ve toplum arasındaki ilişkiye odaklanan sanatçılar, sanatın doğası gereği mekânla bağlantılı olan heykel yaratım süreçlerini, tarihi çevre ile doğal çevre arasındaki ilişkilere bağlı olarak heykelin fiziksel ve sosyal çağrışımlarını ele alarak işaret dili oluşturmaktadırlar. Bu nedenle, heykel sanatçılarının çalışmalarında mekânlar merkezi bir rol üstlenmektedirler; çünkü mekânlar olmadan heykeller var olamaz. Heykeller bir mekânın yakından gözlemlenmesine olanak sağlayarak, onunla etkileşime giren, onun özelliklerini vurgulayan ve alışla gelmiş algısını değiştiren, böylece sorular uyandıran ve olası yanıtlar sunan bir işaret dilidir. Bir ortamın okunmasında heykeller estetik prensibin dilini içermektedir. Tarihi çevre ve doğal çevre ile uyumlu heykeller, ortamın ziyaretçilerine gördükleri şey üzerinden bir derin düşünme aracı olarak yaklaşmalarına olanak sağlayarak, heykele aktif olarak katılım sağlayıp onunla bağ kurmaya teşvik etmektedir. Bu bakımdan heykeller doğal çevre ile izleyici arasında verimli bir diyalogun başlangıcına da işaret ederek mekânın işaretlenmesinde önemli rol üstlenirler. Tarihi çevreler toplumu içinde barındıran sosyal, kültürel ve ekonomik yapısını, yaşam biçimini yansıtarak doğa ve insan ilişkilerini yansıtan büyük bir birikimin ifadesidir. Doğal çevre, bütün canlılar ile varlığını bildiğimiz, gözle göremediğimiz, yaşamı oluşturan, yaşama sisteminin oluşturduğu etkileşimi ve iletişimi oluşturan biyolojik, fiziki, kimyasal ekonomik sosyal ve kültürel yapıyı oluşturmaktadır. Bu çalışmada, heykel sanatının olanaklarının estetik değerler içerisinde mekânın işaretlenmesindeki rolü ele alınmaktadır. Mekânın işaretlenmesinde toplumun kültürü içinde var olan bir olayın mekânı ile değerlendirilmesinde yapılan heykellere yer verilmiştir. Doğal çevre de yapılan heykeller çevrenin bilinirliğine katkı sağlayarak o yere işaret ederek yerin yeniden mekânlaştırılmasına katkı sağlamaktadırlar. Çalışmada yapılan araştırmanın içeriğini doğal çevre içerisinde mekâna işaret eden heykellere yer verilmiş aynı zamanda doğal çevrede yapılan heykellerin bir işaret dili oluşturmadaki rolüne değinilmiştir.

**Anahtar Kelimeler:** Mekân, Doğal çevre, Heykel



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SCULPTURE AS A SIGN IN THE NATURAL ENVIRONMENT

#### ABSTRACT

Focusing on the relationship between art and society, artists create sign language by addressing the processes of sculpture creation, which are inherently linked to space, and the physical and social connotations of sculpture depending on the relationships between the historical environment and the natural environment. For this reason, spaces play a central role in the works of sculpture artists; Because sculptures cannot exist without spaces. Sculptures are a sign language that allows close observation of a space, interacting with it, emphasizing its features and changing its usual perception, thus raising questions and offering possible answers. Sculptures contain the language of the aesthetic principle in reading a medium. Sculptures that are compatible with the historical and natural environment encourage visitors to actively participate in the sculpture and establish a bond with it, allowing them to approach what they see as a tool for deep reflection. The natural environment constitutes the biological, physical, chemical, economic, social and cultural structure that creates life and the interaction and communication created by the living system, the existence of which we know and cannot see with the naked eye, with all living things. In this study, the role of the possibilities of sculpture art in marking space within aesthetic values is discussed. In marking the place, sculptures made to evaluate the location of an event that exists within the culture of the society are included. Sculptures made in the natural environment contribute to the re-spatialization of the place by contributing to the awareness of the environment and pointing to that place. In the study, the content of the research was included in the sculptures that point to the place in the natural environment, and at the same time, the role of the sculptures in the natural environment in creating a sign language was mentioned.

**Keywords:** Space, Natural environment, Sculpture



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1.GİRİŞ

Doğal çevreyi heykele mekân olarak seçen sanatçılar, toprak, taş, ağaç, buz, su, kar gibi heykele malzeme olabilecek her tür nesneyi ifade aracı olarak kullanmışlardır. Heykelin fiziksel ve sosyal çağrışımlarını dikkate alarak doğal çevrede izleyiciye mesaj veren heykel uygulamaları yapmışlardır. Heykeller, kent ve yaşam alanlarında hayata ve mekâna özel anlamlar katan estetik öğelerdir. Uzun yıllar boyunca özellikle anıtsal heykeller mimari bir yapının parçası olarak ya da mimari alanın içinde konumlanan ve mimari tasarımın kurgusunda anlamlaşan sanatsal nesne olmuştur. 18. Yüzyıldan sonra günümüze kadar hızlı bir değişim süreci ile birlikte özerkleşen heykel, sanatçı-mekân ve sanat ilişkisinde, anıtsal heykelin biçimi ve uygulanması anlamında değişim geçirmiş yaratıcılıklarını çevresel ve kültürel gibi konulara yönelterek, kentsel mekânlardaki yapıtlarla görünür olmuşlardır (Kaya, & Bulat, M. 2022). Doğal çevrede yapılan sanat, arazi sanatı, doğa sanatı kavramları iç içe geçmiş kullanılan materyaller ve yöntemler ile farklılıklar gösterebilmektedir. Sanat malzemesi olarak, galeri içine alınamayacak kadar büyük ya da satılamayacak bir nesne olan yeryüzünün kullanılmasının temel amacı, sanatın metalaştırılmasından, sanatçının zihinsel süreçlerinin değersiz kılınmasından ve sanatçının sömürülmesinden uzaklaşmaktır (Atakan, 2015). Doğal ortamda yapılan sanat Land art (arazi sanatı) disiplinler arası sanatı ortadan kaldırmıştır. 1960'lı yıllarda kuş uçmaz kervan geçmez geniş arazilerde hayata geçirilen yerleştirme temelli çeşitli sanat projeleri, sanatın geleneksel temellerinden biri olan manzaranın tanımını büyük ölçüde genişletmiştir. Sanatçılar yüz yıllar boyunca doğayı yansıtan görünümleri resim ve heykel gibi alışla gelmiş mezzarlar içinde sunarken, 1960'lardan sonra manzara gerçek bir mekâna dönüşerek arazi sanatçılarının müdahalesine uğramaya başlamıştır (Antmen, 2009). Doğal ortamın sunmuş olduğu malzemeler ile yapılan düzenlemeler dâhil, mimari, heykel, resim, video sanatı, performans, happeningler doğal ortamda yapılan sanatlardır. Mimari ve heykelde, doğal malzemeler kalıcı olarak değerlendirilirken performans dayalı süreç sanatları, sanat yaratımı ile video sanatı kayıt altına alınarak yapılmaktadır. Doğa ile bütünleşerek sanat üretimlerini yapan sanatçılar, kırsal alanları başıboş arazileri, çölleri, akarsu kenarlarını, terk edilmiş sanayi alanlarını yapıtlarına sergileme mekânı olarak tanımlamışlardır. Çevresel sanat çalışmalarında sanatçı müdahaleleri ile zamanla geçecek, doğal yaşamın döngüsüne uzun süreli etki etmeyen kalıcı izler bırakmayan yeryüzü şekilleri doğal çevre içerisinde bir işaret olarak tercih edilmektedir. Doğal çevrenin sanat çalışmalarına mekân olarak seçilmesi ile sanat eseri, yaşamın, doğanın kendisidir. Mekânın öznel öğeler ile olan ilişkisi ise, mekâna öznel öğeler





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

aracılığı ile yüklenen anlamlar ile oluşmaktadır. Daha açık bir deyişle mekânın öznel öğeleri, insanın o mekânı algılaması sırasında ya da bu algılama sonucunda o mekâna kattığı özellikler, nitelikler, duygu-düşünce ve değer yargıları gibi ölçülemez değerlerdir. Heykeller özgün belirleyici özellikleri ile alan-da gerçekleşen etkinlikler ve elde edilen diğer deneyimler ya da algılarla birlikte mekâna ve kente ilişkin bireysel ve/veya toplumsal imgeler oluştururlar (Kurtaslan, 2005). Mekân bu yönüyle insanı sadece maddi varlığı ile içinde barındıran bir yer değil aynı zamanda onun duygu-düşünce ve değer yargılarıyla anlam kazanan bir olgudur (Karaarslan, 2005). Bu alanda gelişen sanat yapıtları değişerek dönüşerek zamanla yok olur. Bu tür sanatsal üretimler daha önceden planlanarak tasarlanarak zihinsel süreçlerin sonucu olduğu gibi aynı zamanda arazi koşullarına bağlı olarak arazinin yapısı göz önüne alınarak yapılan çalışmaları içermektedir. Doğal çevrenin heykel sanatı ile sanatsal pratiklere mekân olması doğal çevrenin işaretlenmesi, sanatın estetik değerleri ile meydana gelmektedir. Sanatsal üretimlerde hem konu hem de malzeme olarak yeni söylem alanına kavuşan doğa kavramı, farklı disiplinlerden birçok sanatçı tarafından sanatın konusu ve malzemesi olarak kullanılmış ve değerlendirilmiştir (Duydu, 2022).

Heykel, mekân içinde üç boyutlu estetik biçimli kompozisyonlar yaratmayı amaçlayan görsel bir sanat dalıdır. Değişik açılardan bakıldığında alıcıya farklı görünüm vermektedir. Mekân biçim-form etkileşiminin sanatsal kaygılar ile bir araya getirilmesidir ( Bulat, S & Bulat, M, 2014). Çevresel heykel çalışmalarında mekâna işaret eden heykel uygulamalarına toplumun kültürü de dâhil olabilmektedir. Toplumu ilgilendiren, uzun yıllar acısı süren unutulmayan doğal olaylar, tarihi olaylar çevresel sanat içerisinde değerlendirilerek sanatın anlatım dili ile toplum arasında bir bağ oluşturulmaktadır. Doğal çevrede yapılan heykel uygulamaları, o yerin bilinirliğine katkı sunarak o yere işaret ederek o çevrenin bilinirliğinin ötesinde yeniden mekanlaştırılmasına katkı sağlamaktadır.

### 2. MATERYAL ve YÖNTEM

Konuya ilişkin araştırması yapılan sanatçıların gerçekleştirmiş oldukları sanat yapıtlarının görsel dokümanları ve eser metinlerinin incelenmesi çalışmanın materyalini, oluşturmuştur. Nitel araştırma yöntemi kullanılmış, araştırmanın kavramsal çerçevesinin oluşturulmasında, dergi, kitap, makale, internet kaynakları kullanılmıştır.

### 3. BULGULAR

Coğrafi konum ve zamanın etken olduğu doğa sanatında, sanatçılar doğal çevrede farklı malzemeler ile yapıtlarını mekâna özgü gerçekleştirmişlerdir. Doğayı sanat eserlerinin yaşam



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

bulduğu mekân olarak tercih etmişlerdir. Doğaya zarar vermeden doğa ile birlikte yapıtlarını barışçıl ve organik yaklaşımlar ile yapmışlardır. Sanatçı yaklaşımlarının doğal çevre ve o yere mekâna işaret eden sanat yapıtlarının varlığı tespit edilmiştir.

### 4. Doğal Çevrede Mekâna İşaret Eden Sanat Uygulamaları

Doğal çevrede yapılan sanat çalışmaları doğada iz bırakmaya yönelik mekâna işaret eden ilkel bir eylem olarak binlerce yıldır sürmektedir. Mekân kavramı, evrende insan eliyle sınırları belirlenmiş evrenin parçası olarak tanımlayabiliriz. Sanatsal eylemlerin meydana geldiği mekân ise fiziksel bir alanı oluşturmaktadır (Karaarslan, 2005). Doğal çevrede ki heykel uygulamaları ile doğanın işleyişi içerisinde mekâna özgü heykelleri ve arazi sanatı ile sanat yapıtlarını meydana getiren İngiliz sanatçı Andy Goldsworthy 1956 yılında doğmuştur. Sanatçı heykel ve fotoğraf sanatçısı olarak İskoçya'da bir köyde yaşamaktadır. Sanatçının çocukluğu çiftliklerde çalışarak geçmiştir. Sanatçı tarım ile uğraşmayı heykeltıraşlığa benzetmektedir. Sanatçı geçmiş yaşantısını referans olarak hatıratları üzerinden çalışmalarını yapmaktadır. Goldsworthy, gençliğinin çoğunu tarım sektöründe işçi olarak geçirmiştir, bu, yalnızca malzeme seçimini etkilemekle kalmamış, aynı zamanda sanatsal pratiğinde çevreye odaklanmanın temelini de oluşturmuştur. Heykelleri büyük ölçüde, ahşap, taş, yaprak ve ince dallar gibi yakın çevreden gelen bir dizi doğal ve kalıcı malzemeyi kullanarak yapmaktadır (Lala,2017). Geçmişinin tanımlanması üzerine yaptığı çalışmaları mekân ile ilişkilidir. Yapıtları ile mekân ilişkilendirilerek hatıra kalıcı hale gelmektedir. Hatıranın inşa edildiği mekân, koşullar ve görsel referanslar o hatırayı kalıcı hale getiren unsurlar olarak tanımını kolaylaştırmaktadır (Daşkesen,2023). Andy Goldsworthy; doğanın işleyişine bağlı kalarak doğadan kopmayarak onun yönlendirmelerine uyum sağlamaktadır. Sanatçı iklim koşullarına bağlı olarak eserlerini meydana getirmektedir. Mekânın el verdiği koşullar dâhilinde eserlerini yapmaktadır. Doğal taşlar, buzlar yapraklar, kar, yosun gibi doğal malzemeleri eserlerine aracı olan kullanmaktadır. Sanatçı ilgilendiği formları, taş, buz, kar ağaç dalları ile yapmaktadır. Farklı malzemeler ile yapmış olduğu deneyimlerine coğrafi konum ve zaman en büyük etkendir (Goldsworthy, 2023). Coğrafi konum ve zamanın etken olduğu arazi sanatı, doğada geniş alanlarda mekâna özgü olarak gerçekleşmektedir (Antmen 2009, 253).

Arazi Sanatı akımının izinden giden doğa sanatçısı Andy Goldsworthy, hem doğal hem de kentsel ortamlarda buldukları yere özgü heykeller üretmektedir. Eşsiz güzellikte sanat eserleri yaratmak için doğayı tuvali olarak kullandığından, sanat eserleri sonuçta dünyanın

kırılganlığını sorgular niteliktedir. Goldsworthy'nin sanata yaklaşımı, yaratımlarının doğayla birlikte var olması gerektiği yönündedir ve bu barışçıl ve organik yaklaşımı eserlerinde de açıkça görülmektedir. Doğayı galeri gibi yapay mekânlarda bulunan bir şey olarak değil, sanat eserlerinin hayat bulduğu dış dünyanın تنها bölgelerine uzanan bir şey olarak görmektedir. Sanatçı çalışmaları ile insan ve doğa arasında gerçekte hiçbir sınırın bulunmadığını göstermektedir (Mayer,2021). İngiltere de, çobanların ve tarımla uğraşanların “cumhuriyeti “ olarak tanımlanan Cumbria'da yüzlerce koyun ağılı, yıkamak, kırmak ve işaretlemek için koyunları barındırmaktadır. Goldsworthy'nin 1996 yılında başlayan projesi, harap ağılları alıp onları restore ederek ağılların içerisine heykel yerleştirmiştir (Görsel 1). Sanatına mekan olarak seçtiği koyun ağılları onun çocukluğunun geçmişine işaret etmektedir. Doğal çevrede mekâna işaret eden çalışmaları iz niteliğindedir. Sanatçının çalışma süreçleri insan ve doğa ilişkilerine yöneliktir. Ham bir tual olarak değerlendirdiği doğayı heykellerine mekân olarak seçerek doğal bir kaide olarak sunmaktadır. Goldsworthy, "koyun ağıllarının izleyici kitlesi, her zaman oradan geçen ve orayı kullanan ya da tesadüfen oraya gelen kişilerdir" demektedir. Çalışmalarını insanların kulaktan kulağa duyarak ziyaret etmelerini istemektedir (Goldsworthy, 2023).



**Görsel 1.** Andy Goldsworthy, Koyun ağılları, 1996

Andy Goldsworthy Koyun ağıllarının, tarımın bir anıtı olarak görülmesini istemektedir. Cumbria'da yüzlerce koyun ağılı vardır; bunların çoğu uzun zaman önce, çiftçilerin yaya olarak çobanlık yaptığı ve koyunlarını bozkırların üzerinde veya yakınında topladığı zaman inşa edilmiş terk edilmiş harabelerdir (Görsel 2). Ağıllar koyunların sağlığını kontrol etmek,



toynaklarını kesmek, yaraları sarmak, parazitleri tedavi etmek ve yıkamak, kırpmak ve işaretlemek için kullanılmıştır. Harap olmuş ağıllar birçok insan için özel ve romantik çekiciliğe sahip olmuştur, ancak aynı zamanda koyun çiftçiliğiyle eşanlamlı olan bir ilçede çağrıştırmalı bir sembolizmi de temsil etmektedirler (Goldsworthy, 2023). Bir insanın kendi geçmişiyle ilgili bir anıyı hatırlaması gerektiğinde aynı anıya dair ipuçlarını barındıran diğer insanların anılarına başvurması gerekmektedir. Bu şekilde kendi belleğinde var olanla birlikte toplum tarafından onanmış referans noktalarına başvurmaktadır (Daşkesen, 2023).



**Görsel 2.** Andy Goldsworthy, Koyun ağılları, Koni,1996



**Görsel 3.** Andy Goldsworthy, Yıkama Kıvrımları, Dub taşı 1996-2009

Sanatçının yıkama kıvrımları, 'Dub taş' heykeli, Melmerby köyünün içinden geçen küçük derenin yanında yer alan ağılın yanındadır. Koyunların yapağlarını yıkamak için atıldığı havuz olan çamaşır ağının dubasına taş bir heykel yerleştirmiştir (Görsel 3). Sanatçının görüşü; Bu havuz kıvrımın hareketinin ve enerjisinin odak noktasıdır. Koyunların itildiği yer orası. Koyunların daldığı yere taş heykel konulacağı düşüncesi hoşuma gitti. Heykel, gözü taşlara ve havuza yönlendirecek şekilde kumtaşına oyulmuş, alçalan dairesel deliklerden oluşuyor. Heykelin uzun süre görünür kalmasını beklemiyorum. Yakında çamurla kaplanıp yok olacak. Bu da beni ilgilendiriyor özellikle o çamaşırhanede ve havuzda yaşananların anısı bağlamında. Burada aynı zamanda bir anıya dönüşecek bir şey yapıyorum ama o da tamamen kaybolmuş değil, çünkü her zaman temizlenip yeniden keşfedilebilir. Bu yeniden keşfetme ve yeniden görme fikrinin, bizim göremediğimiz bir şeyin orada olduğunu bilmenin, geçmişimizle ve onu somutlaştıran yerlerle olan ilişkimizin çok şiirsel bir ifadesi olduğunu düşünüyorum (Goldsworthy, 2023). Sanatçının geçmiş ile kurduğu bağ, mekân, kavram ve yapıt üzerinden yeniden bir temsiliyet kazanmıştır. Kavram ve yapıt arasında bir bütünlük kurulurken çağrışımlar ve referanslar toplumun anıları üzerine kurulmuştur. (Daşkesen,2023).



**Görsel 4.** Andy Goldsworthy, Pin Katlama Konileri, 1980

Sanatçının iz i niteliğinde olan taş konileri çalışmalarında en çok tekrarlanan ve seyahat edilen formlardan biri haline gelmiştir. Dünya çapındaki yolculuklarının kişisel bir işaretidir. Doğada ve çevresinde gördüğü formlardan etkilenmiştir. Kendi iç dünyasının referansları ile taklidin ötesine geçerek formlara kendi tavrı ile yaklaşarak yeniden keşif ederek formları ve nesnelere derecelendirmektedir (Görsel 4). Değer çağrışımlarında istenilen değeri göremeden saf dışı kalan nesne, bir bakıma keşfedilmemiş bir nesne olur ve kültürlerin genel estetikleşmesi sürecinde formların kuvvetini ve dolaysızlığını kısmen geri kazanır (Taşar&Bulat,2021).



Sanatçı form üretirken doğada veya çevresinde gördüğü nesnelere etkilenebilir fakat onu birebir taklit etmeyi tercih etmez. Onu bir sanat nesnesine dönüştürmek için çalışır. Sanatçı zihninde canlandırdığı doğadan bir biçimi kendi iç dünyasında yeniden yorumlayarak şekillendirebilir. Bu onun üslubu olarak ortaya çıkmış öznel tavrıdır. (Kaya & Bulat, 2022). Ancak sanatçı için muhtemelen seyahat etmekten daha önemli olan başka bir yolculuk daha var ki o da formun kendisine yapılan yolculuk ve keşiftir. Tekrar gibi görünen şey aslında formun içerdiği zenginlik ve çeşitlilik konusunda derinleşen bir farkındalıktır. Bazen farklılıklar ancak tekrarlarla görülüp anlaşılabilir. Her koni ile yeni bir şey öğreniyorum. Öğrenmeyi bıraktığımda onları yapmayı da bırakacağım demiştir (Goldsworthy, 2023).

Goldsworthy'nin çalışmalarının çoğu daha az kalıcıdır; kalıcı yapılara uygun olmayan yerlerde genellikle buzda, yapraklarda ve çubuklarda çalışmaktadır. Sanattaki bu tür geçicilik çoğu zaman tuhaf görünebilir, ancak Goldsworthy'nin yorumları onun geçici olanla güzel olduğu için değil, doğayla işbirliğine açılan bir pencere olduğu için ilgilendiğini göstermektedir.



**Görsel 5.** Andy Goldsworthy, *Kuzeye Dokunmak*, 1989, Kuzey Kutbu

1989'da Andy Goldsworthy, Dünya Gezegeni'nin en uzak yerlerinden biri olan Kuzey Kutbu'nda dört devasa kar halkası yapmıştır. Bu geçici heykeller Kuzey Kutbu'nun konumunu işaret etmektedir. Dört heykelin herhangi birinde yön her zaman güneydir. Doğal ortamda yapılan heykel çalışmasını inşa ederken kar kesme ve birleştirme yöntemini geleneksel bir yerli kaynaktan, Eskimo yerlisinden öğrenmiştir (Görsel 5). Goldsworthy yarattıklarından "geçici eserler" olarak söz etmektedir. "Geçici bir çalışma yaptığımda, bittiğinde bu bir bakıma bittiği



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

andır" demiştir. Goldsworthy daha dayanıklı malzemelerle de çalışmış olsa da, geçici malzemelerin kullanılmasının içinde yaşadığımız dünyanın bir yansıması olduğunu söylemektedir. Onun malzemeleri şöyle diyor: "Yerden ham olarak geliyor ve bu nedenle tüm düzensizliklere ve tuhafliklara sahip." Ancak Goldsworthy'nin geçici yaratımları tamamlandığında izleyicilerin gözünden tamamen kaybolmamaktadır. Sanatçının heykel uygulamaları doğayla birlik duygusunun taş beyanları ve evrendeki yerlerinin doğrulanması üzerindedir.

Çalışmaları ile yaşam ve sonsuzluk duyguna işaret ederken unutulmuş gibi görünen sonsuz antik bir bilgeliği özetlemektedir. Andy Goldsworthy, birlikte çalıştığı nesneyi, doğanın kendisini anlamak ve ideal olarak izleyiciyi de onu daha iyi anlamaya çekmek istemektedir. Goldsworthy, çalışma şekliyle doğayı sanatçı mertebesine yükselterek ona hak ettiği saygıyı vermektedir. (Trimborn, 2023). Sanat olarak şekillenen yeni pratikler, resim ve heykel anlayışının sınırlarını kıran, eylemlere ve yeni bir bilgi türüne dönüşmüştür (Susamoğlu,2018). Benzer amaçlara sahip, mekâna özgü sanat eseri üretimi yapan bir diğer sanatçı ise İngiltere'de yaşayan ve uluslararası alanda çalışan, çevre sanatçısı olan Steve Messam'dır. Messam'ın çalışmaları, sıklıkla arazinin mevcut kullanımlarından yararlanarak ve hali hazırda manzarayı şekillendirmek için kullanılan jeolojik, kültürel, tarihi ve tarımsal uygulamalara ilişkin bir anlayışı yansıtarak, kırsal çevredeki anlatı katmanlarını keşfetmeyi ve ortaya çıkarmayı amaçlamaktadır. Arazi sanatı doğayı görünür kılan doğaya dair bilinç uyandırmayı amaçlayan, teknoloji karşısında doğayı kutsayan bir yaklaşımın ürünüdür (Antmen 2009). Çiftçilerle çalışmaktan yerel mimariyi yeniden hayal etmeye kadar, geçici, mekâna özel sanat düzenlemeleri ile gizli hikâyeleri açığa çıkararak, mekânın daha derin anlaşılmasına yardımcı olmaktadır. Sanat nesnelere sanatçının sezgi ve sanatsal kaygılarının sonucu olarak biçimlenirler. Heykel sanatçısının düşünce iletisi heykelidir. İletisini aktarırken gerçek dünyanın yanında kendi hayal gücünü kullanarak yeni biçim ve formlar elde edebilir. (Yağmur, 2017: 438-441).

Sanatçının Paper Bridge, isimli çalışması, Lake District'teki bir dere üzerinde, tamamen yerel olarak yapılmış parlak kırmızı kâğıttan inşa edilmiş, ağırlık taşıyan bir köprüdür. Köprü'nün kaynak noktası ilçede daha önce kullanılan kemerli köprülerdir. Bir arada tutacak yapıştırıcı veya cıvata bulunmayan Paper Bridge, kuru taş duvarlarda ve ilçenin orijinal yük atı köprülerinde kullanılan prensiplerin aynısına dayanmaktadır.



**Görsel 6.** Steve Messam, Kâğıt Köprüsü, 2015

Paper Bridge Göller Bölgesi'nin manzarası içinde ve bununla ilgili olarak yapılmış geçici bir sanat eseridir (Görsel 6). Estetik düzeyde yapıt, geniş arazide, odak noktası görevi görmektedir. Parlak kırmızı renk dikkat çekerek doğal çevreye müdahale ederken aynı zamanda yeşil fon ve su akışıyla kompozisyon dengesi oluşturmaktadır. Göller Bölgesi, peyzaj ve estetik algısı açısından uzun ve önemli bir geçmişe sahiptir. Paper Bridge, devam eden ve gelişen mirasının bir parçası olarak görülmektedir. Çalışma sahaya özeldir; tam olarak o nokta için yapılmış bir eserdir. Paper Bridge, özel olarak üretilen kâğıttan yapılmıştır. Cumria'da renkli kâğıt üreten fabrikaların bulunduğu bir merkezdir. Bu eser aynı zamanda Cumbria'da gerçekleştirilen birinci sınıf renkli kâğıt üretiminin kutlanmasının bir sembolü olarak yapılmıştır. Kısacası Paper Bridge Cumbria dışında başka bir yerde gerçekleşemezdi. Kâğıt, odun hamuru ve sudan yapılan basit bir malzemedir. Malzemelerin doğal çevreyle bir uyumu vardır. Paper Bridge'de kullanılan tüm kâğıtlar geri kazanılacak ve geri dönüşüm - yeniden kâğıt hamuru haline getirilip yeni kâğıt haline getirilmek üzere üretim fabrikasına iade edilmiştir. Bu şeffaf döngü, eserin genel çevresel anlatımının bir parçasıdır ( Messam, 2014 ).



**Görsel 7.** Steve Messam, Harabelerin Mimarı, 2021



County Durham'da yaşayan sanatçı Steve Messam, gereksiz ve yıkık binaların, peyzajın tarihindeki ve mekânın karakterindeki rollerini aydınlatmak için geçici Projeler yapmıştır. 2.dünya savaşından kalma bir dizi harap yapıyı, geçici olarak fantastik ve görsel simge yapılarla dönüştürmüştür. Projede, sıklıkla gözden kaçan bu yapıları vurgulayarak, madencilik ve tarımdan demiryollarının dönüştürücü etkisine ve arazi sahiplerinin rolüne kadar arazinin öyküsünü oluşturan anlatı katmanlarını ortaya çıkarmayı amaçlamıştır. Sanatçıların çevreyle ilgili ve kültürel restorasyonla da ilgilendikleri için metinleri, fotoğrafları çeşitli bilimsel raporları kirlenmiş ve hasar görmüş alanlara insanların dikkatini çekmek ve o alanları yeniden kazanmak için kullanmışlardır (Mamur,2017). Benzersiz tekstil formları ile kırılğan binaları doldurmuş veya sarmıştır. Onları yeni şekillerde hayal eden form ve renk katmıştır. Tekstil kullanımı, binanın yapısına sabitlenmeye veya herhangi bir şekilde zarar verilmeye gerek kalmadan, önemli formların oluşturulmasına olanak sağlamıştır (Görsel 7). Harabelerin Mimarı, Messam, mekâna özel formlarla çektiği, devasa boyutlardaki ve reklam panolarında sergilenen, fotoğraflardan oluşan bir sergi de yapmıştır.



**Görsel 8.** Steve Messam, Harabelerin Mimarı, 2021

2.Dünya Savaşı koruganlarından (mevzi) harap ahırlara, gereksiz demiryolu köprülerine ve ağır sanayi kalıntılarına kadar, bu yapıların çoğu, ya kaldırılmaları çok zor olduğu için ya da ilk inşa edildiklerinden bu yana çok sayıda kullanımları olduğu için varlığını sürdürmektedir. Ancak hepsi peyzajın kullanımına ilişkin bir hikâye anlatmaktadır. 'Harabelerin Mimarı' Herbert Rosendorfer'in modern klasik bir Alman romanıdır. Burada, ana karakteri yerin derinliklerine yönlendiren, hikâyeler parçalar halinde anlatılırken giderek aşağıya doğru ilerleyen bir

'Harabelerin Mimarı'nı hayal ediyor. Dibe ulaştıktan sonra yolculuk tekrar yukarıya doğru çıkıyor, hikâyeler çözülüyor ve daha geniş resim ortaya çıkıyor. Proje, arazideki bir dizi harap yapıyı geçici olarak fantastik çılgınlıklara ve görsel simge yapıları dönüştürmeyi amaçlamaktadır. Proje, sıklıkla gözden kaçan bu yapıları vurgulayarak, peyzajın öyküsünü oluşturan anlatı katmanlarını ortaya çıkarmaktadır (Görsel 8).



**Görsel 9.** Steve Messam, İzlendi 2019

'İzlendi', Alman İkinci Dünya Savaşı, 'Atlantik Duvarı' tahkimatlarının bir parçası olan üç beton sığınma kalıntılarını dolduran ve bunları geçici olarak mimari anormallikler olarak sanat eserlerine dönüştürülerek sanat yapıtı üzerinden yeniden değerlendirmeye yönelik bir çalışmadır (Görsel 9).



**Görsel 10.** Steve Messam, Sus, 2019

Sanatçının ' Sus', isimli çalışması, İngiltere'nin Durham İlçesi'ndeki Kuzey Pennines'in Olağanüstü Doğal Güzellik Bölgesi'nin uzak arazisinde geçici bir sanat düzenlemesidir. 370 m uzunluğunda, 50 m genişliğinde ve en yüksek noktası 45 m olan 'Sus', Tate Modern'deki geniş Turbine Hall'un gölgesinde kalır ve neredeyse dört futbol sahası uzunluğundadır. Sanat eserini



yapmak için 5 kilometreden fazla kumaş kullanılmıştır. Dinamik sanat eseri, 18. yüzyılda bu bölgede araziden maden çıkarılmıştır. 'Sus' bu etkileyici özelliğe dikkat çekmeyi ve peyzajın ne kadarının insanın doğayla etkileşiminden oluştuğunu göstermeyi amaçlamaktadır (Görsel 10). Bölge aynı zamanda yabani kuşların yuvalanma, barınma alanıdır. Kullanılan tüm malzemeler daha sonra tekrar hammaddeye dönüştürülmüştür. Kullanılan tüm donanımlar, peyzaj üzerinde kalıcı bir etki bırakmayacak şekilde tasarlanmış, doğaya zarar verilmemiştir. (Messem, 2019).



**Görsel 11.** Steve Messam, Giyinmiş, 2009

Giyinmiş, on sekizinci yüzyıldan kalma, kanal kenarındaki bir kır evi, orijinal ahşap çerçeve desenini yeniden yaratacak şekilde 300 yerel koyunun yapağıyla kaplanmıştır. Sanatçının çalışması Newtown kasabasını oluşturan iki koyun ırkının siyah ve beyazıyla ayırt edici, siyah beyaz ahşap çerçeve desenini bir araya getirmiştir. Newtown yün endüstrisi üzerine inşa edilmiştir ve hala Wool Board'un Galler deposuna ev sahipliği yapmaktadır; Galler'deki her yapağı Newtown'dan geçer. Koyunlar yalnızca çevredeki tepelerdeki yün pazarı için yetiştirilmektedir. Mizaçları ve davranışları çelik tepelere ve sert kışlara uygun, yünleri yumuşak ve tekdüze renktedir. Yapı Doğu Montgomeryshire'in ahşap çerçeveli mimarisi yerel mimarinin bir sonucudur; bölge iyi düz meşe ağaçlarının kaynağıdır. Yüzyıllar boyunca desenler bir statü sembolü haline gelerek ve daha karmaşık desenler gelişmiştir. Desenler, demiryollarının tuğla ve kiremitlerle birlikte gelmesinden sonra da devam etmiştir. Evler daha sonra giderek artan karmaşıklıkla boyanmıştır. Koyunyünleri ile tasarlanan yapı ahşap çerçeveli desenin somut örneğini oluşturmuştur. Sanatçının kır evi üzerinde çalışması yerel mimari ile bölgenin sembolü niteliğindeki yapılara vurgu yapılmıştır (Görsel 11). Çalışmanın geneline baktığımızda bölgeye özgü ağaçların kullanıldığı özel mimari yapılar referans alınmış, yöreye özgü koyunların yün renkleri kullanılarak mekâna özgü yapıt sanatçı tarafından yapılmıştır. Yapıda kullanılan yünler ayrıştırılarak, temizlenip aynı desenler ile battaniyeler dokunmuş ve geri dönüştürülmüştür (Messem 2009).



**Görsel 12.** Steve Messam, Jübile Kemerı 2022

Jubile kemerı, Birleşik Krallıkta yapılmış göze çarpan ve kamusal bir alanda inşa edilmiş büyük bir tören kemeridir. Yerel olarak yetiştirilen koyunların ham yapağısıyla kaplı, 7,5 m yüksekliğinde geçici bir anıttır. Zamanın tarihi anını anmak ve tarımla uğraşan topluluğu kutlamak için yapılmıştır. Mekânla ilişkili olarak koyunyünlerinden yapılmış mekânı işaretlemektedir. Temsiliyet ve işaretleme mantığı üzerinden üretilen ve işlevlendirilen anıtlar genellikle figüratif ve dikey formlara sahiptir. Mekânla temsil edici gösterge arasında bağlayıcıdır (Şengüenalp 2018).



**Görsel 13.** Steve Messam, Nöbetçi,2010

Koyun yetiştiriciliği, İngiltere de Kuzey Pennines'in yüksek arazilerinin temelini oluşturmaktadır. Ulusal Yün Haftası kapsamında yapılmıştır (Görsel 13). Nöbetçi koyununun yapağısıyla yapılmıştır. Ahır başlangıçta koyunların barınağı olarak inşa edilmiştir. Ahır bir şekilde koyun cinsine bağlamak istenmiştir; koyun gibi tepeye tutunmaktadır, ama aynı zamanda tarım tarihindeki ve bu manzaradaki noktalar olarak ahır ve cins arasındaki ilişkiye de



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

işaret etmektedir. Nöbetçi, manzara ve koyun arasındaki kusursuz bağın sembolü olarak durmaktadır (Messem 2010).

Çevre sanatı üzerine yoğunlaşan sanatçılar, etraflarındaki doğa ile uyum halinde üretmeyi, onu olumsuz manada dönüştürmekten daha fazla gözetmektedir. Ortaya koydukları sanatsal üretim üzerinden insanın çevre ile ilişkisini araştıran sanatçılar böylelikle bizlerin de sanatsal üretimin işlevi ve doğası üzerine yeniden düşünmemizin önünü açmaktadır (Altuğ,2023).

Genel olarak he iki sanatçının eserleri değerlendirildiğinde arazi koşulları dikkate alınmıştır. Mekânların çevresi ile vermiş olduğu referanslar dâhilinde sanat yapıtlarını varlığını görmekteyiz. Arazi koşullarını dikkate alan doğa sanatçıları, malzemelerin doğası gereği, çalışmalarını dış dünyanın vermiş olduğu olanaklar ile mekâna uygun ve mekân ile ilişkili açık hava çalışmaları yapmışlardır. Tarihi, sosyal ve kültürel birikimin meydana geldiği doğal yaşam alanları, doğa ve insan diyaloglarını çevreleyerek yansıtan, büyük bir hazinenin ve birikimin ifadesidir.

### TARTIŞMA

Doğal çevrede yapılan sanatçı eserleri doğal yaşama ve doğanın yapısına etki etmeyecek mekâna özgü mekânı işaretleyen yapıtları ile mekânı özel bir alana çekmişlerdir. Sanatçı yapıtları yaşamın, doğanın kendisidir ilkesi doğrultusunda yapılmıştır. Mekân ve kullanılan malzemeler, mekâna özgü öğeler aracılığı ile yeni anlamlara işaret etmektedir. İnsanın mekânı algılaması, mekâna kattığı özellikler, nitelikler mekânın öznel öğeleri, duydu ve düşünce değerleri sanatçı yapıtları ile açığa çıkarılmaktadır.

### ÖNERİLER

Yapılan sanat eseri, doğaya bırakılır, değişime ve dönüşüme açıktır, hatta zaman içinde yok olur. Doğada yapılan çalışmalarda kullanılan nesnelere geri dönüştürülür, doğada bırakılmaz. Sanatçı, araziye gelmeden önce zihninde tasarlamış olduğu fikirleri uygulamak ya da kendi sanat tarzını o araziye uyarlamak yerine, arazi ve barındırdığı potansiyelleri değerlendirerek üretir. Arazinin yapısal özellikleri tasarım değişkenlerini belirler. Bu noktada, ortaya konan sanat eserinin bağlamıyla ilişkisi araziye özgüdür. Doğal ortamların korunması temel ilkedir, doğaya, yaşama, saygı niteliğindedir. Doğal çevrelerde yapılan eserler çevrenin kendi kimliğini açığa çıkarmaktadır. Geçici veya kalıcı sanat yapıtları mekâna özgüdür ve o yere işaret etmektedir. Doğal çevrede, doğayı çevresi ile ilişkilendirerek, yapıtın uygulanacağı yer, tarihi, kültürü ve insan ilişkileri, ortamın sosyal çağrışımları dikkate alınarak mekâna özgü sanatsal uygulamalar yapılabilmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SONUÇ

Sanatsal üretimler sanatçıların kendi doğal çevre ve kültürleri üzerinden gerçekleşmektedir. Sanatçı yapıtları doğal çevrenin nesnelere ile yapıtın var olduğu mekâna özgü anlatımları ön plana çıkarmaktadır. Kendi yaşamlarının üzerine kurulu sanat anlayışları sanatçının sanatsal kültürünü oluşturmaktadır. Doğal malzemeler ve mekânlar ile ilişkili çevresel sanat yapıtları, düşüncelerin, fikirlerin, eylemlerin birlikteliğinden meydana gelmektedir. Çevresel sanat eylemleri, gerçek malzeme gerçek mekân, gerçek zaman dilimi ile ilgilenmektedir. Doğal çevrede ki sanatçı yapıtları belirli yerlerde temsil etme yönünden o yere işaret etmektedir. Malzeme ve fikir o yere aittir. Çevresel sanat yapıtları izleyici açısından bir karşılaşma yeridir. Doğru yerde doğru zamanda doğal ortamda yapılmaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KAYNAKÇA

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DETERMINATION OF THE ECOTOURISM POTENTIAL OF LATMOS (BEŞPARMAK) MOUNTAINS

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#### ABSTRACT

Since its emergence in the mid-19th century, uncontrolled mass tourism has caused irreversible damage to natural and cultural resource values. In the early 1980s, an alternative tourism approach called 'ecotourism' began to develop. This approach was guided by principles of respect and engagement with local cultures, understanding and conservation of nature and cultural resources, aiming to minimize visitor impact, and providing socio-economic benefits to local communities. Today, ecotourism is widely recognized as one of the fastest-growing segments of the tourism industry. This study aims to determine the ecotourism potential of the Beşparmak (Latmos) Mountains, which are situated within the boundaries of Aydın and Muğla provinces and are renowned for their natural and cultural landscape values. The methodology of this study comprises five stages. Firstly, data related to the study area were collected, and fieldwork was conducted. Secondly, a total of 23 natural and cultural indicators, believed to influence the ecotourism potential of the area, were identified. In the third stage, these indicators were shared with an expert group of 50 people, and the weighting coefficients of the indicators were determined using the Delphi Technique to reach a consensus. In the fourth stage, each indicator was assessed on a 5-point Likert scale, and these assessments were conducted using criteria cards developed by Kalem (2001). In the final stage, the findings were synthesized, and various recommendations related to ecotourism planning and visitor management, aligned with the principle of conservation, were presented.

**Keywords:** Ecotourism, sustainable tourism, recreation, Latmos



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Today, tourism has evolved into a major industry that significantly impacts economic, cultural, and political relations both nationally and internationally (Çevirgen, 2004; Bilgiçli, and Altinkaynak, 2016; Boz, 2006). However, the rapid growth of tourism, which began in the 19th century, has posed threats to the sustainability of natural and cultural resources. Consequently, a shift in tourism attitudes occurred worldwide after the 1980s, giving rise to the concept of "soft tourism" and the subsequent development of ecotourism (Kalem, 2001; Tankut, 1992; Azevedo, 2021; Bacsı and Tóth 2019; Slee, Farr and Snowdon, 1997).

Ecotourism, as a form of tourism, aims to promote the responsible and long-term use of natural resources, offering an alternative approach to mitigate the negative impacts of mass tourism. It is recognized as a crucial tool for sustainable development (Kurdoğlu, 2001; Kahraman and Türkay, 2004; Öztürk and Yazıcıoğlu, 2002). The International Union for Conservation of Nature (IUCN) defines ecotourism as environmentally responsible travel to pristine natural areas that fosters an understanding of and conservation efforts for nature and cultural resources. It emphasizes low visitor impact and the generation of socio-economic benefits for local communities (Burgoyne and Mearns, 2020).

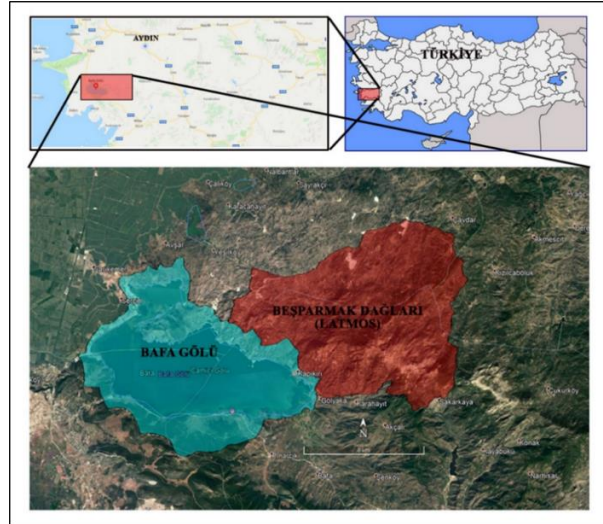
In recent years, significant changes have occurred in tourism in parallel with economic, technological and political changes. Today, people are heading towards regions where the natural environment is protected and maintained, and they are trying to expand their holidays with personal development and growth. In this context, they move away from Sea-Sand-Sun tourism and focus on the concepts of Entertainment-Education-Environment (Sabriye and Uğuz, 2011; Emekli, 2005; Kaypak, 2010). According to the official definition made by Lascurain in 1987, ecotourism is considered as travels aimed at scientific studies in natural areas, landscape observation, watching natural life and experiencing cultural features. This definition emphasizes tourists' interaction and experience with the natural environment (Lascurain, 1987).

This study aims to assess the ecotourism potential of the Beşparmak (Latmos) Mountains, situated within the borders of Aydın and Muğla provinces, which are distinguished by their natural and cultural landscape values.

### 2. MATERIALS and METHODS

**2.1. Study area:** The Study Area encompasses the regions within the administrative boundaries of Aydın and Muğla provinces. To the west, its limits extend to Bafa Lake, while to the north,

it includes Serçin, Köprüalan, Karakaya, and Çavdar Villages within the Bafa Lake Nature Park. In the east, the study area is defined by Bağarcık and Sakarkaya Villages, and to the south, it encompasses Karahayıt and Gölyaka Villages (Figure 1).



**Figure 12.** Work area location map

**2.2. Methods:** The methodology of this study consists of 5 stages.

Stage I: Initially, an examination of previous studies pertaining to the study area was conducted, and a comprehensive database was compiled, encompassing the natural and cultural resource values of the region. Fieldwork was undertaken to closely investigate key aspects of the area in relation to ecotourism. During these field investigations, interviews were conducted with local residents, and photographs of natural and cultural elements deemed significant for ecotourism were taken.

Stage II: Subsequently, a total of 23 natural and cultural indicators, believed to impact the ecotourism potential of the region, were identified.

Stage III: Recognizing that each identified indicator may not have an equal influence on the ecotourism potential of the area, these indicators were shared with a group of 50 experts. Over the course of three rounds, employing the Delphi Technique, a consensus was reached by determining the weight coefficients of these indicators. Experts' opinions about the prediction were collected in writing (in a closed manner) and the average of the predictions was taken and reported back to all experts as a single prediction. In the second round, the experts were invited to adjust their opinions and provide revised predictions. The results were collected once more, and the averages recalculated. The same process was repeated in the third round, gathering predictions anonymously and averaging them again. The importance of each indicator was rated



on a 5-point Likert scale, ranging from "not at all important" (0 points) to "very important" (4 points).

Stage IV: In the fourth stage, each indicator was assessed on a 5-point Likert scale, utilizing the criterion cards developed by Kalem (2001).

Stage V: Finally, the findings were synthesized, and a range of suggestions pertaining to ecotourism planning and visitor management were proposed, all guided by the principle of conservation.

### **3. FINDINGS and DISCUSSION**

In the initial stage of the study, the natural and cultural resource values that hold significance for ecotourism were investigated, examined in the field, and documented through photography. These resource values are categorized under the following headings.

#### **3.1. Important natural resources of Latmos in terms of ecotourism**

3.1.1. Interesting Geological Formations: These intriguing rock formations, resulting from the weathering of 500-million-year-old gneiss rocks over time, form visually striking landscapes. At higher elevations, stone pine trees contrast with olive trees at lower altitudes. These geological formations exhibit non-uniformity, each resembling various shapes and figures. The widespread presence of these rocks across the natural landscape imparts a sensation of visiting a distinct planet to the visitors (Figure 2).



**Figure 2.** Interesting geological formations

3.1.2. Important Floristic Features in Terms of Ecotourism: The study area is situated along the westernmost boundaries of the Western Menteşe Mountains range in the Southern Aegean Region, encompassing the sub-basin of the Büyük Menderes River and exhibiting the ecological characteristics of the basin. Both the Büyük Menderes River Basin and the Western Menteşe Mountains are recognized as one of the 122 Important Plant Areas, among the 305 Important Nature Areas and 184 Important Bird Areas in our country (Eken et al., 2006).

The predominant plant community within the area is the Red Pine forests, while Stone Pine (*Pinus pinea*) forests take their place in locations where bedrock, soil structure, and microclimate conditions are suitable. Many attractions within the region are nestled within these forests, and the walking routes leading to these points, including the Ancient Carian road, traverse these forested areas. Stone pines, which are widely distributed and visible from elevated viewpoints, have a striking visual impact due to their distinctive forms.

Moreover, at higher elevations along the hiking routes, you may also encounter black pine forests. In nearly every village within the study area's boundaries, stone pines and extensive olive groves serve as significant sources of income for the local population, in addition to their profound visual impact on the landscape (Figure 3). Furthermore, the richness of medicinal and aromatic plants in the area holds considerable value for ethnobotanical tourism.



**Figure 3.** Stone pines and olive trees

3.1.3. Important Faunistic Features for Ecotourism: A total of 219 bird species, 22 reptile species, 4 amphibian species, and 20 mammal species have been documented in the vicinity of Bafa Lake, including the Beşparmak Mountains (İlemin, 2015). Lake Bafa, considered one of Turkey's most picturesque lakes in terms of natural beauty and historical significance, is home to 21 recognized fish species. Furthermore, it serves as both breeding and wintering grounds



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

for numerous endangered bird species. According to Kuşbank, Turkey's birdwatcher observation database, 219 species have been recorded in Lake Bafa and its surrounding areas. The lake and its environs are pivotal for water bird breeding and wintering. Noteworthy bird observation habitats in the vicinity of the lake include the lake's islands, mud flats and meadows along the shoreline, reed beds within the lake, olive and maquis vegetation, red pine forests, cliffs, and human settlements (Ürker, 2015; İsfendiyaroğlu 2015).

### 3.2. Important historical and archaeological resources of Latmos in terms of ecotourism

3.2.1. Civilizations Established in Latmos: Traces of the Prehistoric Period, Ancient Period, Byzantine Period and Ottoman Period can be found in Latmos.

*Prehistoric Period:* Traces from the prehistoric period were uncovered during surface surveys conducted by Peschlow-Bindokat (2014). These discovered rock paintings represent the earliest known prehistoric rock paintings from the Western Anatolian region. The rock paintings have been dated to a span ranging from the Late Neolithic Period (New Stone Age) to the Chalcolithic Period (Copper Age), specifically from 6000 to 5000 BC (Peschlow-Bindokat, 2014).

*Ancient Period:* The old city of Latmos, sharing its name with the mountain, was founded around 300 BC, while the new city, Latmos Herakleia, was situated on the southern slope of Mount Herakleia. During the abandonment of the settlement, the city of Latmos was completely destroyed, and the stones removed from it were used as building materials for the new city. Latmos Herakleia, located by the lakeside, was established in the 3rd century BC by Pleistarchus. This city served as a port city at the end of the gulf and marked the beginning of the highway leading to inner Caria. While the city enjoyed substantial economic and political power during the Hellenistic Period, its grandeur waned in the Roman Period (Peschlow-Bindokat, 2014).

*Byzantine Period:* Latmos Gulf lost its significance around the 50s BC and by the 10th century AD, it had become disconnected from the sea. Following this period, Christian settlers from the Arabian Peninsula and Yemen established themselves in the area and initiated the rule of the VII. They commenced the construction of various monasteries, a practice that continued into the 19th century.

*Ottoman Period:* After the Menderes Valley and the Caria Region came under Turkish rule in 1278, the settlements were abandoned. However, many Byzantine settlements in Latmos were

not initially inhabited but served as seasonal residences and pasture areas for nomads (such as Yörüks, Karakeçeli, and Turkmens) due to the presence of water sources.

3.2.2. Distributions of Cave with Rock Paintings:(Figure 4) The distribution of rock paintings is concentrated in the mountainous area between Bafa Lake and Çine Stream and especially around Tekerlek Mountain. (Peschlow-Bindokat, 2014)

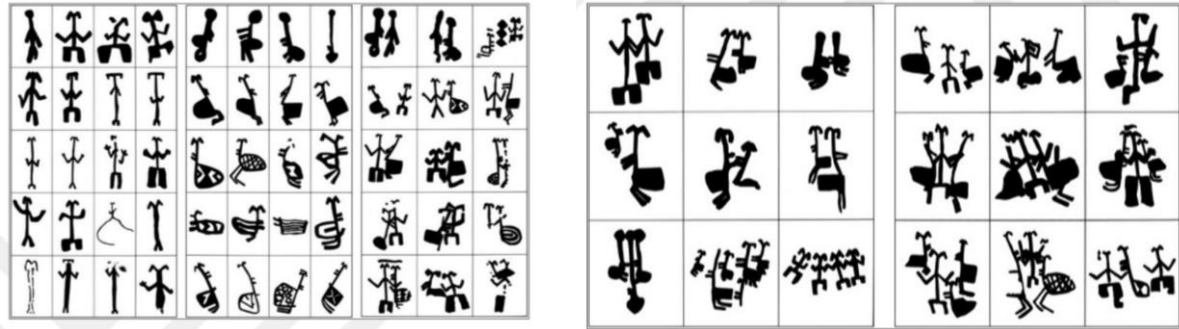


Figure 4. Rock Paintings

3.2.3. Karadere Cave. The prehistoric rock paintings in Latmos typically depict family scenes, and it is believed that the history of Karadere Cave dates back 10 thousand years. Within the cave, there are 12 unique figures exclusive to Latmos. Among these images, one picture stands out prominently. This figure, placed in a natural niche in the rock, is adorned with bull horns on its head, symbolizing the supreme deity, the "God of Air." Horned human figures have been known since the Paleolithic Period and are referred to as horned gods, sorcerers, or shamans in literature. Hence, the male figures in the picture are interpreted as "Latmos Mountain Gods." The Karadere painting is distinctive due to its subject matter, descriptive integrity, and its ability to evoke a sense of enchantment.

Just outside the cave's entrance, there is a shallow, bowl-shaped depression carved into the rock floor by human hands. When you gaze towards the mountain's ridge from this point, you'll notice the "Wheel Hill," with its enchanting circular appearance. This illustrates the connection between Karadere Cave and the mountain's summit, suggesting that it served as the primary temple of Latmos in its early periods (Figure 5) (Peschlow-Bindokat, 2014).

3.2.4. Tekerlek Hill: The Beşparmak Mountains, also known as Latmos, represent an extension of the Western Menteşe Mountains and were once considered one of the Sacred Mountains of Asia Minor. The highest peak of Latmos stands at 1400 meters, with Tekerlek Tepe located at this elevation. In the Latmos Mountains, worship of the Anatolian god of Air and Rain dates back to the Neolithic period. Subsequently, this deity was replaced by Zeus, the Greek god of the sky. The mountain's summit, known as Wheel Mountain in Turkish due to its circular shape,



was regarded as the divine throne of the God of Air (Figure 5) (Peschlow and Bindokat, 2014; Derinöz, 2021).



**Figure 5.** Karadere Cave and Tekerlektepe

3.2.5. Latmos City Ruins: Due to the reutilization of the old city's building blocks in the newly established city, the remnants of buildings in the old city have been preserved only at the foundational level. In the early 4th century B.C., natural rocks were employed in constructing the city walls. Within the city center, which was resettled during the Byzantine era, there existed an agora featuring steps crafted from bedrock. In late antiquity, a church was erected atop the agora, accompanied by a monumental chamber tomb situated nearby (Figure 6) (Peschlow-Bindokat, 2014; Kocalar, 2018).



**Figure 6.** Latmos City Ruins

3.2.6. Ancient Period Roads of Latmos and Herakleia: Three primary roads have been identified within the road network. The first one commences in Herakleia, the second initiates from Euromos, and the last one begins at Myus Ancient City. The Herakleia road extends for 5 km and is remarkably well-preserved, featuring large gynas constructed from blocks. The road's width varies between 2-4 meters, and terraces have been constructed to accommodate it on sloping terrain. The absence of tire marks on the road suggests a lack of vehicular traffic.



Additionally, there are fountains and water sources positioned at specific intervals along the road (Figure 7) (Peschlow-Bindokat, 2014).

**3.2.7. Bağarcık Castle Settlement:** This settlement, situated along the ancient paved road originating from ancient Herakleia and Myus, continuing through Yuva Tepe Pass, holds a strategic location. The significance of this settlement becomes evident when considering that these ancient roads lead to important ancient cities such as Alinda and Amyzon. The city walls, constructed for defensive purposes, were thoughtfully designed to align with the natural terrain. Bağarcık Castle is believed to have served as a central gathering place for the Carians, where they assembled in the presence of their highest deity for religious or political gatherings. At the settlement's highest point, a rock was carved into a staircase, likely used for surveillance. Rock tombs can be observed on both sides of the road leading to the acropolis (Figure 7) (Peschlow-Bindokat, 2014; Herda, 2017).

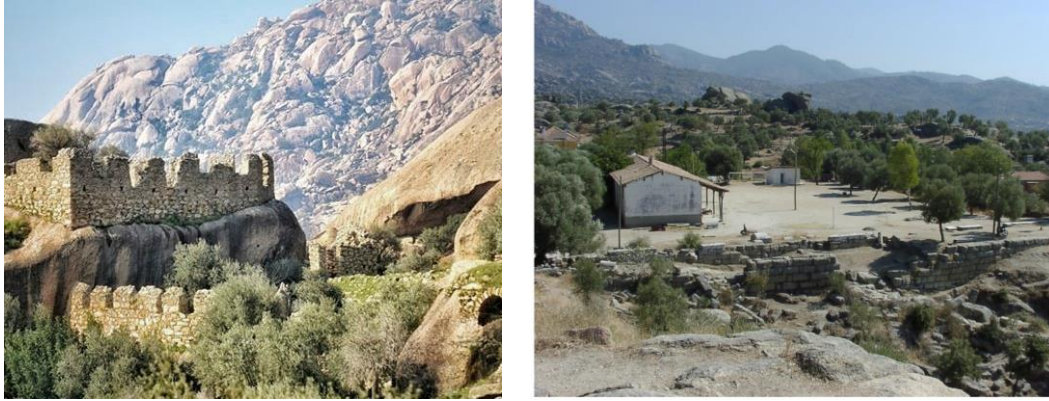


**Figure 7.** Latmos and Heraklia Ancient Period Roads and Bağarcık Castle Settlement

**3.2.8. City Walls:** The city walls can be traced back to the time of Pleistarchus' founding. Extending over a length of 6.5 km, certain segments of these walls have been remarkably well-preserved since their initial construction, serving as prime examples of the wall-building techniques of their era. In specific locations, stone walls constructed in a box-like manner were set upon the bedrock. At intervals of 75 meters, towers were strategically positioned along the walls. Unfortunately, the walls have suffered damage due to modern construction near the lake (Figure 8) (Peschlow-Bindokat, 2014).

**3.2.9. Agora:** Constructed in the 2nd century BC, the agora is positioned on an expansive terrace within the city center. Initially, it was enclosed by galleries (stoas) featuring marble columns arranged in the open Doric order. Support infrastructure was erected along the south and partially on the west sides. A two-naved stoa can also be found within the agora. The modern

settlement shifted its focus to the agora when the village school was constructed in 1961 (Figure 8) (Peschlow-Bindokat, 2014).



**Figure 8.** City Walls and Agora

3.2.10. Temple of Athena Latmia: The structure, prominently visible from the bay atop a steep cliff to the west of the agora, stands as the city's symbol. This building, dating back to the 3rd century BC, has been preserved up to its roof height. In ancient times, the walls were constructed with gynas and then plastered in white. The facade, pediment, and flooring are all crafted from marble. Inscriptions on the building's antes suggest that it also functioned as a city archive, likely influenced by the city's political circumstances (Figure 9) (Peschlow-Bindokat, 2014).



**Figure 9.** Temple of Athena Latmia

3.2.11. Sanctuary of Endymion: Constructed in the 3rd century BC, this building features a facade adorned with five columns positioned between the corner antennas. With dimensions of 15x24 meters, it boasts a front courtyard designed in an apse shape, and the rear room's wall is integrated into the natural bedrock. Walls were erected in areas where the bedrock allowed. Evidence from stone slots on the rock suggests that the wall originally stood taller than its



present preserved level. The entire edifice was crafted using local gynas stone (Figure 10) (Peschlow-Bindokat, 2014).

3.2.12. Theatre: Situated in the northeastern part of the city, the theater's placement on the terrain is distinctive. This structure, which originates from the Hellenistic Period, seamlessly incorporates the natural topography of the land with its well-fitted steps. Some of the marble seating steps remain visible, while the lower sections of the stage building are still intact (Figure 10) (Peschlow-Bindokat, 2014).



**Figure 10.** Sanctuary of Endymion

3.2.13. Cist Graves: Over 2400 graves, primarily in the form of cist graves, designed for both individual and family burials, were constructed in rocky areas. These cist graves are covered with rectangular or pediment-shaped gneiss plates. Beyond the city walls, necropolis areas are concentrated mainly to the east and southeast of Latmos, as the lake shores are now submerged. Unlike the adorned tombs found in various regions of our country, the rock tombs here are plain. They were predominantly carved into large rocks, arranged adjacent to each other and placed side by side. Each grave is equipped with rock lids (or located next to them) (Figure 11) (Peschlow-Bindokat, 2014).

3.2.14. Temple of Zeus Akraios: As you descend from the Bağarcık Settlement, you will come across a small sacred area known as the Zeus Akraios Temple, measuring 6.90 m x 7.30 m. Situated on a mountain ridge covered with pine trees in the valley to the north of the mountain's defensive structure, this temple is oriented in the north-south direction and follows the Doric order. Notably, one of the still-standing ante poles is adorned with a shield, while the other displays a helmet. The inscriptions found on the architraves indicate that it was dedicated to Zeus Akroios, signifying Zeus at the mountain peak (Figure 11) (Peschlow-Bindokat, 2014; Graf, 2009).



**Figure 11.** Cist Tombs and Temple of Zeus Akraios

3.2.15. Yediler Monastery: The monastery, situated at the southwestern base of Latmos Mountain, is distributed across three distinct levels, primarily due to the steep terrain. The encompassing walls, however, lack continuity and are occasionally disrupted by rock formations. Notably, this monastery is the largest within the Latmos region. Frescoes adorn various spaces within the Yediler Monastery complex, and they extend to the inner surface of the natural rock formations located north of the monastery. Additionally, the complex features a small bathhouse among its architectural elements. In the religious center of the southwest, there are two chapels and a cave utilized as a chapel. At the uppermost section of the castle, well-preserved multi-celled spaces and vaulted cell rooms are positioned on the western and northern sides (Figure 12) (Peschlow-Bindokat, 2014; Tekin, 2003).



**Figure 13.** Yediler Monastery

3.2.16. Pantokrator Cave (Ak Avlu Monastery): The Pantokrator Cave, situated in Kapıkırı Village within the Ak Avlu Location, is a rock cavity renowned for its unique features. There are remarkable rock paintings depicting five saints, including the Prophet Jesus. The cave's interior is adorned with three distinct scenes, each separated by plain purple stripes. These scenes portray the ascension of Jesus into heaven, Mary Theodocus alongside the saints, and an



unidentified scene where only the heads of three figures are visible. Notably, an inscription is also present within the cave. These paintings have endured through the ages and remain remarkably well-preserved to this day (Figure 13) (Peschlow-Bindokat, 2014; Özcan, 2023).

3.2.17. Arapavlusu Monastery (Stylos): During the 7th century, priests and monks who fled from Mount Sinai and Upper Egypt found refuge in these mountains, which provided an ideal setting for monastic life, prior to the Arab settlement. In this era, numerous monasteries were constructed on the islands of Lake Bafa and throughout the Latmos region. Among these, Stylos, also known as the Arabian Hall, stands out as the most magnificent. It is nestled within a breathtaking natural landscape, surrounded by rugged and inaccessible cliffs. Situated at an elevation of 740 meters, Stylos is located in the southwest of Karakaya Village. Notably, Saint Paulos (Paulos vita), who was laid to rest in a church within this monastery on December 15, 955, was revered as a saint during his lifetime and distinguished as "young Paulos" to differentiate him from Paulos, one of the chief apostles (Figure 13) (Peschlow-Bindokat, 2014; Sun, 2023).



**Figure 13.** Pantokrator Cave (Ak Avlu Monastery) ve Arapavlusu Monastery (Stylos)

3.2.18. Lake Bafa Islands: Lake Bafa is home to a total of four islands, each housing historical and archaeological artifacts. These islands are known as Kahveasar Island, Menet Island, İkiz Islands, and Kapıkırı Island. Across all of these islands, you can find Byzantine monasteries, fortress-like structures, churches, and chapels (Figure 14) (Peschlow-Bindokat, 2014).

*Kahveasar Island ve Monastery:* The island is enclosed by defensive walls, which also define the boundaries of the monastery. On the island, you'll find a spacious monastery church adorned with intricate brick decorations. Alongside the monastery church, there are chapels and arkosole tombs. This structure dates back to the 13th century.



*Menet Island:* Located on the western side of the lake's shoreline, Menet Island is the largest among the islands. It is strewn with ruins of buildings from the Byzantine Period. The island hosts a church with a cloverleaf design and two small chapels.

*İkiz Island:* Situated on the northern shores of Lake Bafa, the Twin Islands consist of two seemingly interconnected islands. The larger island boasts a small castle dating back to the 13th century, while the other houses a monastery as part of its defensive system. The castle walls on both islands and most of the building walls within them have been well-preserved.

*Kapıkırı Island:* Within the outer walls of Kapıkırı Island, you'll find a church along with two small chapels. Additionally, the island's historical significance lies in its Hellenistic-era defensive fortress, which used to be connected to the mainland. Within the monastery, you can identify substantial structures through remnants of foundations and walls.



Kahveasar Island



İkiz Islands and Küçük Island



İkiz Islands



Kapıkırı Island

**Figure 14.** Islands in Lake Bafa

3.2.19. Yörük Tombs: The rugged terrain of the Beşparmak Mountains in Western Anatolia has provided shelter to nomadic Yörük tribes for centuries. What remains from these Yörük tribes, who once made these mountains their home, are variously sized, long, and slender nameless tombstones made from local stones in the region (Figure 15).

3.2.20. Stone Houses: Traces of the architectural style found in Alinda, an important city of Caria, can be seen in many of the old stone houses in the Beşparmak Mountains. These works, meticulously crafted from the region's natural stones with millimetric precision and using the main rock formations without disturbing nature, serve as examples for later civilizations. It is immediately evident that the use of local stones and harmony with nature were central in constructing these old stone houses and other structures found in many villages in the region (Figure 15).



**Figure 15.** Yörük Tombs and Stone Houses

### **3.3. Important cultural resources of Latmos in terms of ecotourism**

3.3.1. Bilir Family: Yusuf and Teslime Bilir, a couple residing at the summit of Beşparmak Mountain, renowned for its rocky terrain and stone pine trees near Çavdar District, provide a prime illustration of how humans can coexist with nature without causing harm. The Bilir family upholds a lifestyle akin to that of the inhabitants of the region centuries ago, making them a focal point for eco-tourists who are drawn to the area for these attributes (Figure 16).



**Figure 16.** Bilir Family

3.3.2. Bandit Hideouts in the Beşparmak Mountains: During the waning years of the Ottoman Empire, the challenging terrain of the Beşparmak Mountains provided refuge for numerous fugitives and bandits, including figures like Çakırcalı Mehmet Efe. These individuals achieved



folk hero status for defending the weak, the poor, and the local villagers against oppressive landlords. The bandit hideouts, often situated on high hills overlooking valleys, are composed of intricate rock formations resembling labyrinths. Each hideout had two entrances, allowing Efes to escape if they sensed danger, emerging from the alternate exit to save their lives. Numerous epics and folk songs were composed in honor of the outlaws who sought shelter in these mountains. Lacking written records, these folk songs have been transmitted orally, becoming valuable components of our folklore heritage, reflecting the era.

**3.3.3 Traditional Attire:** In the Latmos Villages, traditional clothing from Aydın and its vicinity is worn during holidays, weddings, and special occasions, preserving this cultural tradition. There are four distinct styles of women's attire known as Çitari, Canfez, Ağır Esvap, and Sırmalı. Men's clothing includes Fez, Bürümcek, Camadan, Sallama, Potur, Tripoli Belt, Socks, and Bellows Boots (Figure 17) (Anonymous, 2019a).



**Figure 14.** Traditional Attire

**3.3.4. Legends:** One of the most prominent legends in the region revolves around the love story of the moon goddess Selene and the shepherd Endymon. This ancient legend, handed down through generations for centuries, has taken on various forms and interpretations. It plays a particularly significant role in attracting ecotourists to Lake Bafa who come to witness the full moon (Yalçın, 2015).

**3.3.5. Primary Agricultural Activities:** The primary agricultural products in Latmos include Pine Nuts (Küner), Olives, and Olive Oil. Additionally, the region engages in beekeeping and livestock farming (Figure 18).

*Pine Nut (Küner):* The northern region of the Beşparmak Mountains, formerly known as Latmos, boasts the largest stone pine (*Pinus pinea*) forests in Turkey, a species with a very limited distribution. Harvesting pine nuts, which undergo a series of challenging steps before becoming edible, begins with the collection of cones from the trees. These cones are initially subjected to boiling in hot water. Subsequently, the scales of the boiled pine cones are carefully opened, and the pulp is separated from the pine nut kernel using blunt instruments. The next step involves taking the kernels to crushing machines and processing facilities for the extraction of pine nuts. Pruned branches or decaying trees are employed as boundary fences between fields. Once the shells are removed, the remaining shells are utilized as fuel (Anonymous 2019b).

*Olives and Olive Oil:* Latmos and Heraklia have been renowned for their olive cultivation for centuries. The eastern part of the Beşparmak Mountains is surrounded by stone pine forests, while the western part is enveloped by olive groves. Historically, numerous villages in the vicinity of Lake Bafa, also known as the Beşparmak Mountains, were dedicated to olive farming and olive oil production. Many houses in this region still possess a section that functions as an olive workshop and olive oil storage facility. Moreover, vestiges of olive oil workshops can still be found in certain villages (Figure 18) (Anonymous 2019b).



**Figure 15.** Pine Nut (Küner) and Olive Workshops

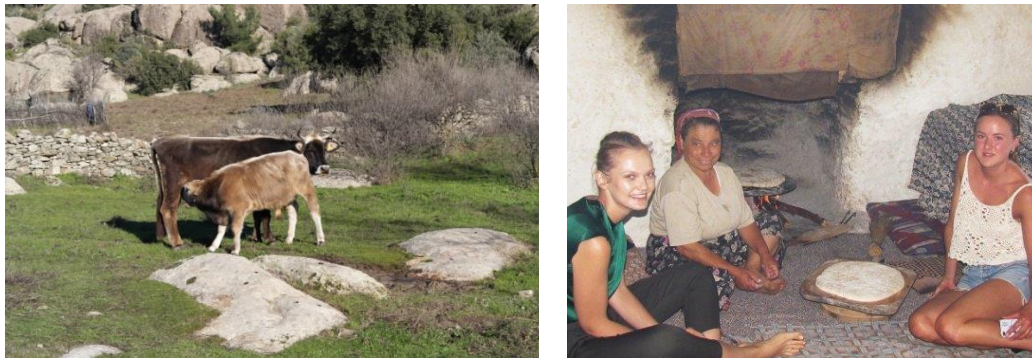
*Beekeeping:* Ancient inscriptions reveal that the Carian cities of Latmos Heracleia, Pidasia, and Theangela were engaged in beekeeping. These cities levied income taxes, and honey was exported as far as Egypt. In the pristine Latmos landscape, you can find intriguing structures made of local stones atop massive rocks. These structures, known as hives, were used for honey production and housed the traditional black beehives of the local people until recently. These hives are strategically built on large rocks, which are inconspicuous from the front and

accessible only via wooden stairs, to protect them from bears. Historical records suggest that these structures were utilized from ancient times up to the recent past (Anonymous 2019b).

*Fishing:* Fishing is a prominent economic activity in the Bafa Lake Basin, with Serçin Village, situated within the basin, particularly known for its importance in the fishing industry. Bafa is renowned for its eel (İlemin, 2015).

*Pastoralism:* Pastoralism farming is still practiced in the mountain villages of Latmos. Ecotourists visiting the region often refer to these cattle as "Free Cows." Pastoralism farming is regarded as a valuable asset due to the quality of the meat and its cost-effectiveness (Figure 19).

**3.3.6. Food Culture:** The villages in Latmos have a rich food culture featuring local dishes prepared from natural herbs, olive oil dishes crafted from dried black-eyed peas, dried beans, chickpeas, and kidney beans, soups made from buckalak tarhana and local tarhana, fried dried peppers and eggplants, herb pastries, pancakes, zerde (a sweet rice pudding), semolina halva with pine nuts, and bakery bread. These culinary delights are highly cherished (Figure 19) (Anonymous 2019b).



**Figure 19.** Pastoralism and Food Culture

### **3.4. Recreational activities available in Latmos**

**3.4.1. Trekking, Botanical and Cultural Tours, Photography:** The EKODOSD association has identified 10 walking and trekking routes in Latmos, all of which are located within the Aydın province. Additionally, there are numerous routes in the Latmos region within the boundaries of the Muğla province.

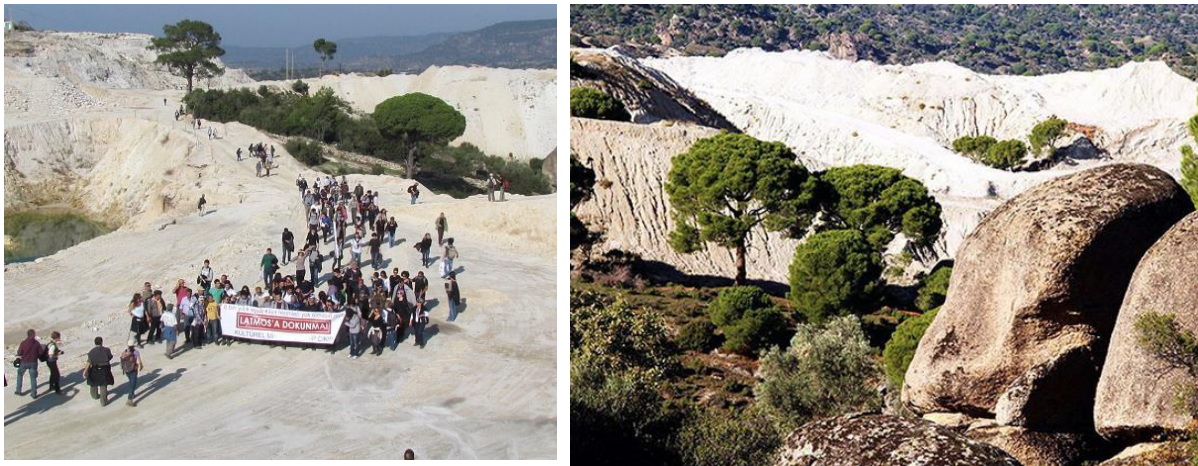
**3.4.2. Tent Camping:** Occasional camping sites are established in the valley descending from the Latmos peak to Bağarcık Village. Kapıkırı Village also offers suitable areas for tent camping.



3.4.3. Bird Watching: Lake Bafa Nature Park, located southwest of the study area, is a significant hub for bird watching. Within Bafa Lake Nature Park, there are facilities such as a bird observation tower and observation terraces.

3.4.4. Festivals: Various festivals are sporadically organized by nature-themed associations, non-governmental organizations, and municipalities in Aydın and Muğla provinces. Notable among these festivals is the 4th Latmos Mountaineering and Nature Festival, held in 2018 and organized by the Turkish Mountaineering Federation, Milas Mountaineering and Nature Sports Club, and Muğla Metropolitan Municipality. Another significant event is the annual 6th Latmos Nature Festival, organized with the participation of clubs in the Aydın Region, and last held in 2018. The Karakaya Prehistoric Rock Paintings Festival, known for its substantial participation and extensive social media coverage, saw its 8th edition in 2017, led by Söke Municipality in collaboration with Karakaya Mukhtar and EKODOSD. However, there has been a hiatus in festival activities in recent years.

**3.5. Environmental problems of Latmos:** The region, known as Beşparmak Mountains (West Menteşe Mountains), is a unique geographical area hosting Turkey's natural and cultural treasures. Regrettably, in recent years, this magnificent region has become a focal point for concentrated mining activities, posing a serious threat to the area's natural and cultural resources as well as human health (Figure 20).



**Figure 16.** Mines in Latmos

Mining enterprises in the region, IV. The group carries out studies that are classified as mining and involve the separation of minerals in rocks. Sodium feldspar and quartz, which are used as raw materials, especially in the production of ceramics, glass, and sanitary ware, are among the most processed minerals in the region.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

According to the report of the Tema Foundation (2021), a total of 66% of the Western Menteşe Mountains Important Natural Area (KBA) is licensed for mining, of which 10% is exploration, 43% is processing and 13% is tender. However, the addition of new mines to these mines is on the agenda every day. Although the reactions of local people and NGOs are increasing day by day, most of the time they are left helpless in the face of new mines to be opened. In recent years, licenses have been granted for many new mines in the area to the east and northeast of Lake Bafa, an area where important rock paintings are found. When these quarries come into operation, historical and natural values in hectares of the area will be in danger of extinction. In addition, in Çavdar Village, which earns its living by producing pine nuts and honey in the region, T.R. By the decision of the President, an expropriation decision was made to increase the capacity of the coal enterprise currently operating in Çavdar. There are also 1st and 3rd-degree archaeological sites in the region where the expropriation decision was made.

Open-pit mining activities conducted in this area are causing severe harm to the region's natural beauty, contaminating surface water, soil, and vegetation, and emitting dust that negatively impacts human health. These mining activities are progressively deteriorating the geographical splendor, historical landmarks, natural flora, rare endemic plants, and local wildlife in this region. Additionally, the areas designated for mining operations are within the Sarıçay Dam basin, a critical source of drinking and utility water for the communities of Söke, Kuşadası, Güzelçamlı, and Davutlar, posing a significant threat to public health.

Rainfall carries sand from the mines into nearby village settlements. In recent years, the mineral sands have not only covered everything but have also desiccated the olive trees along their path. Villagers, who used to cultivate watermelons, tomatoes, and black-eyed peas in the streambeds before mining took over, can no longer grow any crops in these areas. Mining activities in the region are destroying natural springs and streams. The detonation of large, unprotected rocks with dynamite near villages creates substantial craters, negatively affecting human health and natural vegetation while introducing visual pollution to this otherwise breathtaking landscape. Traditionally, people in these villages sustain themselves through honey production, olive farming, stone pine trees, and animal husbandry. However, these areas are being severely damaged by mining, causing living conditions in the villages to deteriorate and resulting in significant migration.

According to statements from the Aydın Medical Chamber, respiratory ailments, high blood pressure, and heart diseases have been on the rise in these villages due to the dust generated by



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

trucks transporting minerals. Approximately 80% of deaths in these villages attributed to increased water and air pollution are linked to cancer. Another contributing factor to the surge in cancer cases is the improper closure of uranium mines that operated in these regions in the 1950s, which continue to emit radiation levels 500 times higher than normal limits. Workers in the mines are particularly at risk, primarily due to the prevalence of silicosis disease.

Çavdar village and most of the settlements on the foothills of Latmos Mountain get their drinking water from artesian wells, that is, groundwater. In the analysis conducted by Greenpeace in 2017 on the drinking water of Kisir village, located at the foothills of Mount Latmos; Radon radioactive gas was measured at 24 times the permitted limits. In addition, it was revealed that radiation was measured at 35-40 times the limits in the old uranium drilling area, 2.5 kilometers away from the village. In the chemical analyzes conducted by Dokuz Eylül University in 2021 on well water used for drinking water in the villages of Latmos; According to the limit values determined by WHO; Arsenic 6100, Barium 235, Iron 170, Chromium 105, Boron 85, Aluminum 70, Cadmium 15, Lead 10, Copper 4, Uranium 3 times more were measured.

**3.6.Evaluation of Latmos ecotourism potential:** In the second stage of the study, we identified a set of indicators believed to influence the ecotourism potential of a region. To establish these indicators, we examined the criteria outlined by Gülez (1990) and Kalem (2001) in their respective studies, using them as references.

In the third stage, we assembled a panel of 50 experts to assess the impact of each indicator on ecotourism potential. This expert group consisted of landscape architects, urban and regional planners, tourism specialists, and ecotourism guides. We conducted a survey with this group using the Delphi Technique. The experts evaluated the significance of each indicator with regard to ecotourism potential, rating them on a 5-point Likert scale (ranging from "Not at all important" = 0 points to "Very Important" = 4 points). After the completion of Round 3, a consensus was reached among the majority of experts. Based on the assigned scores, we calculated the weight coefficients for each indicator, which are presented in Table 1.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 1.** Indicators and weight coefficients

No	Natural Indicators	Weight Coefficients	No	Cultural Indicators	Weight Coefficients
1	Geographical location	2,04	12	Transport	2,4
2	Surface shapes	3,5	13	Communication and communication	1,78
3	Geological formations	3,4	14	History and Archeology	3,1
4	Climate conditions	2,04	15	Socio-Economic Situation	2,2
5	Hydrology	2,74	16	Folklore	2,76
6	Vegetation Diversity	3,3	17	Social Behaviors	3,44
7	Wildlife Diversity	3,16	18	Traditional Architecture and Crafts	3,06
8	Ecosystem Diversity	3,3	19	Gastronomy	2,76
9	Nature Protected Areas/Potential Areas	3,12	20	Superstructure Facilities	2,6
10	Environmental Quality	3,54	21	Competence of Technical Organizations	3
11	Recreational Opportunities	2	22	Infrastructure	2,74
			23	Administrative, Political, Legal and Managerial Conditions	2,92

In the fourth stage, we created an assessment report for each of the identified indicators, following the framework proposed by Kalem (2001). These indicator reports were structured using a 5-point Likert scale. To score each indicator, we considered written and visual data, as well as land monitoring studies collected about Latmos. The completed indicator report cards, along with the scores attributed to Latmos for each indicator, are presented in Table 2.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 2.** Points awarded according to indicator scorecards

<b>Indicator No.1 Geographic Location</b>	
0	The area is only in a coastal or continental geography and is very far from tourist attractions (more than 1000 km).
1	The area is only in a coastal or continental geography and is quite far from places that are sources of touristic demand (500-1000 km).
2	The area is located in both coastal and continental geography, but it is quite far from touristic places (500-1,000 km) or it is only in a coastal or continental geography and very close to touristic centers (250-500 km).
3	The area is in a coastal or continental geography and is very close to at least one of the touristic centers (0-250 km).
4	The area is both coastal and continental and is very close to at least one of the major touristic centers (0-250 km). <b>X</b>
<b>Indicator No. 2: Surface shapes</b>	
0	The area has only one of the terrestrial surface shapes, their landscape value is insignificant.
1	The area has at least two of the terrestrial surface shapes and these have high landscape value.
2	The area has various terrestrial surface shapes, which have high landscape value.
3	The area has a wide variety of landforms and their landscape value is very high.
4	The area has a wide variety of landforms, their landscape value is extraordinary. <b>X</b>
<b>Indicator No 3: Geological Formations</b>	
0	There are no geological formations of tourist interest in the area.
1	There are a small number of ordinary (locally important) geological formations that are of tourist interest.
2	There are a small number of important (nationally important) geological formations in terms of tourist interest.
3	There are few, extraordinary (internationally important) or many important (nationally important) geological formations that are of tourist interest.
4	There are many extraordinary (internationally important) geological formations that are of tourist interest and are ready to be offered to tourism. <b>X</b>
<b>Indicator No 4: Climate Conditions</b>	





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- |   |   |          |
|---|---|----------|
| 0 | Touristic climate comfort value 0-20%   |          |
| 1 | Touristic climate comfort value 21-40%  |          |
| 2 | Touristic climate comfort value 41-60%  |          |
| 3 | Touristic climate comfort value 61-80%  |          |
| 4 | Touristic climate comfort value 81-100% | <b>X</b> |

### Indicator No 5: Hydrology

- |   |   |          |
|---|---|----------|
| 0 | Hydrological elements in the area are not suitable for any recreational activities            |          |
| 1 | Hydrological elements in the area are suitable for 1 type of recreational activity            |          |
| 2 | Hydrological elements in the area are suitable for 2 types of recreational activities         |          |
| 3 | The hydrological elements in the area are suitable for 3-4 different recreational activities. | <b>X</b> |
| 4 | Area hydrological elements suitable for more than 4 recreational activities                   |          |

### Indicator No 6: Vegetation Diversity

- |   |   |          |
|---|---|----------|
| 0 | The area landscape has low vegetation formations and is not suitable for recreational activities.   |          |
| 1 | The area has certain vegetation formations that do not have high landscape value and can offer limited recreational activities.                   |          |
| 2 | The area has certain vegetation formations with high landscape value and can provide opportunities for limited recreational activities.           |          |
| 3 | The area has various vegetation formations with high landscape value and can provide opportunities for limited recreational activities.           | <b>X</b> |
| 4 | The area has a wide variety of vegetation formations with high landscape value and can provide opportunities for limited recreational activities. |          |

### Indicator No 7: Wildlife Diversity

- |   |  |          |
|---|--|----------|
| 0 | There is no wildlife in the area                                   |          |
| 1 | The area has low faunistic importance and is not rich in wildlife. |          |
| 2 | The faunistic importance of the area is partially high             |          |
| 3 | The area has high faunistic importance                             | <b>X</b> |
| 4 | The faunistic importance of the site is extraordinary              |          |

### Indicator No 8: Ecosystem Diversity



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

0 The area has only one of the ecosystems in terms of the opportunities it offers for touristic activities.

1 The area has two of the ecosystems in terms of the opportunities it offers for touristic activities.

2 The area has three of the ecosystems in terms of the opportunities it offers for touristic activities.

3 The area has four of the ecosystems in terms of the opportunities it offers for touristic activities. **X**

4 The area has more than ecosystems in terms of the opportunities it offers for touristic activities.

### Indicator No 9: Nature Protected Areas/Potential Areas

0 It has very little natural and cultural value in terms of recreational opportunities.

1 It has little natural and cultural value in terms of recreational opportunities.

2 Its natural and cultural values are at a moderate level in terms of recreational opportunities.

3 It is rich in natural and cultural values, in terms of recreational opportunities.

4 It is very rich in terms of recreational opportunities, natural and cultural values. **X**

### Indicator No 10: Environmental Quality

0 Air, water soil pollution etc. Environmental problems affect ecotourism at a very high level

1 Air, water soil pollution etc. Environmental problems have a high impact on ecotourism

2 Air, water soil pollution etc. Environmental problems have a moderate impact on ecotourism **X**

3 Air, water soil pollution etc. Environmental problems affect ecotourism to a small extent

4 There are no environmental problems such as air, water and soil pollution

### Indicator No 11: Recreational Opportunities

0 The area only provides one type of recreational opportunities.

1 The area provides 2 types of recreational opportunities

2 The area allows 3 or 4 types of recreational opportunities



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

3 The area offers 4 or 5 types of recreational opportunities.

4 The area offers a wide range of recreational opportunities.

X

### Indicator No. 12: Transportation

0 Access to most of the area is provided by a dirt road. There are no vehicle roads to some villages.

1 Access to most of the area is provided by a single lane stabilized road. Transportation to some villages is provided by dirt roads.

2 Access to most of the area is provided by a single-lane asphalt road. Transportation to some villages is provided by stabilized roads.

3 Access to most of the area is provided by a double-lane asphalt road. Transportation to some villages is provided by stabilized roads.

X

4 Access to most of the area is provided by a concrete asphalt road. Transportation to some villages is provided by asphalt roads.

### Indicator No 13: Communication and Communication

0 Communication and communications are not possible in the area

1 The use of tools such as radio, television, telephone and newspaper is very limited.

2 The use of tools such as radio, television, telephone and newspaper is somewhat limited.

3 Use of tools such as radio, television, telephone and newspaper is moderate

X

4 All media such as radio, television, telephone and newspaper can be easily accessed.

### Indicator No 14: History and Archaeology

0 It does not have any historical or archaeological features

1 It is of low historical significance, has little archaeological value that has been discovered or is likely to be discovered, and is of little use convenient

2 It is of moderate historical importance, has little unearthed or potential archaeological value, and is of little use.

3 It has moderate historical significance, has a large number of unearthed or potential archaeological values, and is suitable for use.

4 It is of great historical importance, has abundant archaeological values that have been unearthed or is likely to be unearthed, and is very suitable for extraordinary use.

X

### Indicator No 15: Socio-Economic Situation

0 The rate of the productive population and economic accumulation are very low, and the sectors that can support ecotourism are not developed.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- 1 The proportion of the productive population and economic accumulation and the sectors that can support ecotourism are limited.
- 2 The proportion of the productive population and economic accumulation and the sectors that can support ecotourism are at a moderate level. **X**
- 3 The rate of productive population and economic accumulation is high, and sectors that can support ecotourism are developed.
- 4 The rate of productive population and economic accumulation is very high, and the sectors that can support ecotourism are very developed.

### Indicator No. 16: Folklore

- 0 The area is very limited in terms of legends and legendary places, local folk music and dances and traditional clothing.
- 1 The area is limited in terms of legends and legendary places, local folk music and dances and traditional clothing.
- 2 The area is at a moderate level in terms of legends and legendary places, local folk music and dances, and traditional clothing.
- 3 The area is rich in legends and legendary places, local folk music and dances, and traditional clothing.
- 4 The area is rich in legends and legendary places, local folk music and dances, and traditional clothing. **X**

### Indicator No 17: Social Behaviors

- 0 Local people do not have a distinctive lifestyle
- 1 Local people have a unique lifestyle, but this aspect is not recognized at all
- 2 Local people have a unique lifestyle, but this aspect is only partially recognized **X**
- 3 Local people have a unique lifestyle and this aspect is well known
- 4 The local people have a unique lifestyle, but this aspect stands out and is very well known.

### Indicator No 18: Traditional Architecture and Crafts

- 0 Architecture and crafts unique to the area and no local production
- 1 There is architecture and crafts unique to the area and some local production.
- 2 There is a moderate level of architecture and crafts unique to the area and local production.
- 3 Rich in architecture and handicrafts unique to the area and local production **X**



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

4 Very rich in architecture and handicrafts unique to the area and local production.

### Indicator No. 19: Gastronomy

0 Does not have traditional food culture Does not have traditional food culture

1 The area does not have a rich traditional food culture and is not well known

2 The area has a rich traditional food culture but this is not well known either nationally or internationally X

3 The area has a rich traditional food culture, but this is only recognized at the national level and is evaluated in terms of tourism.

4 The area has a very rich traditional food culture and this is recognized both nationally and internationally and is evaluated in terms of tourism.

### Indicator No 20: Superstructure Facilities

0 There are no Health, Accommodation, Service, Shopping and Security units

1 Health, Accommodation, Service, Shopping and Security units are very inadequate X

2 Health, Accommodation, Service, Shopping and Security units are insufficient

3 Health, Accommodation, Service, Shopping and Security units are sufficient

4 Health, Accommodation, Service, Shopping and Security units are very adequate

### Indicator No 21: Competency of Technical Organizations

0 The indicator is not valid for the field

1 Promotion of the area is partially done (Radio, TV, Internet, Newspaper), Contracted with Non-Governmental Organizations and Tourism Agencies, Festivals and Festivities are not held.

2 Promotion of the area is partially carried out (Radio, TV, Internet, Newspaper), Contracted with Non-Governmental Organizations, Tourism Agencies, and a few of the Festivals and Festivities are partially carried out. X

3 Promotion of the area is partially carried out (Radio, TV, Internet, Newspaper), Contracted with Non-Governmental Organizations and Tourism Agencies, Festivals and Festivities are partially carried out.

4 Promotion of the area is carried out regularly (Radio, TV, Internet, Newspaper), Contracted with Non-Governmental Organizations, Tourism Agencies, Festivals and Festivities are held.

### Indicator No 22: Infrastructure Facilities





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- |   |   |          |
|---|---|----------|
| 0 | Very inadequate in Solid Waste Management, Clean Drinking Water Resources, Waste Water Method, Power outages          |          |
| 1 | Inadequate issues regarding Solid Waste Management, Clean Drinking Water Resources, Waste Water Method, Power outages |          |
| 2 | Partially sufficient in Solid Waste Management, Clean Drinking Water Resources, Waste Water Method, Power outages     | <b>X</b> |
| 3 | Proficient in Solid Waste Management, Clean Drinking Water Resources, Waste Water Method, Power outages               |          |
| 4 | Very proficient in Solid Waste Management, Clean Drinking Water Resources, Waste Water Method, Power outages.         |          |

### Indicator No 23: Administrative, Political, Legal and Managerial Conditions

- |   |  |          |
|---|--|----------|
| 0 | There are serious administrative, political, legal and managerial problems regarding the realization of ecotourism activities.                   |          |
| 1 | There are at least three serious problems regarding the realization of ecotourism activities: administrative, political, legal and managerial.   |          |
| 2 | There are at least two/medium level administrative, political, legal and managerial problems regarding the realization of ecotourism activities. |          |
| 3 | There is at least one administrative, political, legal and managerial problem regarding the realization of ecotourism activities.                | <b>X</b> |
| 4 | There are no administrative, political, legal or managerial problems regarding the realization of ecotourism activities.                         |          |

The points (P) from the indicator report cards are found in Table 2. Weighted Points (W.P) were calculated by multiplying these scores with the Weight Coefficient (W.C.) corresponding to each indicator. According to the data in Table 3, the indicators that have the most positive impact on Latmos' ecotourism potential ( $P=4$ ,  $W.P>10$ ) are, in descending order: landforms (A.P=14), geological formations (W.P=13.6), nature protected areas/potential areas (W.P=12.48), history and archaeology (W.P=12.4), and folklore (W.P=11.04). On the other hand, the indicators that contribute the least to Latmos' ecotourism potential ( $P\leq 2$ ,  $W.P<10$ ) are superstructure facilities (W.P=2.6), socio-economic situation (W.P=4.4), gastronomy (W.P=5.52), social behaviors (A.P=6.88), and environmental quality (W.P=7.08). The maximum possible total for Weighted Points (W.P) from the indicators listed in Table 3 is 259.6. Latmos received a cumulative total of 192.7 Weighted Points (W.P) from all these indicators. Based on this analysis, Latmos' ecotourism potential is calculated to be 74%.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 1.** Ecotourism Potential of Latmos

No	Natural Indicators	W.C	P	W.P	No	Cultural Indicators	W.C	P	W.P
1	Graphical location	2,04	4	8,16	12	Transport	2,4	3	6,12
2	Surface shapes	3,5	4	14	13	Communication	1,78	3	5,34
3	Geological formations	3,4	4	13,6	14	History and Archeology	3,1	4	12,4
4	Climate conditions	2,04	4	8,16	15	Socio-Economic Situation	2,2	2	4,4
5	Hydrology	2,74	3	8,22	16	Folklore	2,76	4	11,04
6	Vegetation Diversity	3,3	3	9,9	17	Social Behaviors	3,44	2	6,88
7	Wildlife Diversity	3,16	3	9,48	18	Traditional Architecture and Crafts	3,06	3	9,18
8	Ecosystem Diversity	3,3	3	9,9	19	Gastronomy	2,76	2	5,52
9	Nature Protected Areas/Potential Areas	3,12	4	12,48	20	Superstructure Facilities	2,6	1	2,6
10	Environmental Quality	3,54	2	7,08	21	Competence of Technical Organizations	3	2	6
11	Recreational Opportunities	2	4	8	22	Infrastructure	2,74	2	5,48
					23	Administrative, Political, Legal and Managerial Conditions	2,92	3	8,76
<b>Total Score</b>		69			<b>Maximum Points</b>			92	
<b>Total Weighted Points</b>		192,7			<b>Maximum Weighted Points</b>			259,6	
<b>Weighted Potential Percentage</b>					%74				



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 4. CONCLUSION and RECOMMENDATIONS

Beşparmak Mountains (Latmos), located within the borders of Aydın and Muğla provinces in the Aegean Region, is an untouched area with rare values, located almost in the middle of destinations with intense mass tourism such as Kuşadası, Didim and Milas. However, its untouched geography is being destroyed by the opening of new mines every day. Mountain villages, which have very limited job opportunities and income sources, have experienced intense migration and, except for a few villages, their young population has decreased. A large portion of the young population risks their own health by working in mines.

However, in the study carried out, it was determined that the area has a unique value in the world in terms of both natural scales and cultural scales. As a matter of fact, in this study, it was determined that the ecotourism potential of Latmos was 74%. Latmos is unique with its landscape composition along with the traces of an 8,000-year-old culture hidden within its unique natural texture.

Given these considerations, transforming Latmos into an ecotourism hub while safeguarding its integrity and supporting rural development will benefit both the natural and cultural values of Latmos and the local populace.

In recent years, quarries have emerged as a significant conservation concern in this region. The mines presently operational in and around the northern Beşparmak Mountains are causing extensive damage that threatens to disrupt the unique landscape of our country. Unfortunately, these activities are rapidly eroding the region's natural features, which warrant archaeological protection.

A substantial issue is the lack of a requirement for an Environmental Impact Assessment (EIA) report to evaluate the environmental consequences of mining operations. Recent changes in EIA legislation allow mining activities in areas smaller than 25 hectares to proceed without an EIA report. Consequently, the impacts of mines in the Beşparmak Mountains have not been adequately assessed. At present, 90% of the mines have applied for operations in areas below 25 hectares, exempting them from the EIA report requirement.

The recreational potential of Latmos is enhanced by several significant elements, including landforms, geological formations, nature conservation areas and potential areas, historical and archaeological sites, folklore, ecosystem diversity, vegetation variety, and recreational opportunities.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Regarding landforms, the area boasts a diverse range of surface shapes, spanning from mountains, peaks, valleys, lakes, to islands, with elevations ranging from 2 meters to as high as 1500 meters. Latmos also encompasses various ecosystems, such as mountains, forests, caves, and lakes, which naturally facilitate a wide array of recreational activities, including trekking, hiking, photography, boating, and more. However, it's crucial to note that the landscape value of these landforms, particularly the mountain and forest ecosystems, is facing significant threats due to mining activities, resulting in a considerable loss of landscape value.

One of the most distinctive landscape features in Latmos is the intriguing rock formations that have emerged over time through the erosion of 500-million-year-old gneiss rocks. These formations, each resembling different objects or creatures, hold tremendous ecotourism value. Unfortunately, these geological formations are being progressively eroded due to the ongoing expansion of new mining operations, and the surrounding rock structures are also being impacted by the tremors resulting from the mining explosions. Additionally, the visual pollution caused by mining activities is diminishing the visual quality of the landscape in specific locations where these geological formations are prominent.

Latmos carries the enduring imprints of civilizations that have thrived there for the past 8000 years, making it a rare open-air museum for ecotourism. However, numerous cultural treasures, notably the 8000-year-old rock paintings, are exceptionally rare and highly susceptible to any activities conducted in their vicinity. Although the current count of rock paintings stands at 170, new ones are periodically discovered in the area. Unfortunately, the expansion of mining operations into additional areas leads to the destruction of undiscovered rock paintings.

Furthermore, Latmos stands out as one of the regions with the most extensive natural stone pine populations, earning it recognition as one of Turkey's 122 Important Plant Areas by the World Wide Fund for Nature (WWF). Latmos captivates visitors with its landscape compositions, featuring stone pines and captivating geomorphological formations. Its remarkable species diversity is especially valuable for botanical tours. However, mining activities inflict harm upon the region's natural vegetation, rare endemic plants, and wildlife as mining areas continue to expand.

Mining activities also have adverse effects on environmental quality and human health. Dust generated by mining activities combines with water, leading to soil and water pollution across the valley, contributing to various health issues for residents in lower elevation settlements.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

In this context, the local people, who have sustained themselves for centuries through traditional farming and animal husbandry methods while preserving their distinct way of life, are now abandoning their villages, resulting in the erosion of a rich cultural heritage.

It is thought that declaring Latmos as a "National Park" will be an important step towards ensuring the sustainability of the natural and cultural resource values of the area and at the same time promoting and effectively managing these values. According to the National Parks Regulation, places to be designated as national parks must meet the following criteria.

1-The natural and cultural resource value and recreational potential should hold special significance at both the national and international levels.

2 - Resource values must be of such importance that future generations take pride in inheriting them.

3 - Resource values must not be destroyed or should be amenable to rehabilitation through technical and administrative interventions.

4 - In terms of area size and concentration of resource values, excluding special cases and islands, the area should cover at least 1000 hectares, consisting entirely of protection-oriented zones. Development areas for administrative and touristic purposes are exempt from this minimum field size.

Latmos meets each of the criteria outlined above.

In 2015, a petition was supported by 360 non-governmental organizations from various countries, initiated by the Ecosystem Protection and Nature Lovers Association (EKODOSD) and the Turkish Wildlife Conservation Foundation (WWF), to declare the Beşparmak Mountains as a National Park, garnering 40,231 signatures. These signatures were submitted to the Prime Ministry. However, the proposal to grant Latmos "National Park" status, put forth by the National Parks, was rejected by the Council of Ministers. In 2021, efforts were made to designate Latmos and its surroundings as a "Special Environmental Protection Area." Latmos was introduced to a delegation from the General Directorate for the Protection of Natural Assets. In the same year, the proposal to declare Latmos a "National Park" was revisited, and Latmos was introduced to a delegation from the General Directorate of National Parks and Nature Conservation. Nevertheless, despite these endeavors, Latmos has not yet achieved the protection status it rightfully deserves.

In conclusion, mining activities in Latmos pose a significant threat to the region's natural beauty, cultural heritage, and human health. However, the area holds considerable ecotourism





## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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potential. It is crucial for the region to receive protection status to limit mining activities effectively. By transforming Latmos into an ecotourism hub, this unique region's rare beauty can be showcased on national and international stages, providing local residents with a substantial additional economic opportunity within the framework of ecotourism activities.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### PLANT BIODIVERSITY AND MAINTENANCE PRACTICES IN TOURISM RESORTS: THE EXAMPLE OF ANTALYA

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#### ABSTRACT

Landscape design includes the planned combination of natural features such as rocks and stones, as well as living plants such as flowers, grass, ground covers, shrubs, trees and wrappers. The plants preferred in tourism facilities are not only compatible with the design, but also contribute to the soil, local climate and biodiversity. Plants that are used, such as trees, shrubs, seasonal flowers, and grasses, need regular maintenance applications such as pruning, moving, fertilizing, watering, and pest and disease control, which have to be practiced by people who are educated about landscape maintenance. The aim of this study is to determine the plant species used in planting designs and discuss their suitability, contribution to biodiversity, and accuracy of the maintenance practices applied in the hotels, in line with the one-to-one interviews with the people responsible for landscape maintenance and on-site examinations in 12 selected hotels in Kundu, Göynük, Beldibi, Belek, Boğazkent, and Kiriş districts of Antalya province. According to the results, it was determined that a limited number of plant species were used in the tourism facilities examined. These plants are preferred because they are compatible with the area, easy to care and aesthetic appearance. Due to the size of the area, it was determined that maintenance decisions were made by visiting the area without a maintenance program. In addition to what should be done most of the time, it has been determined that the wishes of the owners of tourism facilities are also reflected in the planting design.

**Keywords:** Planting design, Landscape design, Landscape maintenance, Hotels, Plant preference





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Landscape architecture is a professional discipline that requires a multidisciplinary perspective and involves planning, designing, managing, protecting, and repairing the natural or man-made environment. Plant material and plant design, which are among the subjects of professional study, help us learn how to best use our environment and enable the establishment of a sustainable exchange between humans and their environment.

Outdoor spaces, which have an important place in tourism businesses, are an important requirement, especially for accommodation businesses. People's desire to spend most of their time outdoors in accommodation establishments such as hotels and holiday villages where they go for recreation purposes makes outdoor spaces important for these establishments. Water sports, children's playgrounds, sports fields, and other arrangements are outdoor spaces that have an impact on tourists' purchasing behavior. Water sports, children's playgrounds, sports fields, and other arrangements are outdoor spaces that have an impact on tourists' purchasing behavior (Dönmez & Türkmen, 2019). Landscape design and architecture in tourism facilities is the practical art and science of adapting land for customer use and enjoyment, based on the assumption that land use and beauty are harmonious, neither complete without the other.

With the development of holiday tourism, accommodation areas such as hotels, hostels, and resort hotels have also developed rapidly. Due to the geographical locations of these accommodation areas and the needs of individuals, the outdoor designs of these areas have become the main element of the process. In this process, while outdoor designs came to the fore, buildings remained in the background. Therefore, the importance of environmental factors in the selection of these areas was once again emphasized.

An enterprise that has made landscape arrangements appropriately and beautifully according to tourist needs has positive effects on tourists (Cooper et al., 1998). Thus, visitors may use the same facilities again and again. The reasons why tourists choose these facilities are the room, service, and food services offered by the facilities they go to for holiday purposes after a busy business period, as well as the services offered outdoors. Especially for families with children, touristic hotels that offer comfort and many activities may be the primary choice (Dönmez & Türkmen, 2019).

Landscape design includes the planned combination of living plants such as flowers, grasses, groundcovers, shrubs, trees, and vines, as well as natural features such as rocks and stones. Reflecting pools, fountains, outdoor artworks, gazebos, benches, or fences can also be included



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

in this design process (Masoudi et al., 2013). Plants constitute the most important part of landscape design in tourism facilities. Plants preferred in tourism facilities should not only be compatible with the design but also contribute to the soil, local climate, and biodiversity. In addition to the scientists who argue that the use of natural species that are specific to the region, have survived through a certain natural selection process, have adapted to environmental conditions, and require less care than foreign species should be encouraged, the plant designs also support the biological development of the region by allowing the use of exotic new species instead of natural species. It should be known that there are also scientists who support increasing diversity. This is a controversial issue, and when exotic species are used in designs, species with the potential to become invasive should not be preferred, the germination and growth characteristics of the species should be investigated, and species that contribute to biological diversity should not be endangered. Appropriate plant selection means choosing plants that not only match the design but are also well suited to the soil and local climate. Plants need to be selected according to the soil type and the sunshine duration of the area. Ideally, the plants chosen should be able to adapt to local fluctuations in temperature and soil moisture. In this context, the preference for the use of natural species and exotic species that are well adapted to the region comes to the fore. The use of these species, which require less irrigation, fertilization, and maintenance, contributes to the creation of sustainable landscapes. The healthiness of the selected plants, determining their water requirements, and ensuring the use of plants with similar water consumption together are other issues that should be taken into consideration in terms of effective irrigation (Selim et al., 2021).

Sustainable strategies for maintaining the landscape should be taken into account in addition to species selection. In order to preserve finite and expensive natural resources, reduce waste output, and aid in the prevention of air, water, and soil pollution, designing and building a sustainable landscape effectively combines the use of mechanical, chemical, biological, and cultural methods. Planning for sustainable landscape care aims to reduce negative environmental effects and increase return on investment. Sustainable landscape maintenance techniques include planting highly adapted plants and designing lawn areas that require less upkeep, conserving water while providing irrigation in the landscape, managing water runoff and maintaining its recycling, consciously using fertilizers and pesticides, improving the soil structure with compost and mulch, pruning meticulously, and carrying out all of these tasks by conscientious and knowledgeable individuals. It should be known that the species used in



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

vegetal designs also have different care requirements, and attention should be paid to these care practices to ensure sustainable vegetal designs. These landscape maintenance practices can be listed as irrigation, fertilization, pruning, disease and pest control, lawn area establishment, species selection, over-seeding, shape of lawn areas, weed control, use of insecticides, herbicides, and fungicides, and use of mulch.

Within the scope of this study, in line with one-on-one interviews with the people responsible for landscape maintenance and on-site examinations in 12 hotels selected in the Lara, Kiriş, Beldibi, and Belek regions of Antalya province, the identification of plant species used in plant designs, the maintenance practices applied in the area, and the characteristics of the technical team responsible for maintenance, it is aimed to reveal the existence of annual periodic maintenance programs.

### **2. MATERIALS and METHODS**

The study was carried out in 12 five-star hotels selected in Belek, Beldibi, Kiriş, and Lara districts of Antalya province. Ramamda Resort, Wyndham Garden, Royal Wings, Royal Holiday Palace, Liberty Holiday Palace are selected from Lara; Alva Donna World Palace, Queen' s Lejardin and Akka Alinda are selected from Kiriş; Nirvana Hotel, Mirage Park Resort and Mirada Del Mar are selected from Beldibi; Alva Donna Exclusive Hotel is selected from Belek district.

The research was conducted between September 2022 and June 2023. The working method consists of 7 stages. A literature review on the subject was conducted, and then the hotels where the research would be conducted were determined. First of all, an information form was prepared to determine the maintenance services applied to hotels. In line with the prepared information form, one-on-one interviews were held with landscape architects or authorized persons responsible for the landscaping of 12 five-star hotels, and field research was carried out. Information forms were filled out through one-on-one interviews. In addition to general information about the hotels (establishment, amount of green area, capacity), the information form includes the education and experience of the person responsible for landscape maintenance, the education level and experience of the team working in landscape maintenance, and landscape maintenance practices applied in green areas (fertilization, irrigation, pruning, mowing, etc.). It consists of 60 questions that reveal how the park is carried out (use of mulch) and whether there is an annual park maintenance program.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 3. FINDINGS and DISCUSSION

The establishment years, capacities, and number of green areas of the five-star hotels examined within the scope of the research are presented in Table 1. The oldest of the facilities is Mirada Del Mar, which started operating in 1991. Among the facilities examined, the newest one is Royal Wings, which was put into service in 2017 and has been in service for six years. When the hotels were evaluated in terms of their capacity, it was seen that the number varied between 800 and 2500 people. Facilities also differ in terms of the amount of green space they have. It was determined that Liberty Hotels with the smallest green area have a green area of 25 decares, while the facilities with the largest green area (80 decares) are Alva Donna and Nirvana Hotels.

**Table 1.** The establishment years, capacities, size of green areas, number of plant species of each hotel

	Hotels											
	Akka Alinda	Alva Donna	Alva Donna Beach Resort	Liberty Hotels	Mirada Del Mar	Mirage park resort	Nirvana	Queen Lejardin	Ramada Resort	Royal Holiday Palace	Royal Wings	Wyndham Garden
Establishment year	1995	1998	2013	2005	1991	1993	2016	2000	2014	2011	2017	2014
Capacity (person)	1070	2500	2000	800	1200	2000	1500	1500	1056	1600	1500	924
Green area size (decare)	35	80	55	25	70	60	80	30	40	65	60	30
Total plant species number	22	29	28	32	21	25	23	28	77	25	12	71
Natural plant species number	9	8	11	7	8	11	11	10	25	11	7	24
Percentage of natural species (%)	41%	27%	39%	21%	38%	44%	48%	36%	32%	44%	58%	34%
Egzotic plant species number	13	21	17	25	13	14	12	18	52	14	6	47
Percentage of egzotic species (%)	59%	73%	61%	79%	62%	56%	52%	64%	68%	56%	42%	66%

The people responsible for the landscape maintenance of the 12 hotels examined within the scope of the research's occupational status, including 5 landscape architects (42%), 3



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

agricultural engineers (25%), and 4 others (33%). When we look at the educational status of the people responsible for the landscape maintenance of the 12 hotels examined within the scope of the research, it was determined that they were 4 graduates, 4 undergraduates, 2 high school graduates, 1 secondary school graduate, and 1 primary school graduate. When the educational status of the landscaping team working under the command of the people responsible for the landscape maintenance of the 12 hotels examined within the scope of the research was examined, it was determined that 11 were high school graduates, 40 were secondary school graduates, and 20 were primary school graduates.

It was stated that 7 of the 12 hotels examined during the research had a plant species list, and 5 of them did not. In 12 hotels, it was determined that 1 of them produced the plants themselves, 3 of them purchased them from outside, and 7 hotels both produced and purchased their own plants. It was reported that 8 of the 12 hotels had a maintenance program, whereas 4 of them did not. The plant species determined in the green areas of the 12 hotels by field studies and are presented in Table 2.

When all facilities were examined together, it was determined that there were a total of 81 plant species. The tree and shrub species frequently found in every hotel are *Cycas revoluta*, *Olea europaea*, *Phoenix canariensis*, *Washingtonia robusta*, shrubs and climbing species such as *Bougainvillea glabra*, *Buxus sempervirens*, and *Nerium oleander*, seasonal flowers such as *Begonia sp.*, grasses such as *Cynodon dactylon*, *Festuca arundinacea*, *Lolium perenne*. *Stenotaphrum secundatum* and *Zoysia japonica*.

**Table 2.** The plant species determined in the green areas of the 12 hotels

Natural plant species (N)/Egzotic plant species (E)	Hotels											
	Akka Alinda	Alva Donna	Alva Donna Beach Resort Comfort	Liberty Hotels	Mirada Del Mar	Mirage park resort	Nirvana	Queen s Lejardin	Ramada Resort	Royal Holiday	Royal Wings	Wyndham Garden
<i>Acacia cyanophylla</i> (N)									X			X
<i>Agapanthus africanus</i> (E)			X			X			X			X
<i>Agave americana</i> (E)							X		X			X
<i>Alternanthera brasiliiana</i> (E)		X	X		X	X			X			X
<i>Araucaria araucana</i> (E)			X			X			X			X





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

<i>Arecastrum romanzoffiana</i> (E)	X	X	X		X				X			
<i>Bambusa aurea</i> (E)				X					X	X		X
<i>Begonia sp.</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Bouganvillea glabra</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Buxus sempervirens</i> (N)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Callistemon citrinus</i> (E)		X		X					X	X	X	X
<i>Canna indica</i> (E)	X		X	X			X	X	X			X
<i>Chamaerops humilis</i> (E)									X			X
<i>Citrus sinensis</i> (E)									X			X
<i>Citrus lemon</i> (E)						X		X	X	X		X
<i>Citrus aurantium</i> (E)								X	X			X
<i>Citrus reticulata</i> (E)						X			X			X
<i>Citrus fortunella margarita</i> (E)									X			X
<i>Cortaderia selloana</i> (E)				X					X	X		X
<i>Cuphea hyssopifolia</i> (E)					X		X		X			X
<i>Cupressocyparis leylandii</i> (E)	X	X	X	X					X	X	X	
<i>Cupressus arizonica glauca</i> (E)		X							X	X	X	X
<i>Cupressus macrocarpa</i> 'Goldcrest' (E)		X	X	X					X	X	X	X
<i>Cupressus sempervirens</i> (N)		X							X			X
<i>Cycas revoluta</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Cynodon dactylon</i> (N)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Cyperus alterniflorus</i> (E)									X			X
<i>Duranta lemon</i> (E)		X			X							X
<i>Erica arborea</i> (N)									X			X
<i>Eucalyptus globulus</i> (E)									X			X
<i>Euonymus japonicus</i> (E)		X		X					X			X
<i>Festuca arundinacea</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Festuca ovina</i> (E)									X			
<i>Ficus elastica</i> (E)				X					X			X
<i>Ficus nitida</i> (E)				X	X				X			X
<i>Gazania rigens</i> (E)									X			X
<i>Hedera helix</i> (N)				X			X		X	X		
<i>Hibiscus rosa sinensis</i> (E)									X			X
<i>Jacaranda mimozifolia</i> (E)	X											
<i>Jasminum officinale</i> (E)									X			X
<i>Juniperus horizontalis</i> (N)									X			
<i>Lagerstroemia indica</i> (E)				X		X		X	X			X
<i>Lantana camara</i> (E)									X			X
<i>Laurus nobilis</i> (N)		X			X				X			X



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

<i>Lavandula angustifolia</i> (N)							X		X	X		
<i>Ligustrum japonicum</i> (E)	X	X					X	X	X			X
<i>Lolium perenne</i> (N)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Magnolia grandiflora</i> (E)				X		X		X	X	X		X
<i>Melia azedarach</i> (E)		X	X	X					X			X
<i>Morus nigra pendula</i> (N)			X									
<i>Musa acuminata</i> (E)		X	X					X	X			X
<i>Nandina domestica</i> (E)									X			X
<i>Nephrolepis exaltata</i> (E)									X			
<i>Nerium oleander</i> (N)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Olea europaea</i> (N)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Opuntia ficus-indica</i> (N)									X			
<i>Pelargonium zonale</i> (E)		X							X			X
<i>Pennisetum setaceum rubrum</i> (E)									X			X
<i>Petunia hybrida</i> (E)									X			
<i>Phoenix canariensis</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Phoenix roebelenii</i> (E)									X			
<i>Pinus brutia</i> (N)	X		X	X	X	X	X		X			
<i>Pinus pinea</i> (N)	X		X	X	X	X	X		X	X		X
<i>Pittosporum tobira</i> (E)	X		X			X			X	X		
<i>Platanus orientalis</i> (N)									X			X
<i>Prunus cerasifera 'Nigra'</i> (E)									X			X
<i>Punica granatum</i> (E)									X			
<i>Rosa spp.</i> (N)									X			X
<i>Rosmarinus officinalis</i> (N)					X				X	X		
<i>Ruellia brittoniana</i> (E)			X	X		X			X	X		
<i>Russelia equisetiformis</i> (E)				X			X	X	X			
<i>Salix babylonica</i> (N)	X								X			X
<i>Stenotaphrum secundatum</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Strelitzia nicolai</i> (E)		X							X			X
<i>Strelitzia regina</i> (E)		X							X			
<i>Tradescantia pallida</i> (E)			X			X			X			X
<i>Viburnum tinus</i> (E)	X								X	X		
<i>Vinca erecta</i> (E)			X						X			X
<i>Washingtonia robusta</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X
<i>Yucca gigantea</i> (E)				X			X		X			
<i>Zoysia japonica</i> (E)	X	X	X	X	X	X	X	X	X	X	X	X

When the number of plant species in hotels was taken one by one, it was determined that the number varied between 12 and 77 (Table 1). It has been determined that the species found in



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

hotels largely consist of exotic species. The rate of natural species was found to be between 27 and 48%, and the rate of exotic species was found to be between 42 and 79%.

As a result of the interviews and observations, it was understood that there are annual maintenance programs, but they are not taken into account in practice. It was determined that the recommended soil/leaf test before fertilization was not carried out in all the hotels. The amount of fertilizer applied at the facilities is unknown. This shows that the annual maintenance program for fertilization is not followed, which poses a threat to soil and underground water resources. Irrigation, which should generally be applied in early morning, is done at night. It has been found that plants are often pruned at the wrong time. Although pruning varies from species to species, it is a general rule that it should be done after flowering. Although it varies from hotel to hotel, it has been understood that the grass is mowed without complying with the mowing height rule. It was observed that mulch application was not included.

#### **4. CONCLUSION and RECOMMENDATIONS**

According to the observations made, the total number of plant species used in the tourism facilities is 81. The number of species used varies from hotel to hotel but is between 12 and 71. In terms of maintenance operations, it has been understood that fertilization applications are applied to grass areas, trees and bushes, and seasonal flowers in spring and autumn. However, in Antalya conditions, it is recommended to fertilize mostly in the summer months. It was understood that soil or leaf testing was not done while fertilizing. Determining the nutrient deficiencies in the plant and soil before fertilization will ensure the elimination of factors that interfere with underground resources and cause pollution through unnecessary fertilization. The presence of weeds has been detected on the lawn of the hotel. Weed presence varies between 30% and 90%. It has been determined that mowing the grass too frequently and deeply causes the grass to thin out and helps the growth of weeds. Although irrigation time varies according to facilities, it has been determined that it is generally done. The most appropriate irrigation time is recommended to be between 05:00 and 08:00 in the morning. It was determined that the use of mulch in the facilities was insufficient. The use of mulch should be increased because it enables plants to grow more regularly, prevents the occurrence of diseases and pests, and creates an aesthetic appearance.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### IMPROVING THERMAL PERFORMANCE OF LIGHTWEIGHT CONCRETE FACADE PANELS: AGGREGATE TYPE

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#### ABSTRACT

It is known that lightweight concrete is commonly used in the production of facade panels. It was emphasized that the building envelope is the most crucial element in terms of energy efficiency in a structure. In this context, it was reported that various methods were applied to achieve optimal energy efficiency. The aim of this study is to improve the insulation properties of facade concrete to achieve optimal energy efficiency. In this context, the effect of aggregate type and usage ratio on the thermal performance of lightweight concrete mixtures was investigated. Within the scope of the study, a lightweight control mixture containing 100% limestone as fine and coarse aggregates was prepared. In addition to the control mixture, a total of 5 different lightweight concrete mixtures were produced by substituting 50% and 100% of the fine limestone aggregate with pumice and expanded perlite (EP), respectively. In all mixtures, the water-to-cement ratio, cement content, and slump value were kept constant at 0.46, 300 kg/m<sup>3</sup>, and 40±20 mm, respectively. The unit volume weights of the prepared mixtures were measured in the range of 850-1900 kg/m<sup>3</sup>. The 28-day thermal conductivity coefficients of the produced mixtures were determined. The thermal conductivity coefficient of the control mixture was measured as 0.43 W/Mk. It was observed that with the substitution of EP and pumice, the thermal conductivity coefficients of the mixtures significantly decreased. This behavior became even more pronounced with an increase in the aggregate substitution ratio. Compared to the control mixture, a 60% and 51% decrease in thermal conductivity coefficient values were calculated for mixtures with 100% EP and pumice substitution, respectively. The lowest thermal conductivity coefficient value was measured in the mixture containing 100% EP.

**Keywords:** Lightweight concrete, thermal conductivity coefficient, pumice, expanded perlite





## **INTRODUCTION**

Improved material technologies and construction methods were emphasized as enabling significant reductions in energy consumption for buildings and the provision of comfortable living conditions indoors (Chan et al., 2019; Kalipcilar et al., 2018; Aytekin and Mardani, 2021). It was reported that one of the most effective strategies for reducing energy consumption in buildings is to enhance the thermal insulation of the building envelope (Rahiminejad et al., 2021; Yoon et al., 2022). Therefore, it is understood that lightweight concrete facade panels are increasingly preferred.

Various studies investigating the thermal properties of concrete used in lightweight concrete facade panels were found in the literature (Jiang et al., 2022; Shao et al., 2022). In these studies, several authors have reported that fundamental parameters such as the water-to-cement ratio, cement content, aggregate type, and usage ratios used in concrete mixtures have a significant impact (Lo et al., 2007; Bakhshi et al., 2023; Dabbaghi et al., 2021). However, there is a limited number of studies that examine the effect of aggregate type and usage ratio used in lightweight concrete mixtures on the thermal properties of concrete (Ustaoglu et al., 2020). Therefore, it was understood that new research is necessary concerning the influence of lightweight aggregate type and usage ratio on the thermal properties of mixtures.

In this study, the aim is to enhance the insulation properties of facade concrete to achieve optimum energy efficiency. In this context, lightweight concrete mixtures were produced by substituting pumice and expanded perlite (EP) aggregate types at different usage ratios in place of limestone aggregate, with the goal of optimizing the thermal conductivity coefficient.

## **MATERIALS and METHODS**

### **Materials**

The binder utilized in this investigation was CEM I 42.5 R type cement (EN 197-1 Standard). Table 1 shows the cement chemical composition as well as some of their physical and mechanical characteristics after being purchased from the supplier.

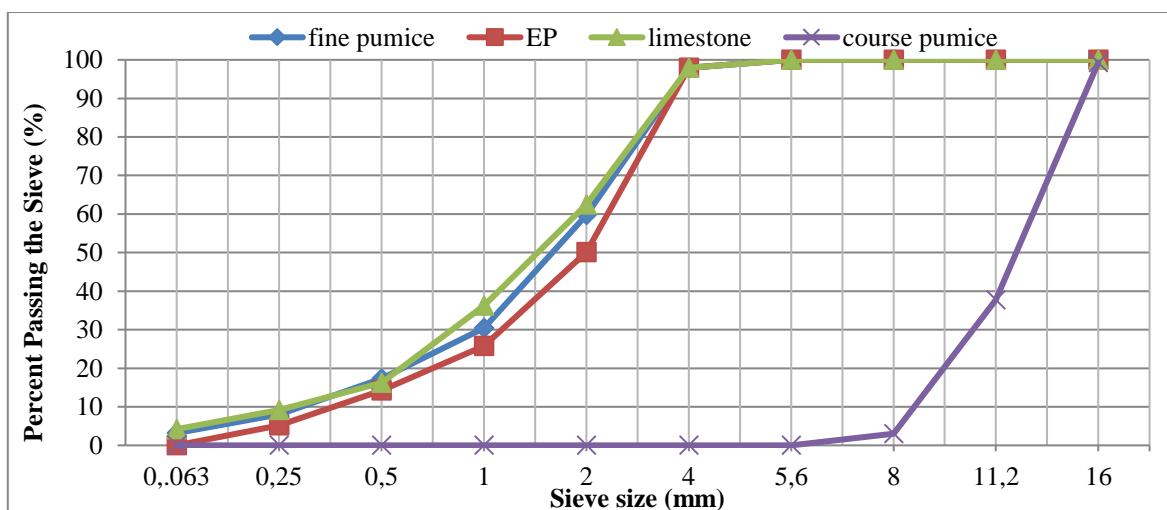
**Table 1.** Chemical Composition, Physical, and Mechanical Properties of Cement

Material	(%)	Physical properties	
SiO <sub>2</sub>	18.86	Specific gravity	3.15
Al <sub>2</sub> O <sub>3</sub>	5.71	<b>Mechanical properties</b>	
CaO	62.70	1-day	14.7
Fe <sub>2</sub> O <sub>3</sub>	3.09	CS (MPa)	2-day 26.80
MgO	1.16		7-day 49.80
Na <sub>2</sub> O+0.658 K <sub>2</sub> O	0.92		28-day 58.5
SO <sub>3</sub>	2.39	<b>Fineness</b>	
Cl <sup>-</sup>	0.01	Residual on 0.045 mm sieve (%)	7.6
Loss on ignition (LOI)	3.20	Blaine specific surface (cm <sup>2</sup> /g)	3530
Insoluble residue	0.32		
Free CaO	1.26		

Pumice with particle sizes of 5-15 mm and 0-4 mm, and as fine aggregates, crushed limestone with a particle size of 0-4 mm and EP, were used. The specific gravity and water absorption capacity test results of the aggregates used in the study are provided in Table 2. The gradation curve of the aggregates is shown in Figure 1.

**Table 2.** Specific Gravity and Water Absorption Capacity Values of Used Aggregates

Size(mm)	Specific Gravity	Water-Absorption Capacity (%)
0-4 (limestone )	2.6	0.37
5-15 (pumice )	0.92	54
0-4 (pumice)	1.09	44
0-4 (expanded perlite)	0.1	250



**Figure 1.** The gradation curve of aggregate



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

To achieve the target slump value in lightweight concrete mixtures, a uniform high-range water-reducing admixture based on Polycarboxylate ether was used. Some technical specifications of the admixture, provided by the manufacturer, are presented in Table 3.

**Table 3.** Some Properties of Polycarboxylate Ether-Based High Water Reducing Admixture

Density (g/cm <sup>3</sup> )	Solid Matter Content (%)	pH Value	Chloride Content (%)	Alkali Ratio , Na <sub>2</sub> O (%)
1.023-1.063	32	5.8	<0.1	<10

### Preparation of mixtures

The mixture calculations were performed based on 1 m<sup>3</sup> of concrete. Mixtures with a water-to-cement ratio of 0.46 were designed according to ACI 211-2 Standard. In all mixtures, the cement content and slump value were kept constant at 300 kg/m<sup>3</sup> and 40±20 mm, respectively (ACI 211-2, 1991; TS 2511, 2017).

In the scope of the study, experiments were conducted by substituting EP and pumice in certain proportions (%100 and %50) in place of limestone (0-4 mm) used as fine aggregate in the control mixture, which was prepared based on previous studies in the literature. A total of 5 mixtures were prepared, including one control mixture (Table 5).

The nomenclature of the mixtures was done based on the aggregate type and substitution ratio. For example, the mixture with 50% substitution of expanded perlite was named EP\_50, and the mixture with 50% substitution of pumice was named P\_50. The material ratios and quantities used in the production of 1 m<sup>3</sup> of lightweight concrete are shown in Table 4.

**Table 4.** Ratios and Quantities of Materials Used in the Production of 1 m<sup>3</sup> Lightweight Concrete

Mixture	Water/ Cement Ratio	Cement	0-4 mm Aggregate Limestone	5-15 mm Aggregate Pumice	0-4 mm Aggregate Pumice	0-4mm Aggregate Perlite
C			1108	296		
P_50			554	296	232	
P_100	0.46	300		296	465	
EP_50			554	296		21
EP_100				296		43

## Method

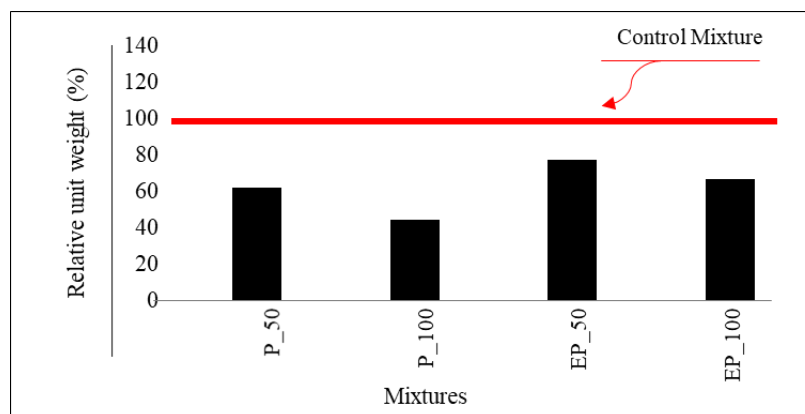
The concrete mixtures were prepared in a vertical-axis, mixer with a capacity of 45 liters, in accordance with the standards. Pumice aggregate was used in a dry surface saturated condition. The prepared specimens were cured in lime-saturated water until the testing day, following the standards.

The slump and unit weight values of the mixtures were determined according to EN 12350-2 and EN 12350-6 standards, respectively. The thermal conductivity test of the mixtures was conducted according to ASTM C518 and ISO 8301 standards using a test setup consisting of cooling plates cooled with water. In the context of the experiment, when there is a temperature difference of 1°C between the two surfaces under equilibrium conditions, the amount of heat passing through a unit area (1 m<sup>2</sup>) of unit thickness (1 m) in a unit time (1 hour) is measured.

## FINDINGS and DISCUSSION

### Fresh state properties

The relative unit weight values of the mixtures compared to the control mixture are shown in Figure 2. The unit weight values of the mixtures produced in the scope of the study ranged from 850 to 1900 kg/m<sup>3</sup>. It was observed that the unit weight values of all mixtures were below the existing limit value of 2000 kg/m<sup>3</sup> for lightweight concrete (ACI 211-2, 1991; TS 2511, 2017). Regardless of the aggregate type and usage ratio, the substitution of pumice and EP for crushed limestone resulted in a reduction of fresh unit weight values of the mixtures by approximately 19-52%. This phenomenon is directly related to the specific gravity of the materials used in place of limestone (Ducman V. & Mirtič B., 2014; Mardani-Aghabaglou et al., 2015). Mixtures with EP substitution had the lowest unit weight values. The mixture containing 100% EP as a fine aggregate had a unit weight value of 850 kg/m<sup>3</sup>.



**Figure2.** The relative unit weight values of the mixtures compared to the control mixture



### **Thermal conductivity**

The thermal conductivity coefficient values of the mixtures are shown in Table 5. The thermal conductivity coefficient of the control mixture was measured as 0.43 W/MK. It was found that the substitution of EP and pumice in the mixtures significantly reduced the thermal conductivity coefficients. This behavior became more pronounced with an increase in aggregate substitution ratio. It was observed that mixtures containing EP exhibited superior thermal performance compared to mixtures containing pumice. In comparison to the control mixture, a reduction of approximately 60% and 51% in thermal conductivity coefficient values was calculated for mixtures with 100% EP and pumice substitution, respectively. The lowest thermal conductivity coefficient value was measured in the mixture containing 100% EP. Previous studies have also emphasized that aggregates with higher density generally exhibit better thermal conductivity properties compared to aggregates with lower density (Sezer et al., 2020; Mardani-Aghabaglou et al., 2020; Al-Sibahy A. & Edwards R., 2012).

**Table 5.** Thermal conductivity coefficient values (U) of the mixtures

<b>Mixture</b>	<b>U value (W/Mk)</b>
<b>C</b>	0,43
<b>P_50</b>	0,25
<b>P_100</b>	0,21
<b>EP_50</b>	0,20
<b>EP_100</b>	0,17

### **CONCLUSION and RECOMMENDATIONS**

- It was observed that the thermal conductivity coefficients of the mixtures decreased significantly with the substitution of EP and pumice.
- The lowest thermal conductivity coefficient value was measured in the mixture containing 100% EP.
- It can be concluded that mixtures containing EP exhibited superior thermal performance compared to mixtures containing pumice.

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION OF EARLY AGE COMPRESSIVE AND FLEXURAL STRENGTH PERFORMANCE OF SUSTAINABLE 3D PRINTABLE CONCRETE MIXTURES HAVING HIGH-VOLUME FLY ASH

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#### ABSTRACT

3D printable concrete (3DPC) has become a focal point of interest due to their ability to provide freedom in design, eliminate the use of molds, reduce labor costs, and minimize occupational accidents. The amount of aggregate is reduced while the amount of cementitious material is increased to meet the extrusion requirements in 3DPC. In mixtures with a high cement dosage, it was observed that the heat of hydration is elevated, which can lead to an increase in autogenous and drying-shrinkage cracks. It was understood that supplementary cementitious materials such as fly ash, slag and silica fume are substituted in order to reduce the production cost and increase the performance of fresh and hardened state properties of 3DPC. Use of mineral additives in 3DPC has a positive impact on workability and mechanical properties but can lead to a reduction in early-age strength. Thus, limitations were imposed on the use of mineral admixtures in 3DPC. In this study, the effect of fly ash dosage on the 7-day compressive and flexural strength of 3DPC was investigated. For this purpose, four different fly ash dosages (300, 330, 350, and 400 kg/m<sup>3</sup>) were used to produce 3DPC with a fixed water/binder ratio and a water-reducing admixture ratio that met the criteria of extrudability, buildability, and shape stability. As a result, it was understood that the increase in fly ash usage up to 350 kg/m<sup>3</sup> does not have a significant impact on the early-age compressive and flexural strength of the mixtures. However, it was observed that these values are significantly adversely affected at the dosage of 400 kg/m<sup>3</sup>.

**Keywords:** 3D printable concrete, sustainability, fly ash dosage, compressive and flexural strength



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

3D technology in the construction industry offers superior features such as enabling faster production, reducing labor and work accidents, providing design freedom, and partially reducing costs compared to traditional methods (Şahin and Mardani, 2022a; Şahin and Mardani, 2023a; Ngo et al., 2018; Hager et al., 2016; Bhardwaj et al., 2019; Buswell et al., 2018). Various researchers have stated that the aggregate amount is reduced, and the cement amount is increased in the production of 3D printable concrete (3DPC) mixtures (Şahin and Mardani, 2023b; Wang et al., 2021). It is known that a high dosage of cement leads to an increase in heat of hydration. It was stated that this situation not only causes economic and ecological damage but also increases the risk of drying-shrinkage of the mixtures (Khalil et al., 2017; Kim et al., 2020). This situation has necessitated the use of alternative binding materials instead of cement in 3DPC mixtures (Chen et al., 2017). For this purpose, it was indicated by Ma et al. (2018) that mineral additives such as fly ash, slag, and silica fume are substituted for ordinary Portland cement in 3DPC mixtures. However, it was reported that due to the use of mineral additives, reductions in early-age strength of 3DPC mixtures can occur (Şahin and Mardani, 2022b). It was stated by Marchon, (2018) that this situation imposes limitations on the use of mineral additives in 3DPC mixtures. In this study, the effect of fly ash utilization ratio on the early age compressive and flexural strength of 3DPC mixtures was investigated.

### 2. MATERIALS and METHODS

In this study, CEM I 42.5R type Portland cement and F type fly ash were used as binders. The chemical composition, physical, and mechanical properties of cement and fly ash are shown in Table 1.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 1.** Some properties of cement and fly ash

Oxides (%)		Cement	Fly Ash
	SiO <sub>2</sub>	18	58.79
	Al <sub>2</sub> O <sub>3</sub>	4.75	22.51
	Fe <sub>2</sub> O <sub>3</sub>	3.58	7.89
	CaO	63	3.7
	MgO	1.4	2.18
	Na <sub>2</sub> O+0,658 K <sub>2</sub> O	0.7	1.93
	SO <sub>3</sub>	3.11	0.29
<b>Specific gravity</b>		3.06	2.35
<b>Specific surface (cm<sup>2</sup>/g)</b>		3441	4000
<b>Compressive Strength (MPa)</b>	7-Day	42.8	-
	28-Day	51.8	-
<b>Pozzolanic activity index (%)</b>	28-Day	-	77.7
	90-Day	-	92.5
<b>Setting Time (min)</b>	Initial	170	-
	Final	240	-

Within the scope of the study, specific gravity, water absorption capacity, and  $D_{max}$  values were obtained using crushed limestone with values of 2.58, 0.4%, and 1 mm, respectively. Additionally, some properties of the water reducing admixture used are shown in Table 2.

**Table 2.** Some properties of water reducing admixture

Density (g/cm <sup>3</sup> )	Solid Content (%)	pH	Chlorine Content (%)	Na <sub>2</sub> O (%)
1.060	32	2-5	<0.1	<10

The parameters proposed by Şahin et al., (2022b) for extrudability, buildability, and shape stability criteria were considered in the design of the produced mixtures. In this context, the mixing ratios used in 3DPC produced within the scope of the study, with four different fly ash





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

ratios, are shown in Table 3. The nomenclature of the mixtures was made according to the fly ash utilization ratio. For example, the 3DPC containing 350 kg/m<sup>3</sup> fly ash is named FA-350.

**Table 3.** Mixture amounts used in the production of 1 m<sup>3</sup> 3DPC (kg/m<sup>3</sup>)

Mixture	Cement	Fly Ash	Aggregate	WRA	w/b
FA-300	450	300	1134.6		
FA-330	450	330	1074.6		
FA-350	450	350	1034.5	8.5	0.35
FA-400	400	400	1021.8		

7-day compressive strength and three-point flexural strength of the mixtures were examined. The mechanical properties of the specimens were determined using the dimensions and loading directions specified in the TS EN 196-1 Standard.

### 3. FINDINGS and DISCUSSION

The early-age compressive and flexural strength results of 3DPC mixtures are shown in Table 4. As can be seen from the table, with an increase in the fly ash content up to 350 kg/m<sup>3</sup>, the compressive and flexural strength values of the mixtures have increased by 13% and 3%, respectively, compared to the FA-300 mixture. It is understood that there is a slight increase in strength values due to the fine structure of fly ash and its filling effect.

However, it was determined that with an increase in the fly ash content to 400 kg/m<sup>3</sup>, the compressive and flexural strengths of the mixtures decreased by 11% and 25% respectively, compared to the FA-300 mixture. It was emphasized that this situation is due to the decrease in the amount of cement and therefore the decrease in C-S-H gels at an early age, which directly affects the strength (Mardani-Aghabaglou et al., 2014; Mardani-Aghabaglou et al., 2013).

**Table 4.** 7-day compressive and flexural strength of 3DPC mixtures

Mixture	Compressive Strength (MPa)	Flexural Strength (MPa)
FA-300	25.1	9.36
FA-330	28.0	9.45
FA-350	28.9	9.65
FA-400	22.2	7.0



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 4. CONCLUSION AND RECOMMENDATIONS

As a result of the materials used and the experiments carried out within the scope of the study, the following results were obtained;

- It was understood that increasing the use of fly ash up to  $350 \text{ kg/m}^3$  does not have a significant effect on the early age compressive and flexural strengths of the mixtures.
- It was observed that these values were significantly negatively affected at the dosage of  $400 \text{ kg/m}^3$ .

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INFLUENCE OF MAIN CHAIN LENGTH OF POLYCARBOXYLATE-BASED WATER-REDUCING ADMIXTURE ON SOME FRESH STATE PROPERTIES OF FLY ASH-SUBSTITUTED CEMENTITIOUS SYSTEMS

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#### ABSTRACT

Substituting cement with fly ash in concrete production offers environmental and economic advantages, as it not only eliminates fly ash waste but also reduces the demand for cement. Polycarboxylate-based water-reducing admixtures (PCE) play a pivotal role in enhancing the fluidity properties of fly ash-substituted systems. In this study, an examination was conducted on the impact of changes in both the main chain length and molecular weight of PCE on several fresh state properties within fly ash-substituted systems. To fulfill this objective, two distinct PCE syntheses were carried out, exclusively focusing on the alteration of the main chain length and molecular weight. Experiments involving Marsh-funnel flow time and mini-slump were executed on cement paste mixtures incorporating fly ash and prepared using the synthesized PCEs. Based on the obtained results, it was observed that PCEs characterized by a shorter main chain length and lower molecular weight displayed superior performance within fly ash-substituted systems when compared to PCEs featuring a longer main chain and higher molecular weight. This observation can be attributed to the incapacity of long main chain PCEs to maintain their stretched structure, the bridging effect, and the intertwining of the main chains.

**Keywords:** Polycarboxylate ether-based water-reducing admixture (PCE), modification of main-chain length, fly ash, Marsh-funnel





## **1. INTRODUCTION**

Fly ashes (FA) constitute one of the residues produced through coal combustion for electricity and heat generation. FA captured by electrostatic precipitators or bag filters before the release of flue gases. Through the substitution of fly ash in concrete production, environmental and economic advantages can be attained by eliminating fly ash and reducing the demand for cement. Per the ASTM C618 Standard, fly ash is classified into two categories: Class F and Class C. Class F fly ash, distinguished by its spherical shape and lubricating effect (ball effect), possesses the capability to enhance the workability of concrete (Joshi et al., 1997; Ramachandran et al., 2017; Altun et al., 2021; Özen et al., 2022). Nevertheless, the utilization of polycarboxylate-based water-reducing admixtures (PCE) may be necessary in fly ash-substituted cement systems to enhance fluidity performance. On the other hand, certain studies have indicated that the anticipated effectiveness of PCE in enhancing workability within fly ash replacement systems may not be realized (Sha et al., 2018; Sathyan et al., 2019). This discrepancy is attributed to the potential for PCE to permeate into the pores on the fly ash surface, either neutralizing the performance of the PCE (resulting in a loss of dispersion effect) or creating a bridging effect through adsorption onto multiple fly ash particles, thereby adversely affecting the workability of concrete (Wang et al., 2021). Conversely, the positive impact of PCE on workability in fly ash-substituted systems is attributed to the fact that the PCE released in the system enhances workability by establishing a barrier that prevents particle agglomeration (Wang et al., 2021). Therefore, in the selection of PCEs for fly ash replacement mixtures, it is essential to consider the properties of both PCE and fly ash that influence their interactions.

In this study, the impact of alterations in PCE's main chain length and molecular weight on Marsh-funnel flow time and mini-slump performance in fly ash-substituted cementitious systems was investigated. To achieve this, two distinct PCEs were synthesized, varying the main chain lengths and molecular weights while maintaining other properties constant. Paste mixtures were then formulated with 15%, 30%, and 45% fly ash replacement by weight of cement, utilizing the synthesized PCEs.

## **2. MATERIALS and METHODS**

As part of this study, CEMI 42.5R type Portland cement, in accordance with the EN 197-1 Standard, and class F fly ash, adhering to the EN 450-2 Standard, were employed. The detailed physical, chemical, and mechanical properties of these materials are outlined in Table 1.

**Table 1.** The physical, chemical, and mechanical properties of the binders

Oxides (%)	Cement	Fly Ash
SiO <sub>2</sub>	18.94	59.22
Al <sub>2</sub> O <sub>3</sub>	4.33	22.86
Fe <sub>2</sub> O <sub>3</sub>	5.53	6.31
CaO	61.67	3.09
MgO	1.55	1.31
SO <sub>3</sub>	2.82	0.17
Cl <sup>-</sup>	0.04	0.001
<i>Free CaO</i>	0.75	-
<i>LOI</i>	3.33	3.20
<b>Specific gravity</b>	3.21	2.31
<b>Specific surface (cm<sup>2</sup>/g)</b>	3786	4300

Throughout the synthesis, the free non-ionic content and the anionic/non-ionic group ratio for all PCEs were consistently maintained at 2.78 mole and 3 mole/mole, respectively. The main chain lengths of the PCEs were designated based on the number of non-ionic groups they contained, while the anionic/non-ionic group ratio remained constant for each polymer. The nomenclature for all PCEs was derived from their respective main and side chain lengths. For instance, a PCE with 31 non-ionic groups, a main chain length of 31k, and a side chain length of 2400 g/mole would be denoted as MC31k-SC2400. The characteristics of the synthesized PCEs are given in Table 2.

**Table 2.** Some Characteristics of PCEs

PCE	Density (g/cm <sup>3</sup> )	Mw (g/mole)	PDI (Mw/Mn)	Main chain length	Side chain length (g/mole)
MC10k-SC2400	1.09	27,000	2.3	10k	2400
MC31k-SC2400	1.08	78,000	2.1	31k	2400

Paste mixtures were initially prepared at a W/B ratio of 0.35 to determine Marsh-funnel flow times (Mardani-Aghabaglou, 2016; Altun et al., 2021; Özen et al., 2022; Kobya et al., 2022; Kobya et al., 2023). The mixture employed for the Marsh funnel test was also utilized for the mini-flow test, following the procedures outlined in references (Aitcin, 2004; Kantro, 1980).

### 3. FINDINGS and DISCUSSION

The Marsh-funnel flow time and mini-slump values for all paste mixtures are given in Table 3. The nomenclature of the mixtures was made according to the fly ash substitution rate and the PCE type used. For example, the mixture containing 14% FA and prepared with MC10k-SC2400 is named FA15-MC10k-SC2400.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Marsh-funnel flow times of all mixtures increased as the fly ash replacement ratio increased. In fly ash substituted cementitious systems, there are mechanisms that affect the workability positively and negatively depending on the properties of fly ash. Since fly ash particles are finer than the cement particles they replace, the surface area increases and this causes agglomeration and an increase in PCE and/or water requirements (Özen et al., 2022; Sha et al., 2018). These conditions adversely affect workability. On the other hand, the spherical shape of the fly ash particles creates a lubricating effect that increases (Tkaczewska et. al, 2014; Sathyan et al., 2019; Wang et al., 2021). This effect is relatively limited possibly due to the dominant presence of irregular fly ash particles compared to spherical ones. The parameters that negatively affect the workability were dominant in all paste mixtures prepared for the Marsh-funnel experiment. In evaluating the impact of PCE main chain length on Marsh-funnel flow time, superior performance is observed with the short main chain MC10k-SC2400 compared to the long main chain MC31k-SC2400. The saturation point of the PCE mixture without FA is 12.5% lower than that of MC31k-SC2400, decreasing to 22% with 15% FA and 10% with 45% FA. Notably, PCE main chain length variation does not significantly affect mini-slump values.

**Table 3.** Marsh-funnel flow times and mini-slump value of mixtures

	Mixtures	PCE dosage (%)										
		0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3
Flow time (s)	FA0-MC10k-SC2400	X*	96.2	64.8	55.2	49.4	<b>47.2**</b>	46.3	46.9	46.1	-	-
	FA0-MC31k-SC2400	X	133.8	99.2	67.9	64.5	56.2	<b>52.1</b>	51.5	52.2	-	-
	FA15-MC10k-SC2400	X	98.8	78.5	70.6	66.2	<b>63.3</b>	62.3	61.3	64.1	-	-
	FA15-MC31k-SC2400	X	X	164.2	130.5	108	96.9	86.1	<b>78.3</b>	77.3	76.8	-
	FA30-MC10k-SC2400	X	X	220.3	146.1	137.2	116.3	104.7	<b>96.4</b>	94.2	93.7	-
	FA30-MC31k-SC2400	X	X	X	240.1	213.6	187.8	124.6	<b>114.7</b>	113.5	112.3	-
	FA45-MC10k-SC2400	X	X	X	220.5	183	164	144	<b>130.9</b>	128.1	127.7	-
	FA45-MC31k-SC2400	X	X	X	X	246	208	142	129.1	<b>122.4</b>	121.9	121
Mini-slump (cm)	FA0-MC10k-SC2400	X	12.8	17.6	17.9	19	<b>21.3</b>	21	19.5	19	-	-
	FA0-MC31k-SC2400	X	11.2	14.3	19.2	19.3	19.8	<b>20.1</b>	19.9	19.8	-	-
	FA15-MC10k-SC2400	X	18.5	18.7	18.9	19.2	<b>20.3</b>	20.1	20.4	20.3	20.2	-
	FA15-MC31k-SC2400	X	X	12.8	14.2	17.4	17.9	18.3	<b>18.8</b>	19.2	19	-
	FA30-MC10k-SC2400	X	X	13.2	15.7	17.6	18.4	18.2	<b>18.9</b>	19.1	19.2	-
	FA30-MC31k-SC2400	X	X	X	13.7	15.8	17.2	17.9	<b>18.2</b>	18.4	18.4	-
	FA45-MC10k-SC2400	X	X	X	16.5	17.3	17.6	18.7	<b>19.1</b>	19.2	19.1	-
	FA45-MC31k-SC2400	X	X	X	X	14.1	15.2	16.8	17.9	<b>18.3</b>	18.4	18.6

\* There was no flow through the Marsh-funnel.

\*\* The saturation point flow time is highlighted with the bolt.

#### 4. CONCLUSION and RECOMMENDATIONS

In this study, the influences of variations in both the main chain length and molecular weight of PCE on various fresh state properties within fly ash-substituted systems. The results are listed below:

- Regardless of PCE type, increment in fly-ash content generally adversely effect on flow time and mini slump-flow performance of mortar mixtures.
- PCEs with shorter main chain length and lower molecular weight exhibited superior performance in fly ash-substituted systems compared to those with longer main chain and higher molecular weight. This can be attributed to the incapacity of long main chain PCEs to maintain their stretched structure, causing a bridging effect and intertwining of the main chains.



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SUSTAINABLE WATER MANAGEMENT: THE ROLE OF UNIVERSITY CAMPUSES AND COMPARATIVE IMPLEMENTATION APPROACH

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#### ABSTRACT

Considering the effects of increasing population, excessive urbanization and climate change, the amount of rainfall-induced surface runoff, peak flows and pollution loads have increased significantly as a result of the increase in impervious surfaces, especially in urban areas. For this reason, especially in recent decades, many methods and practices have been developed in various parts of the world within the framework of sustainable city understanding (LID, WSUD, IUWM, SuDS, BMP). Within the scope of this study, the above-mentioned methods are explained and their similarities and differences are evaluated. The distinct terminology arises from their respective geographic origins, such as LID in the USA, WSUD in Australia, and SuDS in the UK. There are a wide variety of structural and non-structural applications of these methods, but considering that the establishment of different systems for the whole city is quite difficult in terms of both economics, functionality and management, practical applications are proposed for university campuses, which occupy an important place in urban areas. Non-structural measures such as raising awareness of the public and administrators, cluster-type settlement formation and protection of natural habitat should be considered as the first stage. In the second stage, stormwater harvesting systems, rain gardens, green roof systems, permeable pavements and car parks, and the design of university campuses are considered as basic practices for sustainable water management. As a result of the cluster-type settlement, a significant part of the land maintains the natural water cycle, while in the settlements within the campus where construction is concentrated, structural applications reduce the amount of surface runoff, pollutant load, peak flow, and reduce the dependence on mains water by reusing rainwater.

**Keywords:** Urban drainage, urban stormwater management, sustainable drainage systems, low impact developments, water sensitive urban design



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Today, the existence of phenomena such as rapidly increasing population, urbanization and unconscious consumption adversely affects water resources in terms of quality and quantity. Especially the developing urban life has increased the impervious surface areas by creating the need for various structures such as roads, shopping centers, buildings and car parks (Ahmed et al., 2022). This has prevented the natural infiltration of rainwater into the soil, resulting in large amounts of water being diverted to conveyance pipes and receiving water bodies (Qin, 2020 ; Çırağ & Fırat, 2023). In many developing countries, in contrast to 'separate systems' where stormwater and sewage are conveyed in separate underground conveyance systems, 'combined systems' exist where these two water bodies are conveyed together. The rapid collection of rainwater from impervious surfaces in large quantities and its transfer to these combined conveyance systems has both strained the capacity of sewerage systems and turned clean rainwater into a polluted source. In addition, conventional stormwater systems bring many social, economic and structural problems (Hoyer et al., 2011). These include;

- (i) These are the limitation of groundwater utilization activities by reducing infiltration and lowering groundwater levels due to the rapid drainage of water from the impermeable surfaces of urban areas.
- (ii) As a result of the decreases in the amount of infiltration, evaporation and transpiration, it causes negative climatic changes in the precipitation-temperature conditions of the region.
- (iii) In sudden and intense rainfall, the capacities of sewerage systems are exceeded and flood risks increase, especially in downstream areas.
- (iv) In terms of climate change, which is one of the most important problems of today, it can be characterised as weak adaptation ability against uncertain and variable conditions.

In recent decades, it has become common to think of these mandatory impermeable structures brought by urban life as a basin in the smart management system of rainwater and to think of rainwater, which is very clean, as a resource for reuse by collecting rainwater from these surfaces (Gimenez-Maranges et al., 2020). The innovative (sustainable) stormwater management scheme adopted three basic principles: preservation, source control and structural control (Victorian Stormwater Committee, 1999). Preservation as a first principle includes the protection of existing wetlands and natural vegetation. Resource control includes approaches such as public awareness, education, land use planning, etc. to protect against the harmful effects of stormwater. Finally, structural control includes various engineering structures and



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

practices to eliminate the harmful effects of stormwater. Especially in developed countries, various stormwater management principles have been adopted to protect against the harmful effects of stormwater and even to reuse it as a valuable asset. In the following sections of the study, these concepts (terms) will be explained, some management practices will be mentioned, and application suggestions will be presented for university campus areas, which occupy an important place in urban areas.

### **MATERIALS and METHODS**

#### *2.1 Low Impact Development (LID)*

LID is a commonly used term these days, especially in the USA and New Zealand (Fletcher et al., 2015). While some LID techniques are already available, Prince George's County (1999) put forward LID as a guideline for Maryland (USA) to lessen the impact of non-permeable surfaces, which was quickly adopted. In the most general definition, LID aims to bring the hydrological cycle in urban areas closer to its natural state, in other words, it is the measures taken to restore and improve the natural water cycle of the basin before urbanization, especially by prioritizing infiltration and evapotranspiration (Damodaram et al., 2010). LID generally includes small-scale applications and cost-effective practices that can manage large rainfall volumes at source by limiting runoff volume and peak flow, reducing pollutant loads, and preventing overflows in combined sewer systems (Rodríguez-Rojas & Grindlay, 2022). These practices can be divided into structural and non-structural practices (Table 1). Non-structural practices are relatively easy to implement and adopt with minimum budget requirements. However, using structural applications as a backup option may be practical due to their expenses, complex design, and installation demands. Alternatively, a combination of multiple structural applications could be devised and applied to a region for maximum benefit.

**Table 2.** Structural and non-structural LID applications

<b>Structural practices</b>	<b>Non-structural practices</b>
➤ Rain garden	➤ Cleaning of streets and roads
➤ Infiltration trenches	➤ The use of natural vegetation
➤ Stormwater wetlands	➤ Reducing and disconnecting impervious surfaces
➤ Wet ponds	➤ Preservation of natural site features
➤ Permeable pavements	➤ Minimisation of site disturbance (Clustered Settlement)
➤ Vegetated Swales	
➤ Green roofs	➤ Public awareness raising activities
➤ Water harvesting systems	



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 2.2 Water sensitive urban design (WSUD)

WSUD is a term used to refer to an innovative stormwater management approach, particularly in Australia. Guidelines were first published in Western Australia in 1994 (Whelans et al., 1994). It is a planning and design approach to overcome both water quantity and water quality issues by modifying landscape features to reduce the impact of urban stormwater and integrate the natural water cycle into urban development (Kunapo et al., 2009). WSUD aims to minimize the environmental and social impacts of urban development and enables the creation of more sustainable and livable cities. The main objectives of this approach can be listed as follows;

1. Managing the city water balance (groundwater, river flows, etc.).
2. Protect and improve water quality.
3. Promoting water conservation and reducing the use of clean water, especially by collecting and utilizing rainwater for areas not used for drinking water purposes, and recycling wastewater.
4. Reducing the amount of surface runoff and peak flows to reduce drainage cost capacity, prevent pollution and reduce flood risks.

Coombes (2015) characterized WSUD in the most basic sense as practices that help to reduce runoff, increase evapotranspiration and soil infiltration. Table 2 presents the various techniques used for WSUD and how they address water balance, water quality and water conservation objectives.

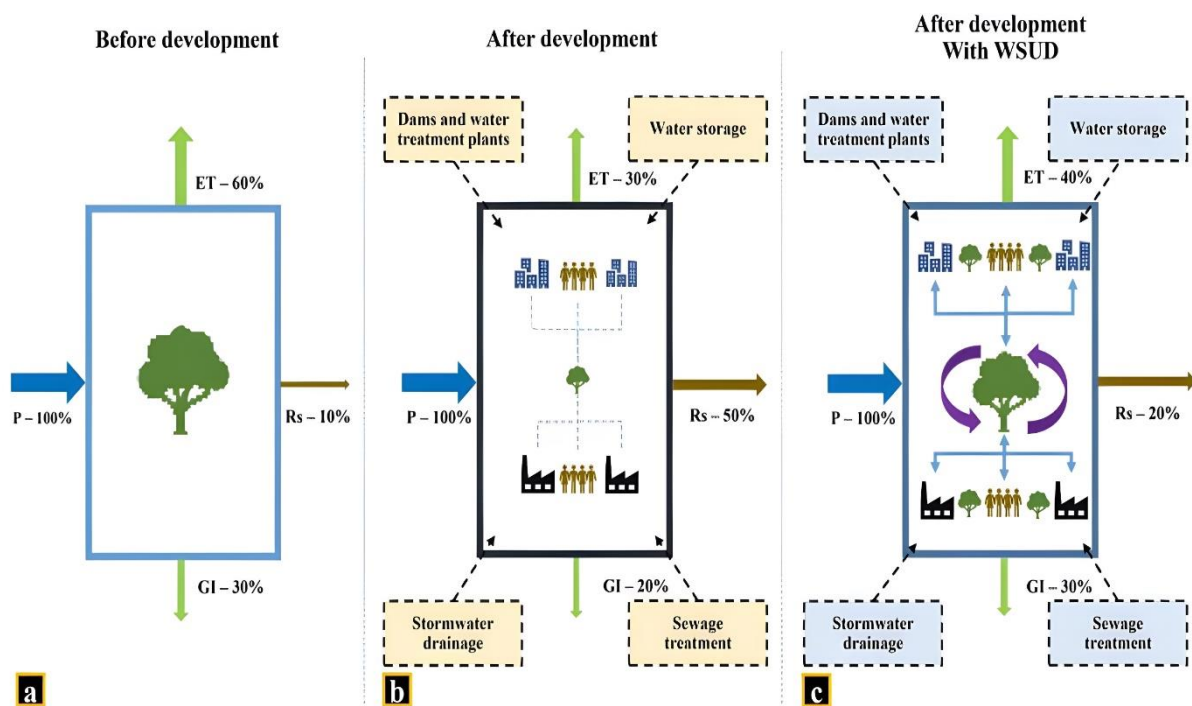
**Table 3.** WSUD applications and classification (Vernon & Tiwari, 2009)

Purpose of application		
Water Balance	Water Quality	Water Conservation
<ul style="list-style-type: none"> <li>➤ Swales</li> <li>➤ Overland Flow/Filter Strip</li> <li>➤ Dry Detention Basin</li> <li>➤ Extended Dry Detention Basins</li> <li>➤ Wet Detention Basins</li> <li>➤ Parking Lot Storage</li> <li>➤ Infiltration Retention Basin</li> <li>➤ Urban Forestry</li> </ul>	<ul style="list-style-type: none"> <li>➤ Stream Rehabilitation</li> <li>➤ Artificial/Constructed Wetland</li> <li>➤ Turfing</li> </ul>	<ul style="list-style-type: none"> <li>➤ Retention of existing infrastructure</li> <li>➤ Xeriscaping</li> <li>➤ Hydrozones</li> <li>➤ Water Harvesting</li> <li>➤ Regulated self-supply</li> <li>➤ Re-use grey water</li> <li>➤ Windbreaks</li> </ul>

This approach, which originated in Australia, is also widely used in the international arena. In particular, the Joint Committee on Urban Drainage established a joint group in 2004, bringing



together different disciplines such as architects, engineers, sociologists and environmental scientists to integrate urban water into infrastructure (Fletcher et al., 2015). Figure 1 shows the relationship between precipitation (P), evapotranspiration (ET), groundwater (GI) and runoff (Rs) before and after urban development and the developed urban concept with WSUD implementation. It should be noted that the WSUD implementation addresses not only stormwater management but also an overall city concept. In particular, it's important to limit the runoff amount and incorporate significant water retention systems and treatment plants within cities - these are essential uses for WSUD.



**Figure 17.** Urban water body balances, a) pre-development, b) post-development, c) WSUD applied development (Meng, 2022).

### 2.3 Integrated urban water management (IUWM)

Integrated Urban Water Management (IUWM) is a concept that addresses water management (water supply, storm water, wastewater, etc.) in urban areas with a comprehensive approach (Bahri, 2012). It addresses not only water management and recycling but also sustainable economy, social and environmental aspects, especially for cities under water stress. In recent years, the effects of climate change have been clearly seen, making IUWM applications more critical. In addition, this method handles long-term strategic planning by considering all stakeholders of urban areas (Closas et al., 2012). IUWM aims to oversee all water sources (including underground water, water on the ground surface, rainwater, and reused water etc.),



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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

all stages of the water cycle (managing the resources, purifying and distributing the water, and collecting, purifying, and disposing of wastewater), water consumption, and demand origins in a coordinated way. IUWM also aims to safeguard urban watercourses and the natural environment, while considering local peculiarities (Mitchell, 2006). Difficulties in predicting system effects as a result of different aspects of innovative solutions such as structural, educational, technological, economic, etc. due to the adoption of a multi-layered approach can be expressed as a disadvantage (Jensen & Nair, 2019). Some applications, design and management measures developed in this context are given in Table 3.

**Table 4.** IUWM applications and fields (Mohammadkhani et al., 2020)

Aspect	IUWM General practice	Design and Management Measures
Rainwater Management	Decentralized Harvesting	<ul style="list-style-type: none"> <li>➤ Green Roofs</li> <li>➤ Rain Barrels and Cisterns</li> <li>➤ Permeable Pavements</li> <li>➤ Bioretention Areas</li> </ul>
Stormwater Management	Decentralized Management by Blue-Green Infrastructure	<ul style="list-style-type: none"> <li>➤ Vegetated Swales/ Dry Swales</li> <li>➤ Curb and Gutter Elimination</li> <li>➤ Vegetated Filter Strips</li> <li>➤ Sand and Organic Filters</li> <li>➤ Constructed wetlands</li> <li>➤ Riparian Buffers</li> </ul>
Greywater Management	Decentralized Treatment and Reuse	<ul style="list-style-type: none"> <li>➤ Direct Use Systems</li> <li>➤ Physical and chemical Treatment Systems</li> <li>➤ Biological Treatment Systems</li> </ul>
Blackwater Management	(Semi)Centralized Treatment and Reuse	<ul style="list-style-type: none"> <li>➤ Physical and chemical Treatment Systems</li> <li>➤ Biological Treatment Systems</li> </ul>
Potable Water Management	Demand Management	<ul style="list-style-type: none"> <li>➤ Water Efficient Fittings</li> <li>➤ Water Efficient Appliances</li> <li>➤ Xeriscaping</li> </ul>

### 2.4 Sustainable Drainage Systems (SuDS)

SuDS is a method of water management that consists of allowing stormwater to infiltration naturally into the ground, treating it through sustainable means, and then using it again, thereby encouraging natural drainage processes. The ultimate goal is to reduce the amount of runoff in urban areas, protect natural ecosystems and reduce pollution loads from runoff. SuDS is also



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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

encouraged in tropical and subtropical regions as it develops a defense strategy against extreme rainfall in urban areas, especially as a result of climate change (Chen et al., 2021). The most crucial practices include swales, bioretention, infiltration systems, stormwater harvesting, green roofs, and infiltration systems. Prevention, source control, site control, and regional control are some of the practices that coexist within the hierarchical structure of SuDS. Woods-Ballard et al. (2007) description of these 4 fundamental hierarchical processes is as follows:

**Prevention:** Taking preliminary measures to reduce peak flows, runoff amounts and pollution loads. Examples; cleaning of site surfaces, public awareness etc.

**Source control:** Examples applied to control rainwater runoff at or near its source. Green roofs, permeable car parking and pavement systems are the most common applications.

**Field control:** It includes practices created to protect against stormwater impacts in a local area. It is the practice of managing rainwater collected from several different structures (houses, car parks, shopping centres, etc.).

**Regional control:** It includes the protection of a large area or several different areas from rainwater as a result of optimum design and applications.

### 2.5 Best Management Practices (BMPs)

Best management practices (BMPs) are a commonly used term, especially in North America and Canada (Fletcher et al., 2015). The main emphasis is on industrial and municipal waste prevention, but BMPs also include stormwater and wetland management practices for urban and rural areas (US EPA, 2015). BMPs are divided into two classes: structural and non-structural. Practices and measures such as minimizing the use of chemical fertilizers, raising awareness of the public and industrial establishments, cluster-type development, protection of green areas are non-structural practices. Detention ponds, vegetated canals, buffer strips, infiltration ditches, filtration applications are examples of structural applications. The most important advantage of BMPs is that they are subject to improvement and development in all areas, from agricultural areas to megacities. In addition, BMPs can be analyzed in 3 classes depending on their service purposes: runoff capture at the source, detention and retention of peak flow, and treatment of captured runoff (Sayre et al., 2006) (Table 4).

Runoff capture at the source is used to attenuate the volume and velocity of rainfall-induced runoff in the immediate vicinity of and/or on impervious surfaces. Peak flow reduction practices include the temporary storage of runoff for reuse or its delivery to water bodies through various transmission networks. A retention pond is often used for temporary storage of water. Captured



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

runoff retention is a particularly cost-effective filtering practice that reduces peak flow and improves water quality by reducing pollutant loads.

**Table 5.** Classification and application examples of BMPs for intended purpose (Sayre et al., 2006)

Runoff Capture at Source	Detention and Retention of Peak Flow	Treatment of Captured Flow
➤ Porous Pavement	➤ Detention Ponds	➤ Filtration
➤ Green Roof	➤ Extended Detention Ponds	➤ Constructed Wetlands
➤ Rain Barrels		➤ Filtration Basins
➤ Cisterns	➤ Retention Ponds	➤ Sand Filters
➤ Dry Wells		➤ Grassed Swales
		➤ Vegetated Strips

### FINDINGS and DISCUSSION

Conventional stormwater management is inadequate to meet the changing climate and precipitation characteristics due to the overpopulation and impervious surfaces (roads, buildings, shopping centers, car parks, etc.) brought by the developing urban life. For this reason, innovative, environmentally friendly and economic systems have been developed in recent decades by considering the concept of sustainable urban design. Management schemes and practices expressed by terms such as LID, BMPs, SuDS, IUWM and WSUD are frequently encountered. All these practices are based on two basic principles: reducing the amount and peak flows of surface waters generated by precipitation and reducing surface pollution (Rodríguez-Rojas and Grindlay, 2022). However, the main reason why these terms have different names is due to the regions from which they are derived (Table 5). For example, SuDS is a term originating from Scotland and Wales and is frequently used in Europe. Similarly, LID is frequently used in the USA and New Zealand. Academics, researchers, and institutions in these areas use local terms to express sustainable urban design studies. For this reason, a single universal term is not used. In addition, these differences in terminology are caused by flexibility and complex planning, execution, and development (Fletcher et al., 2015).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 6.** Terms used worldwide for sustainable drainage techniques (Hoyer et al., 2011)

Terminology	Region	Description
LID	USA	Includes planning and design practices for stormwater runoff management.
WSUD	Australia	In particular, it aims to combine decentralised water management with urban design.
IUWM	Global	It includes not only stormwater but also integrated urban water management practices.
SuDS	UK	Addresses practices and approaches for sustainable stormwater management.
BMPs	Europe	Addresses practices and approaches for sustainable stormwater management.

While LID emphasizes the management of stormwater based on natural processes, WSUD encompasses a broader perspective of urban design (Wong, 2007). In other words, while LID aims to minimize the harmful effects of stormwater, especially through natural infiltration and management of stormwater, WSUD offers an alternative as an urban management practice in which stormwater is part of the urban environment. BMPs often deal with non-structural methods, which are vital for avoiding future problems such as flooding, water resource pollution, and sewer overflows. The most important factor for the realization of sustainable design of a city is the awareness of the society and administrators. Awareness of local-regional administrations and non-governmental organizations on climate change, sustainability and more livable cities are also within the scope of non-structural measures. In addition, BMPs emphasize practices closely related to pollution loads. IUWM addresses a wide range of issues, especially economic and environmental issues, with similarities in practices (De Carvalho et al., 2009). For this reason, the term is often used when considering long-term practices with a wide range of stakeholders. However, long-term programs and the multiplicity of stakeholders and the difficulties of planning for the economic and environmental long term are a significant disadvantage. Implementing innovative stormwater management schemes over large areas and within a large part of the city is challenging in terms of design, project, cost and environmental impacts. Especially, the co-operation of integrated systems with each other brings both economic and design challenges. However, especially for developing cities, it can be very useful to start the process by taking non-structural measures. Apart from this, the availability of many individual systems can be useful. However, it would be more effective to utilize these





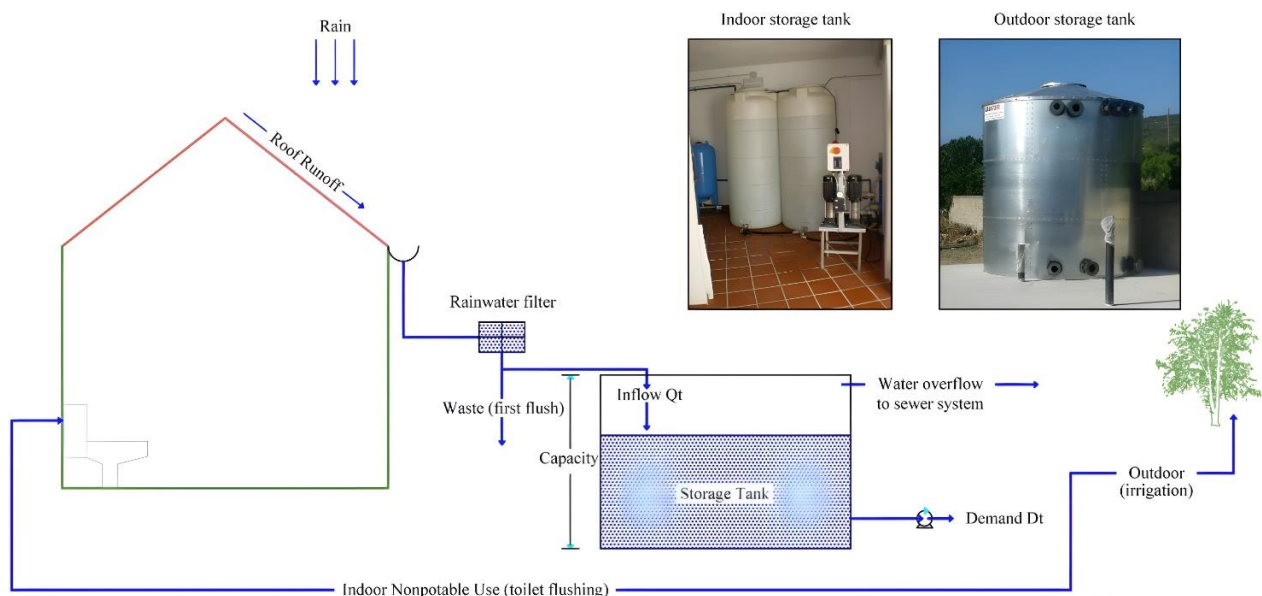
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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

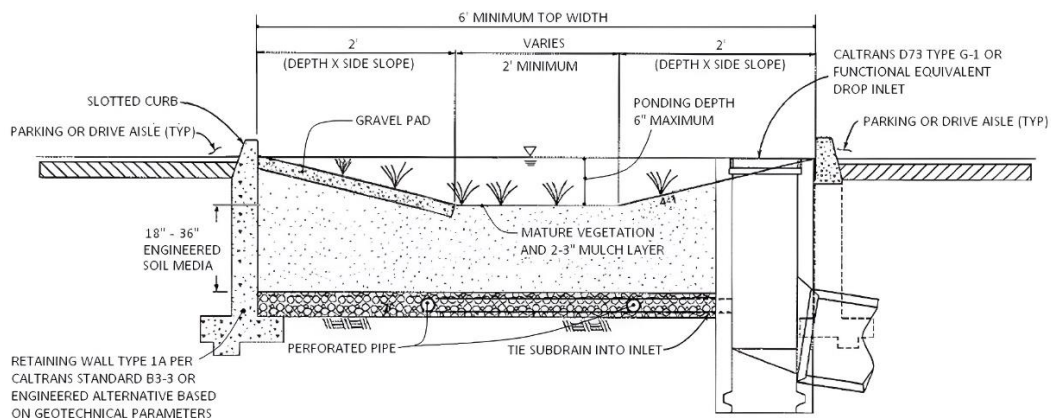
single systems in large-scale facilities spread over larger areas. For instance, collecting rainwater from roofs or any other non-porous surface and reusing it as needed is known as a rainwater harvesting system. This system is crucial for sustainable drainage structures and is frequently used. The implementation of these systems in single detached buildings is possible both with the availability of the necessary areas for the installation of the system elements and with a collective initiative of the public in this regard. However, these systems to be installed in buildings such as shopping centers or hospitals will reuse large amounts of water in a single application. Likewise, porous pavement systems/permeable car parks, which are simple to use and improve both the quantity and pollutant properties of rainwater, have the capacity to manage large areas and water bodies as a single project. For this reason, considering the difficulties in implementing them throughout the city, it would be very useful to use these systems in impervious areas covering larger areas in the first phase.

City areas, particularly university campuses, play a crucial role in this matter. These locations typically offer ample space and are accessible to the public, making them ideal for various structural purposes. Many studies on this subject have been carried out on campuses in our country and around the world (Demir, 2012; Sevimli, 2021). Examples include the University of Oregon (USA), University of Waterloo (Canada), University of Alcalá (Spain), Chulalongkorn University Centenary Park (Thailand), Boğaziçi University (Turkey), Yeditepe University (Turkey). Especially on university campuses, it is highly important to create an innovative and climate-resistant system of infrastructure. This enhances both reputation and encouragement of new developments. To inform university administrators about sustainable urban systems and carry out relevant activities, non-structural measures should be taken. These include establishing research centers, allocating extra funds for implementation, and preparing a comprehensive master plan for the campus. Additionally, it's crucial to avoid large expanses of impermeable surfaces through clustered development and safeguard natural soil surfaces by constructing denser structures and settlements in specific locations. It is recommended that green roof systems and rainwater harvesting systems be implemented in new on-campus buildings to recycle and save water, aesthetic appearance and reduce dependency on municipal water. In addition, the installation of parking areas as permeable systems, the construction of porous pavements and the installation of rain gardens in appropriate places are important practices that will increase the amount of groundwater by reducing the amount of surface runoff and pollution. One of the recommended applications, the rainwater harvesting system, is very

useful in reducing the amount of surface runoff and peak flow rates, as it involves collecting, storing and reusing rainwater from impermeable roof surfaces (Woods-Ballard et al., 2007). Vegetative roof covers, called green roofs, are layers of vegetation installed on building roofs. Green roofs are an effective tool to reduce urban stormwater runoff by replacing impermeable roofs with permeable, vegetated surfaces (Shafique et al., 2018). Porous pavements and car parks allow rainwater and surface water to soak into the ground. This lessens the quantity of runoff and greatly reduces surface pollution (Figure 2).



(a)



(b)



(d)

**Figure 18.** Examples of structural stormwater management practices proposed for use in campus areas. a) Rainwater harvesting systems (Kakoulas et al., 2022), b) rain gardens (Riverside County Flood Control and Water Conservation District, 2011), c) permeable pavements and car parks (Sprouse et al., 2020), d) Green roof (Hamzah et al., 2018)

In the presence of conscious administrators and public, the use of land that is not spread over large areas (cluster type formation) and the installation of RWHS, green roofs, permeable pavements-parking lots and rain gardens in these areas are recommended especially for the design of university campuses with large areas. In addition, in order to address the city as a whole, it is necessary to consider individual and large structures (shopping malls, hospitals, etc.) and carry out similar applications. An important issue is that, when realizing sustainable city designs, it is recommended to create an interdisciplinary design and implementation framework that includes local governments, architects, civil engineers, environmental scientists, economists and social scientists.

## CONCLUSION and RECOMMENDATIONS

Considering the effects of extreme urbanization and climate change, it is crucial to reevaluate conventional stormwater management systems and adopt sustainable drainage approaches. In recent decades, there has been wide-ranging global study of this topic, leading to the creation of several terms, such as LID, BMPs, WSUD, IUWM, and SuDS. While all of these practices share a common goal of reducing runoff volume, peak flow rates, and pollutant loads, subtle distinctions may exist in their specific methods and applications. Especially in urban areas, non-structural practices should be emphasized in the first stage for stormwater management. These



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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practices encompass raising public awareness, formulating regulations and informative guidelines, safeguarding existing wetlands, and devising urban planning strategies to minimize land usage. It is advisable to focus on large-scale structures such as shopping malls, hospitals, and public housing for subsequent structural applications. This approach not only facilitates implementation but also enables the capture, reuse, and effective management of substantial water resources. Furthermore, it is recommended to designate university campuses, which often occupy significant areas within cities, as pilot sites for implementing sustainable drainage practices. Specifically, the incorporation of rainwater harvesting systems, green roofs, porous pavements, and permeable parking systems can be proposed as viable solutions for university campuses.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### HENRY MOORE'UN KOYUNLARI: ÇİZİM-HEYKEL VE HEYKEL-MANZARA ÜZERİNE DÜŞÜNCELER

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#### ÖZET

Doğa, sanatta vaz geçilmez konulardan biridir. Sanat tarihi boyunca doğa yapıtlara konu olmuş, doğal biçimler sanatçıların hayal gücünü beslemiştir. Doğanın doğrudan konu edildiği manzara resminin heykelde karşılığı yoktur. Bir ağaç, taş gibi doğal yapılar, tek başına heykelin teması olabilmektedir. Resim sanatındaki espas kavramı, heykelin bulunduğu çevre içinde karşılık bulmaktadır. Henry Moore, heykelleri yanı sıra, çizimleri ile de tanınan sanatçıların başında gelmektedir. Moore için çizim, heykelin tasarım aracı olmaktan öte, bir üretim aracıdır. 1970'lerin başında, maket atölyesinde çalışırken, penceresinden gördüğü, çayırdaki otlayan koyunları çizmeye başlar. Kuzuların anneleri ile ilişkisi, sürekli olarak ele aldığı anne çocuk teması ile örtüşmektedir. Yün yumağı altında devinen gövdeleri ise heykellerindeki doğa soyutlaması ile yakınlık taşımaktadır. Koyunlar daha önce de Henry Moore'un çalışmalarına konu olmuştur. Sheep Piece heykeli bunlardan biridir. Heykel soyut anlatıma rağmen koyunların kütle ve hareketlerini göstermektedir. Henry Moore Vakfına ev sahipliği yapan Perry Green, Henry Moore heykelleri için ideal manzaraya sahiptir. Küçük yeşil tepelerin görüntüsü, uçsuz bucaksız ufuk çizgisi etkisi yaratarak heykelleri kucaklamaktadır.

**Anahtar Kelimeler:** Henry Moore, Heykel, Çizim, Manzara



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### HENRY MOORE'S SHEEP: REFLECTIONS ON DRAWING-SCULPTURE AND SCULPTURE-LANDSCAPE

#### ABSTRACT

Nature is an indispensable subject in art. Throughout the history of art, nature has been a source of inspiration for artworks, and natural forms have fueled the imagination of artists. There is no equivalent in sculpture to landscape painting, where nature is directly depicted. Natural structures like trees and stones can be the subject matter of sculpture. The concept of space in painting finds its counterpart in the environment where sculpture is placed. Henry Moore, known for his sculptures, is also recognized for his drawings. For Moore, drawing is not just a design tool for sculpture; it is a means of creation itself. In the early 1970s, while working in his maquette studio, he began drawing the sheep grazing in the meadow that he saw from his window. The relationship between the lambs and their mothers aligns with his recurrent theme of mother and child. Their bodies moving under the woolly mass also bear a resemblance to his nature abstractions in his sculptures. Sheep have been a subject in Henry Moore's works before, and "Sheep Piece" is one of them. Despite its abstract representation, the sculpture captures the mass and movements of the sheep. Perry Green, which hosts the Henry Moore Foundation, provides an ideal backdrop for Henry Moore's sculptures. The image of the small green hills creates an effect of an endless horizon, embracing the sculptures.

**Keywords:** Henry Moore, Sculpture, Drawing, Landscape





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. GİRİŞ

Bu metnin öncelikli amacı çizimin heykel tasarımına katkısını vurgulamaktır. Henry Moore'un eskizlerine, etütlerine bakarak, doğadaki biçimleri, hacimleri araştırmanın heykele nasıl yansıdığını görmek mümkündür. Eskizleri sanatçının hayal dünyasına girmek için bir kapı aralamaktadır.

Koyun eskizleri, baskılara dönüşerek koyun albümünü oluşturmuştur. Koyun heykeli ise devinimli soyut formlar olarak tasarlanmıştır. Daha erken tarihli olmakla birlikte bu eskiz ve çizimlerin devamı gibidir. Heykelde ölçek, ölçü algısı ve manzara (çevre) ile heykelin karşılıklı ilişkisini düşündürmektedir.

Henry Moore sanatı hakkında konuşmayı toplumsal bir sorumluluk olarak yerine getirmiş ve hemen her yapıtını açıklamıştır. Mirası sayılabilecek Henry Moore vakfı konuşmalarına ve yapıtları hakkında detaylı bilgilere web sayfasında yer vermektedir.

### 2. Doğa-Sanat- Manzara

Doğa, sanatta vaz geçilmez konulardan biridir. Antik Mısır'da yaşam sevgisi, Nil çevresinin renkli florasıyla ifade olunmuştur. Antik Yunan, Roma mitolojilerinde gizemlerle dolu bir doğa vardır. Batı sanat tarihi boyunca, doğa manzarası; mitolojik figürlerin resmedildiği çerçeveden başka, kendi güzellik ifadesi ile de ele alınmıştır.

Sanayi devrimi, şehirlerin büyümesi ve değişen yaşam şekilleri ile insan-doğa ilişkisini yeni bir düzleme taşımıştır. Manzara artık, konunun gerektirdiği ya da insan eylemlerinin tasvir edildiği bir fon olmaktan çıkıp, bağımsızlığını kazanmıştır. Modernizm'in doğuşunda doğa, hem bir ilham kaynağı, hem de ışıkla değişen renklerin gözlemlendiği bir laboratuvar haline gelmiştir. 20. Yüzyıl'ın öncü sanatçıları, şehir hayatının dışına çıkıp, insanın ilksel halini deneyimlemek üzere doğaya sığınmıştır.

Manzara resminin heykelde karşılığı yoktur. Hayvanlar, bitkiler, dağlar heykel sanatında konu olarak ele alınsa da, resimsel anlamda espas, heykele taşınmamıştır. Teknik ve malzeme olarak heykelin uygulama alanı olan rölyeflerde ise resmin için değerlerine sadık kalınmıştır.

İkinci dünya savaşı sonrası sanat ortamında, *land art*'in ortaya çıkışıyla birlikte, manzara yeniden tanımlanır. Heykel sanatının araziye yayılması; ölçü, biçim ve kavramsal yapısının değişmesine; sürecin dâhil edildiği performatif bir eylem olarak, yeni bir boyut kazanmasına neden olmuştur. Land art ile birlikte manzara sanat yapıtının konusu ya da fonu değil bizatihi kendisi haline gelmiştir. *Spiral Jetty* gibi devasa prodüksiyon örnekleri aksine, performans dayalı, *minimalist*, geçici ve mütevazı yapıtları ile Richard Long'un *Land Art* akımının en önemli sanatçılarından biri olduğunu söyleyebiliriz.

*“Sanatçılar tarafından doğa, prehistorik mağara resimlerinden yirminci yüzyıl manzara fotoğrafçılığına kadar her zaman kaydedilmiştir. Ben de doğayı eserimin konusu yapmak istedim, ancak yeni yollarla. Doğal malzemeleri kullanarak dışarıda çalışmaya başladım, çim ve su gibi doğal malzemeleri kullandım ve bu fikir, yürüyerek bir heykel yapma fikrine dönüştü... 1967'de yaptığım ilk yürüyerek yapılan iş, bir çim alanında bir düz çizgiydi ki bu aynı zamanda benim yolumdu, 'hiçbir yere' gitmeyen bir yol... amacım, yeni bir sanat yapmak ve aynı zamanda yeni bir yürüyüş biçimi yapmaktı: yürüyüşü sanat olarak görmek.”* (“tate.org.uk”)

### 3. Henry Moore ve çizim

Henry Moore(1898–1986), dünyanın hemen her yerinde bulunan dev heykelleri ile Modern heykelin en önemli temsilcilerinden biri sayılmaktadır. Uzak kültürlerden etkilenerek ve organik biçimlerden yola çıkarak oluşturduğu yalınlaştırılmış figür soyutlamaları ile bilinmektedir. 20. Yüzyıl sanatının büyük değişimlerine tanık olan yaşamında; form, malzeme, yüzey gerilimi gibi klasik diyebileceğimiz heykel değerlerine sadık kalmıştır.

Henry Moore'un heykelleri kadar çizimleri de ünlüdür. Çocukluğundan beri çizime düşkün olduğunu ancak heykeltıraş olmaya karar verdikten sonra beğendiği tüm büyük heykeltıraşların (Michelangelo, Bernini, Rodin diye sayar) çizimde de iyi olduklarını fark ettiğini (Moore, 1980) yazar. Henry Moore için çizim, öncelikle heykeli tasarlamının yardımcısıdır. Heykel yapmaya göre daha hızlı bir süreç olduğundan fikirlerini önce çizime aktarmıştır. Kemik, çakıl taşı gibi nesnelere doğa eskizleri yapmıştır. Desenlerindeki taramalarla, katı cisimlerin üzerine düşen ışık yansımalarını, hacim etkisini araştırmaktadır.



**Resim 1.** *A line made by walking*, Richard Long, 1967, [tate.org.uk](http://tate.org.uk)

“Ressamlığın ve heykeltıraşlığın temeli çizimdir”. Bu cümleyi John Berger’den ödünç aldık. Berger (2022) “çizim sanatçı için bir keşiftir” diyerek sürdürür. Bitmiş yapıt endişesi taşımayan eskizlerin, özgürleştirici bir düşünce deneyimi olduğunu ileri sürer. Henry Moore, çizimin öğrenme sürecinin bir parçası olduğundan, ‘nasıl ki herkes gramer öğrenmekle Shakespear olmazsa’ (Moore, 1980) diyerek, kişiye gözün daha iyi görmesini öğrettiği için, aslında sanatçı olmayanların da çizim yapması gerektiğinden bahseder. Çizim sanatın temel malzemesi, sanatçının temel düşünme aracıdır.

### 3.1. *Sheep Sketchbook* (Koyun eskiz defteri)



**Resim 2.** Defter



**Resim 3.** Kapak sayfası

1972 yılında, Floransa gerçekleşecek sergi için hummalı bir paketleme çalışmasının sürdüğü günlerde, Henry Moore kendisini, atölyenin maketler için ayrılmış küçük bir odasına kapatır. Pencereden görünen çayırda komşunun koyunları gezinmektedir. Gürültü ve telaştan kaçmaya çalışan sanatçı defterine uzanarak koyunları çizmeye başlar.

Defter yayınlanırken eklediği notlarda (Moore, 1980) başlarda koyunların biçimsiz birer yün yumağı gibi görüldüğünü söyler. Çizdikçe yün yumaklarının altında bir yapı olduğunu, yüzlerin de birbirlerinden ayrı nitelikler taşıdığını fark eder. Cama vurduğunda koyunlar, “koyunumsu bir merakla” dönüp bakmaktadır. Beş dakika kadar süre içinde sanatçı modelinden yararlanmaya çalışmıştır. Koyun etütleri ilerledikçe resimsel düzenlemelere, mekân kurgusuna yönelir. Paketleme üç hafta sürmüş bu arada defterin 20-30 sayfası doldurulmuştur. İtalya dönüşünde koyunların kırılmış olduğunu gören sanatçı birkaç çizim daha yapar ama o kütleli yün yumaklarını göremeyince konuya ilgisini yitirir: “çıplak, sıska, perişan görünüyorlardı.” (Moore, 1980)

Koyunlar ilk olarak 21x25 cm ölçülerinde ciltsiz bir deftere çizilmiştir. İlk sayfaya “Mary’ye, babasından, 1972” yazılmıştır. Defterdeki eskizler *ballpoint* tükenmezle çizilmiştir. Sanatçının tükenmezle çalışması, çalاکalem izlenimi yaratmakta ve bu da izleyiciye sanatçının düşünce sürecine tanıklık duygusu vermektedir. *Ballpoint* ile çizimin başka kalemlerden farklı olmadığını, bastırıldıkça koyultmanın mümkün olduğunu fark eder. Çizimlere geri dönüşler yaparak bazı yerleri vurgulamak istediğinde keçeli kalem kullanır. Bazı sayfalarda gri suluboya ile mekânsal bir derinlik etkisi yaratılmıştır.

Defter 1980 yılında Kenneth Clark ve Henry Moore’un önsözleri ile kitaplaştırılmıştır. Sanatçının defterin sayfaları üzerine yaptığı açıklamalar filme alınarak Henry Moore *Foundation web* sayfasında yayınlanmaktadır.

Sanatçı defterin son sayfası için, yürürken arkadan görünen bir koyun hayal etmiştir: “Charlie Chaplin filmlerinin sonu gibi” (Moore, 1980) Ancak bu çizim deftere yapılmamış, gravür olarak çalışılmıştır.

### 3.2. *Sheep Album* (Koyun albümü)

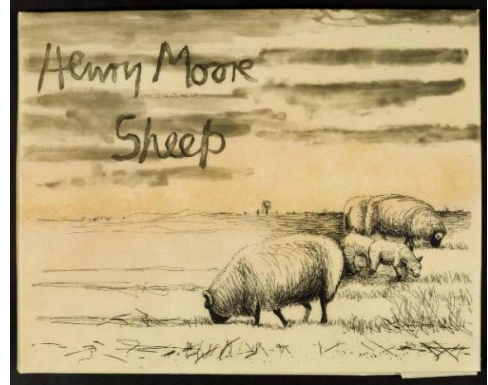
Sanatçıların pek çoğu birkaç temayı hayatı boyunca takıntı şeklinde işler. Henry Moore için “anne ve çocuk” böyle bir temadır. Formların boyut kurgusu, küçüğü koruyan büyük form ya da büyüğe bağımlı küçük form, anne çocuk heykellerinin temelini oluşturur. Kuzulama zamanı gelen koyunlar tam da bu konuya ilham verir. Böylece koyun çizimleri Henry Moore’un yeni takıntısı haline gelir. Defteri takip eden birkaç yıl boyunca zaman zaman koyunlara döner, defterdeki eskizlerini çizim, gravür ve litografi çalışmalarına aktarır.

Koyunların yaşam döngüsünü konu edinen baskıları, 1975 yılında *Sheep Album* başlığıyla yayınlanır. Albümdeki çizimler, *Sheep Sketchbook* eskizlerinden üretilmiştir.



**Resim 4.** *Sheep, Back View*  
1972

Gravür, 213 x 188 mm



**Resim 5.** *Sheep Album, Kapak*, 1974

Gravür ve *aquatint*, 330 x 825 mm



### **3.3. Sheep Piece (koyun heykeli)**

Henry Moore, doğadan etüt yapmayı seven bir sanatçı olarak birçok farklı hayvan çizmiştir. Koyunlar, ilk defa defterde konu olmamıştır. 1971-72 tarihli *sheep piece* heykeli, dört büyük bronz kopyasından biri Perry Green Henry Moore Vakfı bahçesinde, diğerleri Amerika ve İsviçre'dedir.

Perry Green'deki yerleştirme Henry Moore'un heykel için hayal ettiği ideal ortamı sağlamaktadır. Heykelin maketini bitirince atölyesinin önündeki çayır manzarasını fon olarak yerleştirir. Ölçeği, etrafta dolanan koyunların gözünden hayal etmeye çalışır. Heykelin yatay kompozisyonu için koyunların ölçüsü mükemmel bir referans sağlamaktadır: "heykellerim için tasarladığım manzaraya tam uygun ölçüdele. İnekler ya da atlar ölçüyü küçülterek anıtsallık etkisini azaltırdı."



**Resim 6.** *Sheep Piece*, 1971-72

Bronz, 570 cm, Perry Green

(Henry Moore Foundation) Heykelin yatay devinimi yakında ağaç ya da bina gibi dikey bir eleman olmadığı için kolaylıkla

okunmakta, yerleştiği alçak tepecik ise heykeli daha da yüksek gösteren bir kaide işlevi görmektedir.

Henry Moore yapıtlarını mekâna özgü tasarlayan bir heykeltıraş değildir. Kamusal alanlarda yer alan büyük heykellerin çevre bağlantısı, malzeme seçimi ve heykelin yer alacağı zeminden ibarettir. Büyük boyutlu çoğaltmaları, bazen etrafın kalabalığı içinde kaybolma riski taşımaktadır. *Sheep Piece* heykelinin diğer yerleştirme fotoğrafları, Perry Green'de gördüğümüz anıtsal etkinin diğer kopyalarda azaldığını göstermektedir. Bu da, manzara ya da çevrenin, heykelin biçim ve anlam örgüsüne nasıl katkı sağladığını örneklemektedir.





**Resim 7.** The Donald M. Kendall Sculpture Gardens



**Resim 8.** Zürih

Ölçü ve ölçek heykelin en özel konularından biridir. Henry Moore ölçeğin fiziki ölçü ile ilişkili olmadığını söyler. Küçük bir yapıt da büyüklük izlenimi ve anıtsal etki yaratabilir. (Moore, 2010) Avuç içinde çalıştığı küçük maketleri devasa ölçülerde gerçekleştirirken etrafındaki boşluğu da hayal etmiştir. Defterlerinde sadece manzaraya ait eskizler de yer almaktadır.



**Resim 9.** Pen Exercise XX: Landscape with Sheep, eskiz defteri sayfası, 1970, 18x25 cm



**Resim 10.** Landscapes with Poems albümünden bir yaprak, Gong Xian, 1688, 27x41 cm, metmuseum.org

Boşluk içinde devinen çizgilerden oluşan bu eskizler akla uzak doğu manzara resmini getirmektedir. Çin resim geleneğinde manzara apayrı bir disiplindir. Sanatçının hayal gücüne dayalı bir tasvirdir. Ustalık, doğaya ait izlenimleri, en az fırça darbesiyle, boşluğun içine yerleştirmektir. Bu tür resimlerde dağların, yamaçların içine yerleştirilen, insan ölçeğini anımsatan bir detay (ağaç, figür ya da örnekteki gibi bir köprü) doğanın ihtişamını gözümüzde canlandırmamızı sağlamaktadır.

## SONUÇ

Manzara, heykel sanatında, resimde olduğu gibi bir karşılık bulmasa da, heykelin hayat bulduğu bir mekân yaratarak heykel sanatında yer etmiştir. Günümüzde dünyanın birçok yerinde, heykellerin doğal çevreye yerleştirildiği, izleyicinin doğayı ve sanatı birlikte



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

duyumsayabilecekleri heykel parkları bulunmaktadır. Ancak çok azı Henry Moore Vakfı'nın Perry Green Heykel Parkı kadar güzel bir sergileme alanı yaratmaktadır. Sanatçı hayatı boyunca edindiği birikimi buraya aktararak ülkesinin kültür yaşamına katkıda bulunmuştur.

Çizim sadece Henry Moore değil, tüm heykeltıraşlar ve tüm sanatçılar için önemlidir. Ancak Henry Moore'un ileri sürdüğü herkesin çizim yapması gerektiği fikri önemlidir. Görsel iletişimin dünyayı hâkimiyetine aldığı çağımızda, biçimlerin taşıdığı anlamları sorgulayabilmek adına, sanat yapmayanların da çizmeye çalışması, gereklilik olarak karşımızda durmaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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**Resimler:** Henry Moore Foundation, diğerleri ilgili resmin açıklamasında belirtilmiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MAGGI HAMBLING: ÖLÜMSÜZLÜK SANATI

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#### ÖZET

Maggi Hambling öncelikle portre sanatçısıdır. Figürlü ya da figürsüz tüm yapıtları insani nitelikleri ile birer portre kimliği taşımaktadır. Konularını, sadece sevdiği, en azından yakınlık hissedebildiği kişiler arasından seçmiştir. Özellikle yakınlarının kaybı ardından yaptığı portreler ile onların anısını yaşatmaktadır. Nadir olmakla birlikte, kamusal alanda yer alan heykelleri, mütevazı boyutları ve çevre ile kurduğu ilişkiler bakımından önemlidir. Resimlerindeki çizgisel yoğunluğu üç boyuta da taşımıştır. Özellikle küçük heykelleri fırça darbeleri ile yapılmış gibidir. Yoğun etüt ve özveri ile gerçekleştirdiği az sayıdaki anıt heykeli ise, toplumsal beğenileri aşarak tartışmaların odağına oturmuştur. Benjamin Britten anısına gerçekleştirdiği *Scallop* yalınlık, işlevsellik ve biçim-anlam örgüsü ile çevreyle bütünleşirken; *A Conversation with Oscar Wilde*, yazara çok yakışan, ancak toplumdaki anıt heykel algısını altüst eden bir anıt olarak izleyiciyle bağ kurmaktadır. Sanatçı, anıtlarında ele aldığı kişiler ya da konularla yakınlık kurmuştur. Tümünün kendi hayatında karşılığı vardır, kendi söylemiyle örtüşmektedir. Anıtlarının bu denli tartışma yaratması bile başına buyruk karakteri ile uyumludur. Feminizmin öncülerinden Mary Wollstonecraft'ı minyatür boyutta ve çıplak bir figürle anıtlarını ülke çapında tepkilere neden olmuştur. Hambling'in heykelle yönelik eleştirilere verdiği yanıtlar, anıtın ne olduğu ve tarihsel kişilerin temsilinin nasıl olması gerektiğine dair ipuçları içermektedir. Maggi Hambling'in yapıtlarına bakarak, yerleşik anıt algımızı, anıtsallığı ve sanatın ölümden sonra temsil gücünü sorgulamaktayız.

**Anahtar Kelimeler:** Maggi Hambling, Portre, Anıt, Heykel



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### MAGGI HAMBLING: THE ART OF IMMORTALIZING

#### ABSTRACT

Maggi Hambling is primarily a portrait artist. All of her works, whether figurative or non-figurative, carry human qualities and serve as portraits in their own right. She has chosen her subjects exclusively from among those she loves or at least feels a closeness to. Especially through portraits created after the loss of loved ones, she aims to preserve their memories. Though rare, her sculptures in public spaces are significant due to their modest dimensions and their relationship with the environment. She has translated the linear density of her paintings into three dimensions, especially in her small sculptures, which appear as if they were made with brushstrokes. The few monumental sculptures she has created, achieved through intensive study and dedication, have become the center of debates, surpassing societal expectations. "Scallop," dedicated to Benjamin Britten, seamlessly integrates with the environment through its simplicity, functionality, and the interplay of form and meaning. "A Conversation with Oscar Wilde," while a fitting tribute to the author, disrupts societal perceptions of monumental sculptures. The individuals or subjects she has addressed in her monuments are ones she feels a connection to. They all have a personal resonance in her life and align with her own narrative. The controversies surrounding her monuments are in harmony with her independent character. Her portrayal of Mary Wollstonecraft, one of feminism's pioneers, in miniature size with a naked figure, stirred nationwide reactions. Hambling's responses to criticism of her sculptures contain clues about what monuments represent and how historical figures should be depicted. When looking at Maggi Hambling's works, we question our established notions of monuments, monumentality, and art's power of representation after death.

**Keywords:** Maggi Hambling, Portrait, Monument, Statue



## 1. GİRİŞ

Bu çalışma, Maggi Hambling'in anıt heykelleri çerçevesinde, anıt kavramını; anlam ve işlevi açısından sorgulamayı amaçlamaktadır. Sanatçının az sayıda olan anıtları, İngiltere'de çoğunlukla olumsuz tepkilere neden olmuş ve aktüel tartışmalara konu edilmiştir.

1945 doğumlu sanatçı, sigarasız poz vermemesi, cesaretle dile getirdiği cinsel yönelimi, net politik görüşleri ile aykırı; yeteneği ve üretkenliği ile hayranlık uyandırıcıdır. Sanata katkılarında dolayı CBE (*Commander of Order of the British Empire*) nişanına sahiptir.

## 2. Portreler

Resim ve heykel, plastik sanatların iki temel disiplini olarak birçok sanatçı tarafından eş zamanlı çalışılmıştır. Resimde beliren bir obje heykele, ya da tam tersi heykelde yakalanan bir biçim, resme dönüşebilir. Maggi Hambling'in her iki alandaki yapıtları bütünlük taşımaktadır. Sanatçının üç boyutlu anıtlarını anlamak için resimlerine bakmak yararlı olacaktır. Sanatının plastik dili, estetik ve düşünsel yapısı, daha çok ürettiği resimlerinde belirgindir. Maggi Hambling öncelikle portre ressamıdır. Sanatçı olarak tanınırlığını portrelere borçludur. Kendini eski moda bir portre ressamı olarak görür: "Rembrant'ın bilinen tek sözü sadece ama sadece portreler resmettiğine dair. Bu benim için de geçerli." (Jeffries, 2004)

Hambling sanatının politik olmadığını söyler, sadece insani olmasını umut etmektedir. Margaret Thatcher resmi teklif edildiğinde reddeder. Ona karşı bir yakınlık hissetmediğini söyler: "bir yapıt daima aşkla ilişkilidir" (Jeffries, 2004)



**Resim 1.** "Max Wall and his Image", 1982  
tate.org.uk

Maggi Hambling, bir röportajında (Rose, 2008), Damien Hirst'ün köpekbalığı heykelinden etkilendiğini, ama ikinci kez görmeye gerek duymadığını söylemiştir: "Belirli tablolar gibi tekrar tekrar gitmeye gerek yok. Resmin içsel olarak kendi tuhaf bir yaşamı vardır" Resimsel



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

anlatıma, resmin kendine özgü gerçekçiliğine sadıktır. Portrelerinde modelinin özünü açığa çıkarmayı, fiziksel benzerlikten ötesini amaçlamaktadır: "(benzerlik için) bu iki dakika sürer!".

### 2.1. Max Wall

İlk kişisel sergisini 1970'lerin başında açan sanatçı, 1980'de *The National Gallery*'nin ilk misafir sanatçısı olmuştur. Seçtiği ilk model, müzenin güvenlik görevlisidir. Sonra, komedyen Max Wall'u keşfeder:

*"Yakınlarda bir tiyatrodaki oynuyordu. Ona yazıp resmini yapabilir miyim diye sordum. Cevap bir notla birlikte geldi: "Küçük beni mi boyayacaksın. Onurlandım. Ne renk?" (Whetstone, 2007)*

Max Wall iki yıl boyunca poz verir. Sonunda açılan Max Wall sergisinde 38 resim sergilenmiştir. Resimdeki örnek bu portrelerin ilkidir. İlk defa 14 yaşındayken palyaço çalıştığını ve Max Wall'un üzgün palyaço portresinden etkilendiğini anlatır:

*"...Palyaçonun doğasındaki çelişki beni büyülüyor. Palyaçonun sanatı bize hayatın saçmalığını gösterdiği için gereklidir. (tate.org.uk)*

### 2.2. Dorothy Hodgkin ve Michael Jackson

Hambling'in bazı portreleri anıt niteliğindedir. Anıt, özel bir insanı ya da olayı onurlandırmak üzere tasarlanmış yapıtlara verilen genel isimdir. Anıtın alt başlığı sayılabilecek kişi heykellerinin (*statue*) resim sanatında da karşılığı vardır. Heykelde olduğu gibi, topluma mal olmuş kişiler, tam boy ya da portre resimleri ile sonsuza dek yaşatılmak istenmiştir.

Maggi Hambling 1985 yılında, *National Portrait Gallery* için, Nobel ödüllü (1964) Dorothy Hodgkin'in bir portresini resmeder. Hodgkin'in ilk portresi *Royal Society* tarafından Henry Moore'dan istenir. 1904'te bir kadının bilimsel sunum yapmasına izin veren dernek, 1945'te bir kadını üyeliğe kabul etmiştir. Ve ancak 30 yıl sonrasında bir kadın bilim insanının portresinin yaptırılmasına karar verilmiştir. Teklif Henry Moore'a götürülmüş, Moore ise, dostu Hodgkin'i alışla geldik portre nitelikleri çizmemiş; yakalandığı eklem hastalığı ile deforme olmuş ellerine odaklanmıştır. (Fara,2003)

Hambling, Hodgkin portresi için beş gün kadar evinde misafir olur. Hambling etütlerini yaparken Hodgkin çalışmalarına harıl harıl devam etmektedir. Hodgkin'i, masasının kâğıt kalabalığı, tabakta yemek artığı ve görkemli icadı insülin strüktürü gerisinde 'dört kolla' işine sarılmış bir halde aktarmıştır. *National Portrait Gallery*'de sergilenen bu portre, bir bilim kadını, insanlığa katkısı ile ele alarak anıtlamıştır.



**Resim 2.**

Dorothy Hodgkin, 1985  
npg.org.uk



**Resim 3.**

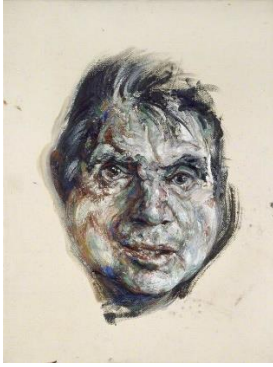
Hambling, Michael Jackson portresinin önünde, 2009  
creativeboom.com

Maggi Hambling'in heykelleri kadar resimleri ile de kışkırtıcıdır. Michael Jackson resmi, *Royal Academy* tarafından geri çevrilmiştir. David Hockney'in "*Bloody good*" (çok iyi) dediği resim politik bulunmuştur. Michael Jackson'un tutuklanma haberi duyulduğunda Hambling Kuzey Denizi resimleri üzerinde çalışmaktadır. Birden bire hiç görmediği adamın resmini yapmaya başlar. "Suçu ispatlanana kadar herkes suçsuzdur ilkesi tamamen unutulmuş olduğu için" (Jeffries, 2004) tepki göstermektedir. Michael Jackson'un, çocukluğunu yaşayamamış bir birey olarak toplumun kurbanı olduğunu düşünür.

Maggi Hambling'in yapıtları, anıt bağlamında ele alındığında, Michael Jackson portresi, bir anti-anıt olarak değerlendirilmelidir. Geleneksel algıları bozan, sorgulayıcı tavrı; rahatsız edici durumla yüzleşmeyi ve eleştirel yaklaşımı önermektedir.

### **2.3. Francis Bacon, Henrietta Moraes ve tüm sevdikleri**

Francis Bacon (1909-1992) Maggi Hambling'in karşılaştığı ressamlardan biridir. Her ikisi de "erkek sanatçı kadın model" klişesini toplumsal cinsiyet rollerini reddederek ters yüz etmiştir. Her ikisinin sanatında da ölüm teması egemendir. Ancak Francis Bacon resimlerine şiddet duygusu hâkimdir, hayattaki modellerini ölümle tasvir ederken, Maggi Hambling'in özellikle ölüm sonrası yaptığı portrelerinde yaşamsallık öne çıkmaktadır. İki sanatçının arasındaki köprü sayılabilecek "Soho Kraliçesi" Henrietta'nın ölümünden sonra çalıştığı portreler için Hambling: "Bu odadakilerden yüz kat daha canlı" (Sherwin) demiştir.



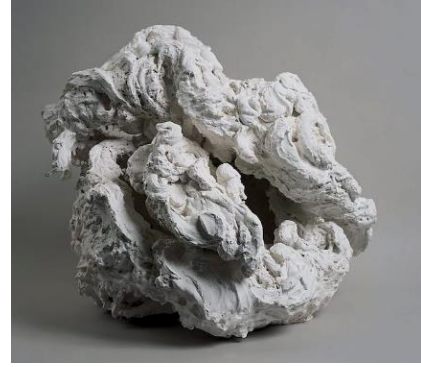
**Resim 4.**

Francis Bacon, 2002  
artfund.org



**Resim 5.**

Henrietta, 2001,  
artbasel.com



**Resim 6.**

Henrietta Eating a Meringue,  
2001, maggihambling.com

Maggi Hambling'in evinin bir köşesi, hayatında derin iz bırakan Henrietta Moraes'e ayrılmıştır. Moraes daha önce Francis Bacon ve Lucien Freud'a da modellik etmiş, tanınmış bir bohem simadır.

Maggi Hambling'in resimleri ve heykelleri birbirlerinin devamı gibidir. Aralarındaki fark ele aldığı konuları farklı malzemelere uyarlamaktan ibarettir. Henrietta'nın çok sevdiği bezeleri iştahla yediği ağzını, alçıyla heykelleştirmiştir. İşte bu heykel, evindeki Henrietta köşesinde yer almaktadır.

Maggi Hambling yapıtlarında sevdiği kişileri ölümsüzleştirir: "Marazi bir şey değil bu, insanlar öylece yok olmuyor. Eğer birini gerçekten seviyorsan, içinde yaşamaya devam ediyor" (Hills, 2021) Yakınlarını kaybederken ölüm döşğinde, hatta tabutlarında çizmeye devam eder. Annesi, babası, resim dersleri aldığı ustaları Cedric Morris ve Lett Haines; portreleri ile yaşattığı sevdikleri arasındadır. En canlı portreleri, bu şekilde ölüm sonrası, hayalden çizdikleridir.

### 3. Kamusal alanda heykeller

Resim, heykel ya da anıt olarak tasarlanan bir yapıt kamusal alana yerleştiğinde, çevresi ve izleyiciyle kurduğu ilişki içinde anlam bütünlüğüne ulaşır. Maggi Hambling'in kamusal alandaki heykelleri az sayıda olmakla birlikte özellikle anıtları, aldığı tepkilerle dikkat çekmektedir. Hambling'in anıtları, kamusal alana yerleştirilen heykelin çevresi ile ilişkisi, anıtın ne olduğu, figür temsilinde yani biçim önerileri ve boyut gibi başlıkları tartışmaya açmaktadır.

Burada seçtiğimiz ilk iki heykel küçük sayılabilecek boyutlardadır. Her ikisi de yerleşmiş oldukları mekânla ölçek olarak yarışmamakta, mimari ve kültürel çevre ile anlam bağı kurmaktadır. Farklı malzemelerle farklı konularda çalışılmış olmalarına rağmen her iki kuş figürü de, sanki fırça darbelerini üç boyuta aktarır gibi, resimsellik taşımaktadır.



**Resim 7.**

*Resurrection Spirit, 2013*

artUK.com



**Resim 8.**

*Heron, 2010*

artUK.com

“*Resurrection Spirit* “(Dirilen Ruh) heykeli, Doğu Sussex’te bir kilisenin siparişi üzerine yapılmıştır. Diriliş heykelinde, öbür dünyada yaşama devam etmeye yükselen ruh, bir umut metaforu olarak ışıklı bir kuş formunda tasvir edilmiştir. Küre formu ve parçalı ayna görüntüsü ile bir disko topunu andırır. Heykel, altarın tam üzerinde olduğu için bakışları gökyüzüne çevirir. Maggi Hambling ölümü konu alan ve inançlı bir sanatçı olarak zaman zaman dini imgelere sanatında yer vermiştir. Her ‘Hayırlı Cuma’ günü (*Good Friday*) dini bir tema üzerinde çalışmayı adet edinmiştir: “Bana puan kazandırır mı, göreceğiz!” (Lacey,2019)

2010 tarihli “*Heron*” (balıkçıl) heykeli, ağzında balık tutan bir kuşun, plakalarla biçimlendirildiği, büyük bir rüzgârgülü şeklindedir. Eskiden bir balık pazarının yer aldığı ana caddede, yürüyenlerin rahatlıkla görebileceği şekilde, *site-specific* (mekâna özgü) tasarlanmıştır. Kentin çok kültürlü nüfusu, her yönden esen rüzgârla simgelenmektedir.

Her iki heykelde de malzeme seçimi öne çıkmaktadır. Dirilişte kullanılan parlak yüzey bir ışık topu etkisi yaratırken çelik plakaların hafifliği asılabılır bir heykel olmasını sağlamaktadır. Malzemenin yapısına uygun olarak, ince plakalar üst üste eklenerek, uçları kanat gibi kıvrılmıştır. Balıkçıda seçilen metal plaka işlevle doğrudan ilişkilidir. Geleneksel rüzgârgülü





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

biçimlerinde olduğu gibi rüzgârı karşılayan bir yüzey oluşturur. Üzerine açılan boşluklar ve kaynatılmış parçalar, sanatçının çizgisel anlatımını silüete taşımaktadır.

### 3.1. Scallop (Deniz kabuğu)

Deniz Maggi Hambling için bir ilham perisidir. Çocukken gidip denizle konuştuğunu anlatan sanatçı: “Şimdi ben denizi dinliyorum” (Jeffries, 2004) diyerek denizle ilişkisini anlatmaktadır. Doğum yeri olan Suffolk sahilindeki çakıllara çarpan dalgaların sesi, bu heykelin çıkış noktasıdır. *Scallop*, Benjamin Britten’in uzun yürüyüşler yaptığı sahilde yer almaktadır.

Heykel, Maggi Hambling’in çok sevdiği besteci, Benjamin Britten (1913 -1976) anısına yapılmıştır. Yüksekliği dört metreyi bulan heykel, çelikten üretilmiş iki kırık deniz kabuğunun parçalarından oluşmaktadır. Birbirine yaslanan kabuklardan dikey olanın uçlarında, Britten’in ünlü operası Peter Grimes’den bir dize yer almaktadır: “*I hear those voices that will not be drowned*” (Boğulmayacak sesleri duyuyorum). Kabuğun denize bakan yüzeyi bir ayna gibi parlatılmış, diğer yüzeyler karartılmıştır. Yatay kabuk, insanların üzerine oturabilecekleri bir platform olarak yerleştirilmiştir. Heykelin zeminle bağlantısını yine kabuk kırıkları sağlamaktadır. Hambling izleyicilerin heykelle temasını hedeflemiştir: “ne zaman birileri üstüne tırmanır ve denizi izlemek üzere oturur, ne zaman bir çift altına girip sevişir; o zaman heykel tamamlanır.” (Hills, 2022)

Hambling bu anıtı Benjamin Britten’a olan sevgisini dile getirmek üzere gerçekleştirmiştir. Alerjisine aldırılmayıp, maketiyle uğraştığı süre boyunca atölyesini deniz kabuklarıyla doldurup; para almak bir yana, masraflarını karşılamak üzere resimlerini satmıştır. Ancak kabuklar herkes tarafından beğenilmez. Sahilin manzarasını böldüğü gerekçesiyle kaldırılmasını isteyen, yerel halktan kimseler dışında, Guardian sanat eleştirmeni Jonathan Jones heykeli İngiliz kamusal sanatının en kötü yapıtları arasında ilan eder. (Hills, 2022)



**Resim 9.**

*Scallop*, 2003

artUK.com



**Resim 10.**

Sibelius Anıtı, 1967

Britten anıtı, su manzarasını yapıta dâhil eden Sibelius anıtını (1967) çağrıştırmaktadır. Helsinki’de göl kenarına, kaide olmaksızın doğal taş zemine yerleştirilen anıt, bir org gibi dizilmiş çelik borulardan oluşmaktadır. Bu iki anıt, arasında, işlev, malzeme ve belki plastik öğeleri açısından yakınlıklar tespit etmek mümkündür. Hambling’in deniz kabuğu tepkilere, tartışmalara konu olurken; yine başka bir kadın sanatçı olan Eila Hiltunen’in anıtı ulusal bir simge haline gelmiştir. Britten anıtı küçük bir topluluğun kararıyla, Sibelius Anıtı ulusal bir yarışmanın sonucunda seçilmiştir. Bu da kamusal alana yerleştirilecek heykellerin, toplum tarafından benimsenmesinde bir faktör olarak değerlendirilebilir.

### **3.2. A Conversation with Oscar Wilde (Oscar Wilde ile Konuşma)**

1980’lerde, aralarında ünlü sinemacı ve LGBTQ+ aktivisti Derek Jarman (1942-1994) da olan, Oscar Wilde hayranı bir grup sanatçı yazarın bir heykelini yaptırmaya karar verir. 1994’te, Derek Jarman’ın ölümünden sonra, “Oscar Wilde Heykeli” komitesi Hambling’in projesini seçer. Bu proje, Oscar Wilde’ın İrlanda dışındaki ilk anıtı olarak, kültürel bir semboldür. (Figes, 2022)

*A Conversation with Oscar Wilde* (Oscar Wilde ile Konuşma) adını taşıyan heykel, Londra’nın merkezinde, Westminster Bölgesinde, işlek bir caddeye yerleştirilmiştir. Heykel tabutundan çıkmış, sigarasını içip gülen bir Oscar Wilde portresidir. Bronzdan üretilen, insan başından biraz daha büyük portre; kaide işlevi gören yeşil granitten yontulmuş bir tabut üzerine yerleştirilmiştir.

Kaide, izleyicilerin üzerine oturup Oscar Wilde ile konuşabileceği bir bank olarak düşünülmüştür. Konunun izleyiciden uzaklaştırılmaması Hambling’in tasarımında temel

unsurdur. Kaideye oturan izleyici Wilde ile yüz yüze gelmektedir. Hambling izleyicinin temas edebildiği ölçüyü şöyle açıklar: “Birçok insan, Oscar Wilde için, *Café Royal*’den çıkmayan garip bir yaratık olduğu düşüncesine sahiptir, ama o aynı zamanda halk adamıydı. Bizim seviyemizde olması gerekliydi” (Figes, 2022).

Heykelin üzerinde Oscar Wilde’dan yapılan bir alıntı yer alır: “*We are all in the gutter, but some of us are looking at the stars*” (Hepimiz bataktayız ama bazılarımız yıldızlara bakıyor). Bu ifade yazarın kimliğini yansıtmaktadır. Oscar Wilde (1854-1900) kısa ömrünü, üst sınıfların estetik nitelikleri ile donatıp bir sanat eseri haline getirmeye çalışırken; “yoksulluğu, politik baskıyı, eşitsizliği, jigoloları ve hapsi” (Colley, 2015:188-189) de tanımıştır. Özgürlükçü, savaş karşıtı ve sosyalist yazar; gizlemediği eşcinsel ilişkileri nedeniyle ağır cezalara çarptırılmış ve yaşamı zorluklar içinde son bulmuştur.

*National Portrait Gallery*’de gerçekleştirilen “*A Statue for Oscar Wilde*” sergisinde, Hambling’in anıt için yapmış olduğu çalışmaları sergilemiştir. Bu sergi hakkında yapılan söyleşide (Lambirth, 1997) Wilde’ı çocukluğundan beri çizmekte olduğunu anlatır. Heykel için de çok sayıda etüt yapmıştır. Heykelin ilk tasarımı Rodin’in Balzac’ına benzer, kumaşa sarınmış bir figürken; çalışmaya devam ettikçe son haline dönüşmüştür. Suffolk’taki evinde çalışırken maketten uzak kalmıştır. Oscar Wilde’ın karşısındaki sandalyede oturup onla konuştuğunu hayal eder; heykel böylece yatay kompozisyona, söyleşi formuna dönüşmüştür. Çizim ve heykellerinde gece, ay, yıldızlar Oscar Wilde ile bütünleşir. Oscar Wilde ölümü bile espri ile karşılamıştır. Hasta yatağında, Paris’teki otel odasının, çirkin duvar kâğıdını kastederek “ya o gitmeli ya ben” der; Hambling “Wilde kaldı” diyerek tamamlar.

### 3.3. *A Sculpture for Mary Wollstonecraft* (Mary Wollstonecraft için bir heykel)

Anıtsallık devasa yapılar için de kullanılan bir ifadedir. Anıt, özellikle bir kişinin heykeli olarak yapıldığında, doğal ölçülerden büyük boyutu akla getirmektedir. Maggi Hambling, Wollstonecraft’ı minyatür ölçülerde çalışmıştır. Böylece mesajın büyüklüğü fiziksel boyutun ötesine geçmektedir.



**Resim 11.** *A Conversation with Oscar Wilde*, 1998  
artUK.com

Mary Wollstonecraft (1759-1797) feminizmin öncülerindedir. Heykel yazarın evinin önüne yerleştirilmiştir. Yazara dair ilk anıt olma özelliğini taşımaktadır. Gümüş kaplı bronz anıt amorf bir yapının üzerinde yükselen küçük bir kadın figürü şeklindedir. Kaidesinde yazarın 1792 tarihli ‘Kadın Haklarının Korunması’ kitabından, ünlü bir alıntı vardır: “Kadınların erkeklerin üzerinde değil, kendileri üzerinde hâkimiyet kurmasını diliyorum”.

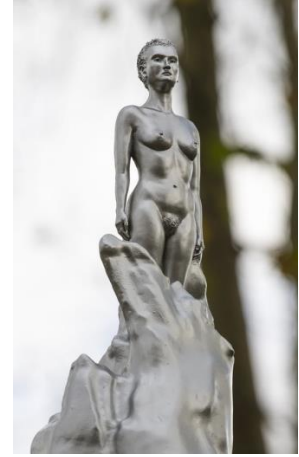
Çok sayıda kadından heykele karşı tepkiler gelir. Kimisi figürün küçük ve çıplak oluşunun konuyu aşağıladığını; kimisi de gerçekçi olmayan, idealize tasvirin kadın bedeni üzerindeki kültürel baskıyı olumladığını iddia eder. Hambling’in cevabı basittir: “İnsanların küçücük figüre püriten tepkisine şaşırıyorum. Figürün Wollstonecraft’ın kendisini temsil ettiğinde yanılıyorlar. Bu onun ruhu. Allah aşkına, kadın bir asiydi!” (Figes, 2022)

Figüratif anıtlarda kostüm rahatsızlık verici bir konu olabilmektedir. “Çıplak olmak zorundaydı çünkü kıyafetler insanları tanımlar. Birine taşra tüvitleri giydirin, at gibi olur. Birine dönem kıyafeti giydirin ve o tarihin bir parçası olsun. Ona bunu yapmak istemezdim.” (Russel, 2022) Gerçekten de yaşadıkları dönemin kıyafetleri içinde betimlenen tarihi figürler, yapıtın anıt niteliğine gölge düşürebilecek kadar komikleşme riski taşır. Ya da kıyafetlerin detayında kişinin fikirleri kaybolabilir. Wollstonecraft’ın bir ışık kümesi gibi parlayan bedeni, en yalın haliyle kadın olmayı temsil etmektedir.

#### 4.SONUÇ

Anıt, topluma mal olmuş kişilerin, olayların, değerlerin kuşaklar boyunca hatırlanması anlamını taşır. Günümüzde anıtlar, teatral sahne ya da fotografik gerçekçilikle temsilin ötesinde birer sanat eseri olarak karşımıza çıkmaktadır. Maggi Hambling’in yapıtları alışageldik anıt kavrayışını sorgulamaya davet etmektedir. Anıtlarda kişinin temsili, kişiyle benzerlikle mi kurulur; temsilen edilen kişinin ya da fikrin büyüklüğü fiziksel büyüklükle mi tasvir edilmelidir; çevrenin özellikleri ve insan hareketini gözetme gereği; üslubun anlama katkısı gibi sorular, Maggi Hambling’in yapıtları çerçevesinde tartışılmaktadır.

Maggi Hambling yapıtlarında izleyiciyi tatmin etmeye çalışmamıştır. Aykırı tavrından ödün vermeksizin tasarladığı anıt heykelleri eleştirilerin hedefi haline gelmiştir. Kamusal alanda yer alan bir sanat yapıtı tepkilere açıktır. Toplumsal beğeni sanatçının beğenisi ile her zaman



**Resim 12.** A  
*Sculpture for Mary  
Wollstonecraft, 2020*  
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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

örtüşmez. Beğenmeyenler azınlıkta da olsa seslerini daha çok duyurabilirler. Oscar Wilde'ın duvar kâğıdı gibi, tepkilerin mi yoksa yapıtların mı daha uzun ömürlü olacağı zaman içinde görülecektir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### DETERMINING THE USAGE AREAS OF *RHODOTHAMNUS* *SESSILFOLIUS* P. PLANT IN LANDSCAPE

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#### ABSTRACT

*Rhododhamnus sessilifolius* P.H. Davis (Mountain rose) is an endemic species belonging to the Ericaceae family, spreading in a limited area in the Artvin province of the Northeastern region of Turkey. It is in critical danger of extinction according to IUCN red list criteria. *Rhododhamnus sessilifolius*, which has a high visual impact in the rural landscape with its ground cover feature, evergreen leaves and small pink flowers, is a ground cover species that is important in terms of landscaping arrangements. In addition to its aesthetic properties, it can also be used in different areas of landscaping (rock gardens, roadsides, etc.) with its functional usage potential. Many plants with their aesthetic properties in the natural landscape are not used in the urban landscape despite the appropriate conditions in terms of temperature, precipitation and soil. However, successful planting practices can be achieved with the use of natural plants found in plant compositions in nature. In our country, not making enough use of natural plant species in landscape design and restoration projects and including more foreign species (exotic) plants in applications increases the costs of landscape applications and disrupts the ecological balance. In this study, the importance of our natural species is emphasized and information is given about the characteristics of our endemic natural species *Rhododhamnus sessilifolius*, which lives only in a small region at an altitude of 2150- 2400 m in the Murgul district of Artvin province, on humid and magmatic rocky ledges in Turkey, as well as the different areas of use of the plant and its importance. The morphological characteristics of our natural species, *Rhododhamnus sessilifolius*, were examined and its areas of use in landscaping applications were evaluated.

**Keywords:** Mountain Rose (*Rhododhamnus Sessilifolius*), Landscaping, Natural Plant Species, Landscape Design, Landscape Restoration, Ecological Balance



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

It is the duty of all people to protect nature and its riches and ensure its sustainability. Although scientific developments on ecological processes are not at an advanced level, the protection of biological species and their ecosystems is very important in terms of sustainability (Koçan, 2014; Tür Eylem Planı, 2016; Çorbacı et al., 2019).

According to the List of Plants of Turkey published in 2012, there are 11,707 species and subspecific plant taxa in Turkey. 3,649 of these plants are endemic, and the endemism rate is 31.82% (Güner et al., 2012). Comparing the flora of Turkey and Europe is very important to reveal the floristic richness of Turkey. There are nearly 12,000 species and subspecific taxa in the entire European Continent, and the number of endemic species is around 2,750. When compared to these numbers, it has been observed that the flora of Turkey is richer than the entire European Continent alone in terms of the number of species, number of endemic plants, and endemism rate (Ekim et al., 2000, Güner et al., 2012).

It is known that in recent years, the distribution areas of many natural plant species have been decreasing and some species have even become extinct (Ekim et al., 2000; Özhatay et al., 2003; Palabaş Uzun, 2009). *Rhodothamnus sessilifolius* P.H.Davis (Mountain rose), one of our endangered endemic species from the Ericaceae family, has a limited distribution in the world only on Tiryal Mountain in the Murgul District of Artvin Province in the Northeastern region of Turkey (Davis, 1965; Yaltırık, 1971). Its threat category has been assessed as critically (CR) according to the IUCN red list criteria.

*Rhodothamnus sessilifolius* is an evergreen ground cover plant that can grow 10-20 cm tall. Ground covers are important materials that are effective in the planning and design of urban landscapes with their visual quality, ecological and functional properties (Acar and Var, 2001; Pulatkan et al., 2018). They provide low green cover covering the ground for erosion control, weed control, and protection of the roots of trees and shrubs from extreme heat and cold. They also add an aesthetic value to the garden alongside trees, shrubs, and flowering plants. Ground covers are widely used instead of grass and add diversity to the landscape, especially in areas where it is difficult to maintain and grow grass, such as dense shade or steep slopes (Rauch, 1985; Sari et al., 2022).

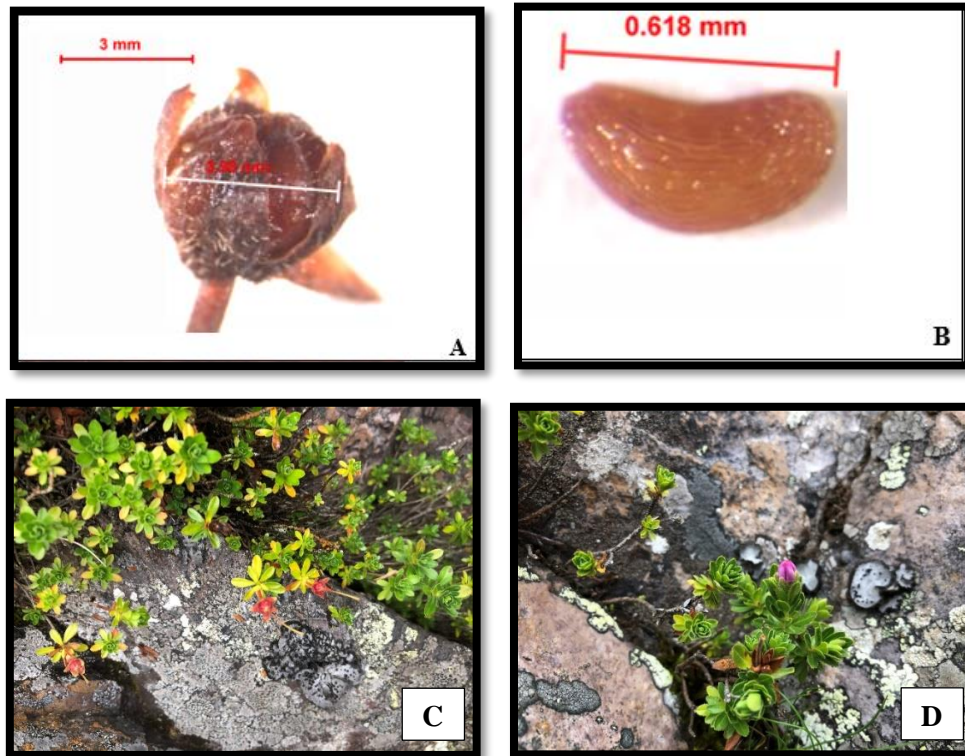
### MATERIALS and METHODS

In this study, *Rhodothamnus sessilifolius* P.H.Davis (Mountain rose), a species belonging to the Ericaceae family, which is an endemic species in our country, was selected as material.

In the study, various literature reviews were made regarding the properties of the *Rhodothamnus sessilifolius*, and as a result of the study, the usage areas and ecological value of the plant in Landscape Architecture were evaluated.

### 2.1 *Rhodothamnus sessilifolius* P.H.Davis (Mountain Rose)

*Rhodothamnus sessilifolius*, a genus belonging to the Ericaceae family, is an evergreen plant that can grow up to 20(25) cm [10cm] (Davis 1962, Terzioğlu and Milne, 2002). Its leaves are 0.7-1.2 x 0.3-0.5 cm in size, sessile, swollen, full-edged, opposite-ovoid in shape, ciliated and hairy. Flower set with 1-3 flowers; flower stalk 0.5-1 cm; The bracts have turned into leaves, the bracts are ovoid in shape and 3 mm. The sepals are 4.5-5 mm. The petals are lavender-pink in color, 1.6 - 2.6 cm from one side to the other, hairless, the tube is 2-3 mm. The capsule fruit is 4 mm and its caps are in 2 parts (Figure 1). Flowering is in June-July (Yaltrık, 1971; Terzioğlu and Milne, 2002; Eminagaoglu, 2014).



**Figure 1.** Seed capsule (A) and seed (B) of *Rhodothamnus sessilifolius* (Yıldırım et al., 2022), leaf and stem images (C and D)

This species is found only in a limited area in the Murgul district of Artvin Province in the Northeastern region of Turkey. It is located on rock outcrops in a small area at 2150 m on Tiryal Mountain in Murgul District (Davis, 1962; Stevens, 1978; Terzioğlu and Milne, 2002) (Figure 2).



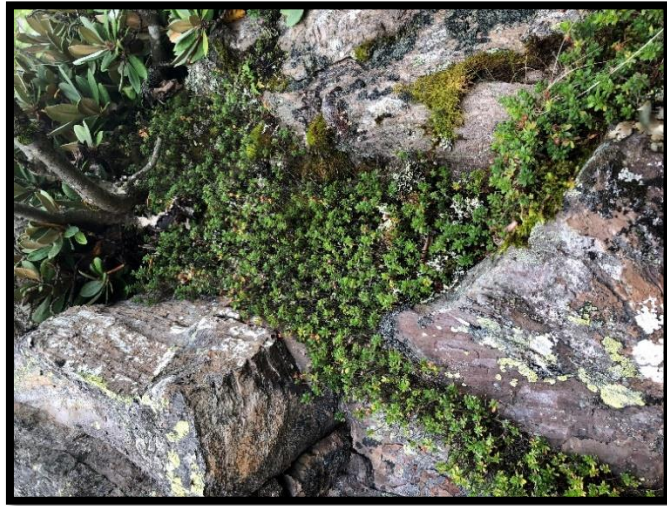
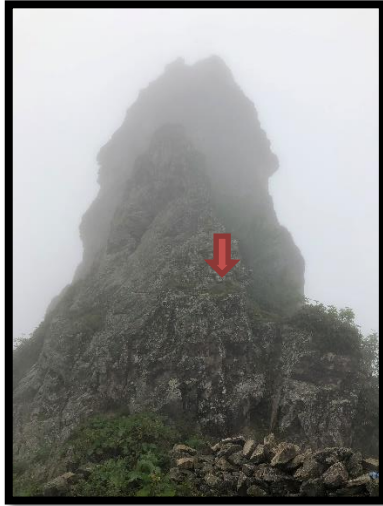
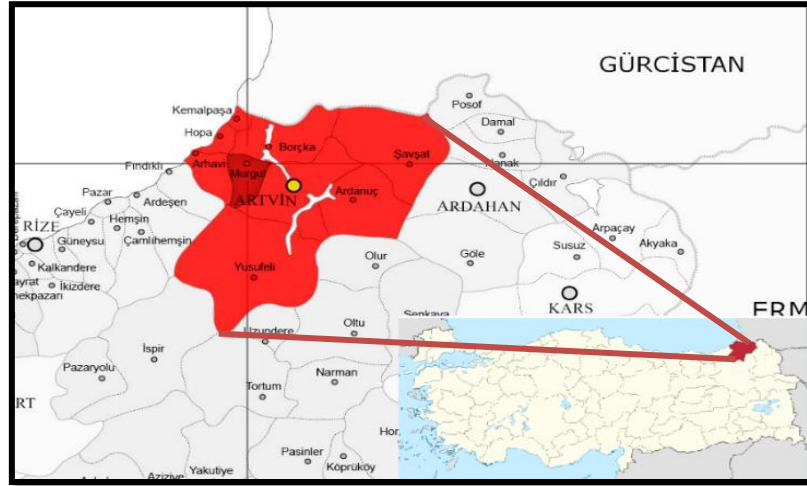


Figure 2. Habitat of *Rhododendron sessilifolius*

### 3. RESULTS and DISCUSSION

*Rhododendron sessilifolius* is an evergreen, aesthetically effective ground cover plant that grows up to 20-25 cm tall with its dark green leaves and pink flowers. By researching the usage areas of ground cover plants in Landscape Architecture, the possibilities of using *Rhododendron sessilifolius* in landscaping arrangements will be determined.

#### 3.1 Uses of Groundcover Plants in Landscape Architecture

Ground cover plants, which have different colors, textures, forms and sizes, are placed in landscape designs to form an integrity with trees, shrubs and shrubs. Therefore, these types of plants emerged as a result of the development of different designs. Depending on the design purposes, the use of groundcovers varies according to their aesthetic and functional features (Acar, 1997; Gül et al., 2014).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 3.1.1 Uses for Aesthetic Purposes

Ground cover plants can be used in rock gardens for aesthetic purposes. It is possible to create a natural appearance in rocky lands with plant species selected according to the shade or sunny conditions (Öztan and Arslan, 1992). Considering the highlighted point of the area on the rock, plant species with lichen and moss characteristics, species that require minimum soil between rock cracks, and low-tall plant species with all kinds of forms and colors, especially those that do not grow very large, can be used around the rock (Acar, 1997).

They can be used as border elements on roadsides. They form the ideal plant groups that can be used to create a distinctive border. They can be used as an accent element. Ground covers are one of the landscaping materials used to attract attention. When used correctly, they can be used on a path, object, plants, etc. They provide emphasis to other landscape elements. They can be used in plant cases and beds. Ground cover plants can create an impact in beds in different urban and rural areas with their resistance to cold and drought, low maintenance requirements, spreading, flower and leaf colors, textures and forms (Günerođlu et al., 2010). They can also be used to create backgrounds and textures with their colors and textures. One of the most striking and important features of plants is their colors (Kavi, 2003).

### 3.1.2 Functional Uses

Ground cover plants have functions such as preventing erosion and retaining soil in sloping areas. In addition, they support the soil together with stones and rocks in areas where the topography is not smooth and contribute to keeping the water content of the soil in balance (Erođlu et al., 2013). The plant arrangement works carried out with ground cover plants, especially in the cuts, sloped areas, excavation and filling areas formed as a result of the interventions made in nature due to the highway route, will cause the formation of a more suitable microclimate to a certain extent in the above-ground parts of the plants close to the soil, will improve the soil structure and improve the soil structure. It will retain the soil thanks to the root system that will develop within it (Öztan and Arslan, 1992).

Ground cover plants spread rapidly in steep areas with landslide problems and stabilize the soil with their widespread root systems. The use of ground cover plants in such areas will be beneficial in terms of appearance and function (Ceylan, 1999). It is also installed on stone walls in urban and rural green areas, to retain soil on steep slopes, in various planting activities with terraces or to create natural-looking private gardens in an environment (Öztan and Arslan, 1992).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CONCLUSION

Natural species, which are important for the protection of the natural environment, are not fully evaluated in landscaping applications. The use of natural species is very important for the protection and improvement of degraded areas. In recent years, with the importance given to urban and rural environments, planting studies have also gained importance. The use of natural species in these areas contributes economically and ecologically because they require easy adaptation to climatic conditions and low maintenance. In this context, to popularize the use of natural species, it is necessary to produce natural species in a planned manner.

Production trials of the *Rhodothamnus sessilifolius* are also being carried out. It has been revealed that this natural groundcover species has many uses in landscape areas.

Ground cover plants make many contributions to the city in terms of aesthetics, ecological and functional aspects. It is very important that such plants can be adapted and used easily in urban centers. It is important to determine the adaptation abilities of these plants, to cultivate them and to use them in landscape applications. Thus, plant species diversity can be increased and the economic value of these species can be revealed, thus contributing to the protection of endangered plant genetic resources (endemic species).

*Rhodothamnus sessilifolius* ground cover plant, which is a natural and endemic species of our country, is one of the aesthetically pleasing plant species that should be included in urban planting designs with its ecological, economic and functional features, as well as the beauty of its flowers, leaves and forms. The use of natural species instead of exotic species used in landscape applications can be preferred to gain a more durable and more natural appearance and to create ecological designs. It can also be used in groups in pots, plant cases, borders, and in recreational areas to make a border or highlight.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### COVID-19 PANDEMİSİNDE ÜNİVERSİTE ÖĞRENCİSİ OLMAK: İSTANBUL'DA BİR VAKIF ÜNİVERSİTESİNDE EĞİTİM GÖREN SOSYAL HİZMET BÖLÜM/PROGRAM ÖĞRENCİLERİNİN AKADEMİK VE GÜNDELİK YAŞAM DENEYİMLERİ ÜZERİNE NİTEL BİR ARAŞTIRMA

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#### ÖZET

Covid-19 pandemisiyle üniversiteler yüz yüze eğitime ara vererek uzaktan eğitim metoduna geçmiş ayrıca sokağa çıkma kısıtlamaları, karantina uygulamalarıyla üniversite öğrencilerinin gündelik yaşamı önemli ölçüde etkilenmiştir. Pandemi sürecinde sosyal hizmetin üstlendiği rol düşünüldüğünde, üniversite yerleşkelerinin eğitime kapatılarak uzaktan eğitim sürecine geçilmesi, üniversite öğrencilerinin yeni ve ani bir yaşam düzenine uyum sağlama gerekliliği bu alanda incelenmesi gereken özel bir yaşam durumudur. Bu doğrultuda bu çalışma kapsamında sosyal hizmet öğrencilerinin Covid-19 pandemi sürecinde yaşadıkları deneyimler nitel desenle araştırılmaktadır. Araştırma sonuçları öğrencilerin pandemi nedeniyle gündelik ve akademik yaşamlarında meydana gelen değişimleri birbirinden çok farklı şekilde anlamlandırdığını göstermektedir. Öğrencilerin değişimleri anlamlandırma şekillerinin; devam ettikleri sınıfa, okudukları yerleşke ile ikamet adresleri arasındaki uzaklığa ve sosyoekonomik durumlarına göre değiştiği görülmektedir. Öğrencilerin deneyimleri ve anlamlandırmaları küresel bir kriz olarak yaşanan Covid-19'un üniversite öğrencileri için sadece olumsuz yaşam deneyimleriyle karakterize edilemeyeceğini göstermektedir. Sosyal hizmet bölüm ve program öğrencileri sosyal destek mekanizmalarını kaybeden pasif üyeler değil pandemi koşullarına cevap veren yeni sosyal destek mekanizmalarını üreten aktif üyeler olarak değerlendirilmelidir.

**Anahtar Kelimeler:** Sosyal hizmet, Covid-19, Üniversite öğrencileri



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BEING A UNIVERSITY STUDENT DURING THE COVID-19 PANDEMIC: A QUALITATIVE STUDY ON THE ACADEMIC AND DAILY LIFE EXPERIENCES OF SOCIAL WORK DEPARTMENT / PROGRAMME STUDENTS STUDYING AT A FOUNDATION UNIVERSITY IN ISTANBUL**

#### **ABSTRACT**

With the Covid-19 pandemic, universities interrupted face-to-face education and switched to distance education method, and the daily life of university students was significantly affected by lockdown restrictions and quarantine practices. Considering the role of social work in the pandemic process, the closure of university campuses to education and the transition to distance education, the necessity of university students to adapt to a new and sudden living order is a special life situation that needs to be examined in this field. Accordingly, within the scope of this study, the experiences of social work students during the Covid-19 pandemic process are investigated with a qualitative design. The results of the research show that students make sense of the changes in their daily and academic lives due to the pandemic in very different ways. It is seen that the way students make sense of the changes varies according to the class they attend, the distance between the campus they study and their residence address, and their socioeconomic status. Students' experiences and interpretations show that Covid-19, which is experienced as a global crisis, cannot be characterised only by negative life experiences for university students. Social work department and programme students should be considered not as passive members who lose their social support mechanisms, but as active members who produce new social support mechanisms that respond to pandemic conditions.

**Keywords:** Social work, Covid-19, University students



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Covid-19 pandemisi sadece global bir sağlık krizi değil aynı zamanda ekonomik, sosyal ve psikolojik alanlara etkisi ile birey, grup, aile ve toplulukların yaşamlarını farklılaştıran, yeni, akut ve bilinmeyen unsur ile tekrar şekillendiren kapsamlı ve çok boyutlu bir süreçtir. Pandemi hem içerdiği sağlık riskleri hem de bu risklerden korunmanın gerektirdiği yeni düzenlemelerle birçok alanda strese neden olan ve halihazırda hissedilen endişe ve kaygıları yükselten bir süreçtir. Türkiye'nin de dahil olduğu birçok ülke, yaşanan Covid-19 pandemisi ile mücadele kapsamında; sokağa çıkma kısıtlamaları, evde kal çağrıları ve karantina uygulamalarıyla çeşitli fiziksel ve sosyal önlemler geliştirmiş ve uygulamaktadır.

Pandemi sürecinde ailelerin evde kalması talep edilmiş ve bu gereklilik çoğu birey ve aile için daha önce deneyimlenmeyen yeni bir yaşam biçiminin geliştirilmesini gerektirmiştir. Normal zamanlarda ailelerin sabahdan akşam yemeği ve hatta kimi zaman yatma saatine kadarki sürelerini kapsayan günlük rutinlerinin neredeyse tamamı askıya alınmıştır. Bu durum hane içindeki bakım sorumluluklarının daha da yoğunlaşmasını beraberinde getirmiştir. Daha açık bir ifadeyle okullar, çocuklar için hizmet veren gündüzlü bakım sistemleri, sportif faaliyetler, kulüpler, oyun buluşmaları vs. ulaşılamaz hale gelmiş tüm bu faaliyetler için ayrılan sürenin evde aile bireyleri ile geçirilmesi gündeme gelmiştir (Szabo ve ark., 2020: 2). Okulların ve gündüz bakım sistemlerinin kapanmasının yanı sıra, yaşlı nüfusun yoğun risk altında olmasına bağlı olarak büyükanne/büyükbaba bakımının tercih edilemez hale gelmesi, sosyal mesafe tedbirleri nedeniyle komşu ve arkadaş desteklerinin kullanılamaz olması çocuk bakımını doğrudan ve hatta yalnızca ailelerin üstlenmesini gerektirmiştir (Alon ve ark., 2020: 1). Ancak pandemiyle gündelik rutinleri değişenler okul ve oyun çağındaki çocuklarla sınırlı değildir. Düzenlemelerle aile içindeki tüm üyelerin hem ev içinde ve dışında geçirdiği zaman dengesi değişmiş hem de ev içinde geçirilen zamanlarda ilgilenilen faaliyetlerin niteliğinde önemli ölçüde değişimler yaşanmıştır.

Türkiye'de ilk vakanın ortaya çıktığı 11 Mart 2020 tarihinden itibaren (Türkiye Bilimler Akademisi [TÜBA], 2020: 29) toplumsal yaşamda büyük bir dönüşüm yaşanmıştır. Türkiye, en erken önlem alan ülkelerden biri olarak 3 ayrı noktaya odaklanan önlemler geliştirmiş ve pandemiyle mücadelesini bu bağlamda sürdürmüştür. Bunlardan ilki; kaynağa yönelik tedbirlerdir. Hastalığın bildirim ve kesin tanı konması ve tedavisi, izolasyon gibi süreçleri içermektedir. İkinci önlem şekli, bulaşma yollarına yönelik kısıtlamaları içermektedir. Çevresel ve sağlığa ilişkin koşulların yükseltilmesi, temizlik ve koruyucu ekipman uygulamalarının



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

yükseltmesi, hareketliliğin kısıtlanması bu kategoride sayılabilir. Üçüncüsü ise; sağlam bireylerin korunmasına yönelik önlemlerdir. Bunlar ise karantina ve gözlem altına alma gibi süreçleri içermektedir (TÜBA, 2020: 29). Alınan önlemlerden belki de en etkili ve aynı zamanda en zor baş edileni karantina uygulamalarıdır. Karantina; bulaşıcı bir hastalığa maruz kalma ihtimali olan bireylerin herhangi bir rahatsızlık geliştirip geliştirmediklerinin belirlenmesi amacıyla hareketlerinin kısıtlanması uygulamasıdır. Bu yolla muhtemel hastanın diğerlerini hasta etme riski azaltılmakta ve bu durum karantina uygulamalarını sosyal izolasyon uygulamalarından farklı kılmaktadır. Karantina uygulamaları; sevdiklerinden ayrılma, özgürlük kaybı, hastalık konusundaki belirsizlik ve endişe, can sıkıntısı gibi nedenlerle uygulamaya maruz kalan bireyler için genellikle hoş olmayan bir deneyimi işaret etmektedir. Yine de Covid-19 pandemisi ile mücadelede kitle karantinalarının tesis edilmesi gündeme gelmiştir. Kitle karantinalarının olumsuz psikolojik etkilerine rağmen iyi planlanarak uygulanması yapılan çalışmalar ve ilgili literatür tarafından desteklenmektedir (Brooks ve ark., 2020: 912). Karantinanın bireyler üzerindeki psikolojik etkileri; geniş yaygın, önemli ve uzun süreli olabilir. Ancak hastalığın psikolojik sonuçları düşünüldüğünde bu etkiler kabul edilebilirdir (Brooks ve ark., 2020: 919).

Bu bilgiler doğrultusunda Türkiye'deki Covid-19 pandemisi ve karantina uygulamalarının sosyal hizmet öğrencilerinin gündelik ve akademik yaşamları üzerindeki etkisi anlaşılmaya çalışılmaktadır. Bu doğrultuda çalışmada küresel bir kriz olarak pandemi ortamında sosyal hizmetin konumu ve işlevlerine değinilmekte ardından pandeminin üniversite öğrencileri üzerindeki etkileri değerlendirilmektedir. Çalışmanın devamında nitel desenle İstanbul'da bir vakıf üniversitesinde sosyal hizmet eğitimine devam eden öğrencilerin deneyimlerini yansıtan araştırmanın yöntem ve bulguları yer almaktadır.

### a. Covid-19 Pandemisi Üniversite Öğrencileri

Bireyselleşme ve farklılaşmanın yoğun olarak gerçekleştiği üniversite yılları bireylerin yeteneklerinin ortaya çıkmasında önemli bir rol oynamaktadır. Bu nedenle başarılı bir kariyer ve güzel bir yaşamın anahtarı olarak yükseköğretim yılları oldukça kritik bir yaşam dönemidir. Eğitim, bireylerin yaşamlarını değiştirme gücüne sahip olduğundan öğrenciler için saygın bir üniversiteden iyi bir eğitimle mezun olmak çok önemlidir (Akova ve Kantar, 2020: 4). Ancak Covid-19 pandemisi toplumsal alanın tüm yönlerini olduğu gibi bu alanı da önemli ölçüde etkilemiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Covid-19 sađlık alanında yarattığı risklerle sınırlı bir etkiye sahip deđildir. Aksine, dünyadaki sosyal yařamı hızlı bir řekilde deđiřtirmekte ve gúndelik yařamı dúnüřtürmektedir. Bu dođrultuda her yařtan bireyin gúndelik alışkanlıklarının, yapma biçimlerinin radikal bir řekilde deđiřtiđi ya da topyekún durduđunu söyleyebiliriz. Yařanan deđiřim ve dúnüřüm içinde sürekli olarak yeni örüntüler ortaya çıkmakta kimi zaman panik ve umutsuzluk duyguları hakim olurken kimi zamansa yaratıcılık ve ustaca üzerinden gelme gibi yeni pratiklerin ortaya çıktığı gözlenmektedir (Yanardađ ve Selçuk, 2020: 1). Üniversite öğrencilerinin içinde bulunduđu genç yetiřkinlik çađı yapısı itibariyle deđiřimlere uyum sađlamayı gerektirmektedir. Ancak eđitim alanındaki belirsizlikler, yařanan gecikmeler birçok ađıdan akademik stresörleri artırır. Üniversitelerin kapanmasıyla ev içi yařamlarına dónen öğrenciler bir daha üniversite yerleřkelerine dónememe endiřesi tařımaktadır (Kara, 2021: 35). Yařanılan sorun ve bu sorunların çözümlü için alınan önlemler düşünöldüğünde 20 yař ve altındaki gençlerin sokađa çıkmasının yasaklanması, üniversitelerin kapatılması, eđitimin uzaktan yürütölmüsi kararlarıyla üniversite öğrencileri küresel salgından oldukça fazla etkilenen özel bir grubu oluřturmaktadır. Salgın sürecinde üniversite öğrencileri zamanlarının büyük çođunluđunu kitle iletişim araçları, çevrimiçi aktivitelerle geçirmektedir. Hořnutluk yaratan bu aktivitelerin, kontrol dıřı kullanımlarda ise bađımlılık yaratabildiđi bilinmektedir (Sađlık ve Ersoy, 2020: 306). Benzer řekilde Asıcı ve Günlü'nün (2021: 18) arařtırması öğrencilerin salgının olumsuz etkileriyle bařa çıkmak için film/dizi/televizyon izlemek gibi ařırı boyutlara ulařtıđında bađımlılık yaratabilecek davranıřlara yöneldiđini göstermektedir. Ancak aynı zamanda kitap okuma, çeřitli aktivite ve hobilerle ilgilenme, spor yapma gibi sađlıklı davranıřsal stratejilerin de üniversite öğrencileri tarafından izlendiđi aynı arařtırmada bulgulanmıştır.

Pandemi nedeniyle üniversiteler yüz yüze eđitime ara vererek uzaktan eđitime geçmişlerdir. Sınıf ortamında devam ettirilen eđitimin ani řekilde uzaktan metot ile deđiřtirilme gerekliliđi öğrencileri belirsizlik, verimsizlik, internete eriřimde güçlük, adaptasyon sorunları, uygun çalıřma ortamının bulunmaması, sađlık sorunları, psikolojik sıkıntılar gibi çeřitli zorluklarla karřı karřıya bırakmıştır (Sever ve Özdemir, 2020: 1655). Öte yandan bahsedilen tüm zorluklara rađmen uzaktan eđitimi salt zorluk ya da sıkıntı yaratan bir olgu olarak ele almak sakıncalıdır. Uzaktan eđitim, zamansal ve mekânsal baskıları ortadan kaldıran, teknolojidaki geliřmelerle paralel řekilde öğrenmeye iliřkin kuramsal geçiřleri sađlayan bir platformdur. Eđitim alanında meydana gelen teknoloji tabanlı geliřmeler çeřitli engel ve kısıtlamaları içermekle birlikte, bazı temel kriterler dikkate alındığında yeterlilikleri teřvik eden, eđitimde





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

fırsat eşitliđi sađlayan bir yapıya kavuşabilmektedir (Tuncay, 2020: 19-24). Velhasıl Covid-19 salgını; afet, acil durum, kriz ve salgın gibi olađanüstü durumlarda uzaktan eđitimin öncelikli bir şekilde deđerlendirilebileceđini göstermiştir. Dahası bu istenmeyen yaşam durumları uzaktan eđitimin imkanlarının keşfedilmesi için büyük imkanlar sunmaktadır (Yamamoto ve Altun, 2020: 30).

Pandemi dönemlerinde ortaya çıkan belirsizlik haliyle kriz durumunun nasıl yönetildiđi oldukça önemli bir konudur. Bu gibi tahmin edilmez durumlarla karşılaşıldığında korku ve panik duygularının yaşanması ve kaçınma davranışlarının sergilenmesi dođal kabul edilmektedir (Karataş, 2020: 6). Benzer şekilde yapılan araştırmalar özellikle sosyal destek sistemleri kısıtlı olan üniversite öğrencilerinde bađımlılık geliştirme riskinin yükseldiđini, bu öğrencilerin ruh hallerini iyi olarak tanımlayamadıklarını ve zamanlarının büyük bir kısmını sosyal medya ve kitle iletişim araçları ile yalnız geçirdiklerini göstermektedir (Sađlık ve Ersoy, 2020: 307). Oysa gençlerin hissetmesi muhtemel korku, kaygı, engellenmişlik hissi, çaresizlik, duygusal karmaşa, kızgınlık, yalnızlık gibi olumsuz duygular fark ve kabul edilmelidir. Sanatsal teknikler bahsedilen bu olumsuz duygularla baş etme ve olumlu duygular hissetmelerini sađlama noktasında işlevsel olabilir (Ulutepeler, 2020: 65).

### **b. Covid-19 Pandemisi ve Sosyal Hizmet**

Sosyal hizmet açısından yaşanan pandemi önemli riskler taşıyan bir yaşam durumudur. Bu nedenle alanda çalışan meslek profesyonellerinin hem kendi hem de hizmet sundukları birey, çift, aile ve toplulukların refah ve iyilik halleri için endişe duyduđu söylenebilir. Pandeminin gerektirdiđi sosyal mesafe, zorunlu karantina ve isteđe bađlı izolasyon uygulamaları düşünüldüğünde sosyal hizmet açısından çok çeşitli karmaşık mesleki zorluk ve baskılar ortaya çıkmaktadır (Yanardađ ve Selçuk, 2020: 1). Sosyal hizmet uzmanları bir yandan pandemiden etkilenen ve çeşitli destek mekanizmalarına ihtiyaç duyan konumdadır. Diđer yandan ise konudan etkilenen diđer birey, aile ve gruplara hizmet veren kiři konumundadır. Bu iki yönlülük uygulamaların önemini göstermekte ve özel müdahale becerilerini gerektirmektedir. Krize müdahale ve psikososyal destek bu süreçte en fazla ihtiyaç duyulan müdahale araçlarıdır (Demiröz, 2020).

Krize müdahalenin temel hedefi müracaatçının kriz öncesi işlevsellik düzeyine dönmesidir. Yani müracaatçının yaşadığı kriz nedeniyle sosyal işlevsellik kaybının önüne geçmek amaçlanır. Ancak kriz bir fırsat olarak deđerlendirilebilirse ve yeni beceriler elde edilirse müracaatçıların bir üst sosyal işlevsellik düzeyine ulaşması da mümkün olabilir (Derezotes,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

1999: 149). Bu doğrultuda krize müdahale sürecinin; sorunu kabul etme, etkisini değerlendirme ve kriz durumlarında faydalanılacak yeni ve etkili davranışları öğrenme şeklinde ilerlemesi tercih edilir. Böyle çözümlenen krizler sonucunda olumlu değişim mümkün olur (Barker, 1995: 75). Diğer bir ifadeyle kriz müdahalesi ilerleyen zamanlarda karşılaşılması muhtemel problemleri önleyecek yeni savunma mekanizmaları geliştirmek amacıyla krize müdahale etmeyi amaçlar (Teater, 2015: 233).

Küresel bir pandemi durumunda başvurulabilecek bir diğer müdahale aracı ise psikososyal destektir. Psikososyal destek, her türlü yerel ve yerel olmayan kaynağı kullanılarak psikososyal refahı koruma ve geliştirmeye, zihinsel bozuklukları önlemeye yönelik uygulamalardır (Inter-Agency Standing Committee [IASC] (2007: 16). Ancak psikososyal destek müdahalesi psikolojik ya da psikiyatrik bir tedaviyi işaret etmemektedir (Kızılay, 2008: 2). Eksiksiz bir psikososyal müdahaleden bahsedebilmek için müdahalenin planlama, ilk yardım, erken müdahale, insan kaynakları ve özelleştirilmiş hizmetleri içermesi beklenmektedir (Bisson ve ark, 2010: 69).

Sosyal hizmetin işlevi ve sosyal hizmet uzmanlarının rol ve sorumlulukları içinde gerçekleştiği toplumdaki değişimlerden etkilenir (Duyan, 2010: 1). Pandemi sürecinde sosyal hizmet uzmanları ihtiyaçlarla uyumlu şekilde çok çeşitli şekil ve düzeyde müdahalelerini yürütürler. Sosyal hizmet müdahaleleri arasında virüs nedeniyle hastalananlar, bu hastaların yakınları, bulaş riskinden dolayı gözlem ve karantina altında tutulanlar ve hayatını kaybeden vatandaşların yakınları ve müdahale eden meslek elemanlarıyla yapılan çalışmalar önemli bir yer tutmaktadır (Demiröz, 2020). Konu dünya genelinde incelendiğinde birçok ülkede sosyal hizmet uzmanlarının bu sorunla mücadelede önemli bir rolü üstlendiği görülmektedir. Öyle ki salgından etkilenen ya da salgından dolayı kaygı/endişe düzeyleri artan topluluklarla sosyal hizmet uzmanları birçok ülkede çalışmalar yürütmektedir. Ayrıca, toplulukların çeşitli önlemler alması ve sosyal mesafe gibi temel düzenlemelerle kendilerini ve diğerlerini koruması teşvik edilmekte böylece virüsün yayılmasına yönelik önemli bir mücadele yürütülmektedir. Tüm bunlar bir arada düşünüldüğünde yaşanan küresel kriz sürecinde sosyal hizmet; en savunmasız grupların belirlenerek bu gruplara yönelik müdahalelerin önceliklendirilmesi, gıda- temiz su gibi temel ihtiyaçların sağlanması, uygun politik düzenlemelerin gerçekleştirilmesi, sosyal dayanışmanın güçlendirilmesi, eşitsizliklerle ve ekonomik zorluklarla mücadele edilmesi gibi temel işlevleri üstlenmektedir (IFSW, 2020).

Pandemi sürecinde sosyal hizmetin üstlendiği rol düşünüldüğünde, üniversite yerleşkelerinin eğitime kapatılarak uzaktan eğitim sürecine geçilmesi, üniversite öğrencilerinin yeni ve ani bir



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

yaşam düzenine uyum sağlama gerekliliği bu alanda incelenmesi gereken özel bir yaşam durumudur. Bu doğrultuda bu çalışma kapsamında sosyal hizmet öğrencilerinin Covid-19 pandemi sürecinde yaşadıkları deneyimler incelenmektedir.

### YÖNTEM

Bu çalışmada, sosyal hizmet öğrencilerinin pandemi sürecindeki deneyimlerini ortaya koymak amacıyla nitel yöntem kullanılmıştır. Bu doğrultuda öğrencilerin uzaktan/çevrimiçi eğitime ilişkin deneyimlerini incelemek için fenomenolojik modele başvurulmuştur. Fenomenoloji, farkında olduğumuz ancak derinlemesine bir anlayışa sahip olmadığımız olgulara odaklanmak için kullanılmaktadır. Olay, deneyim, algı, yönelim, kavram ve durumlar şeklinde karşımıza çıkabilen fenomenlerin anlaşılması için fenomenoloji iyi bir model sunmaktadır (Yıldırım ve Şimşek, 2011: 72). Fenomenoloji ise; insan bilincinin ve insanların içinde yaşadıkları dünyayı yorumlama biçimlerinin araştırılmasıdır (Slattery, 2012: 232). Fenomenolojiye göre; asla değişmeyen ve herkes için geçerli olan bir gerçeklik yoktur. Husserl, “*Fenomenoloji Üzerine Beş Ders*” adlı eserinde fenomenolojik yaklaşımın çerçevesini oluşturan şüpheyi “*Bilgi, bilinenin bilgisidir. Onun karşısında da bilinen nesnelere vardır. Ama bilginin, bilinen nesneye uygun düştüğünden nasıl emin olunabilir?*” (Husserl, 2012:15) diyerek ortaya koymuştur.

Sosyal gerçekliğin araştırılma sürecinde fenomenolojik yaklaşımın kullanılmasındaki ana düşünce, tek tek insanların bakış açılarından bakarak onların anlam yapılarını niyetlerini anlamaya çalışmaktır. Fenomenolojik çözümlemenin ana amacı; şeylerin varlık ve özünün kavranmasıdır. Yüzeysel yansımalarda görülemeyen şeylerin varlık ve özü; esasa indirgeme ile aranmaktadır. Bu doğrultuda, mevcut fenomen farklı bağlamlarda karşılaştırılır. Farklı farklı durumlarda değişiklik göstermeden kalan şey o olgunun özü olarak kabul edilir (Mayring, 2000: 92-93). Bu yaklaşım ile yürütülen araştırmalarda, nitel araştırmanın doğasına uygun olarak, kesin ve genellenebilir sonuçlar yerine herhangi bir fenomen hakkında daha iyi ve kapsamlı bilgiler, bu amaçla örnek, açıklama ve yaşantıların ortaya konulması amaçlanmaktadır (Yıldırım ve Şimşek, 2011: 75).

Çalışma kapsamında İstanbul’da bulunan bir vakıf üniversitesinde önlisans ve lisans eğitimlerine devam etmekte olan 8 öğrenci ile derinlemesine görüşmeler gerçekleştirilmiştir. Pandemi sürecinin devam etmesi, derslerin uzaktan sürdürülmesi, öğrencilerin üniversite yerleşkelerine gelip gitmemeleri gibi nedenlerle görüşmeler bir iletişim teknolojisi olan ve uzaktan çevrimiçi görüşmelere olanak tanıyan Zoom uygulaması aracılığıyla gerçekleştirilmiştir. Katılımcıların belirlenmesi için ders ve danışmanlık gruplarına çalışmanın



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

içeriği hakkında bilgi veren bir mail gönderilmiş ve maili olumlu yanıtlayan (gönüllü katılımcı olmak istediğini belirten) kişiler ile randevular oluşturulmuştur. Bu aşamada maili yanıtlanmayan ancak sonrasında çeşitli kanallar ile araştırmaya dahil olmak istediğini belirten katılımcılar da araştırma planına dahil edilmiş, sonrasında herhangi bir erteleme talebinde bulunmayan ve teknik yeterliliği sahip olanlar (internet erişimi, zoom uygulaması, kamera ve mikrofon erişimi) ile görüşmeler gerçekleştirilmiştir. Çeşitli sebepler ile ileri bir tarihte ya da farklı bir uygulama aracılığıyla araştırmaya dahil olmak istediğini belirten katılımcılar ise kapsam dışı bırakılmıştır.

Görüşmelerin başlangıcında katılımcılara çalışma hakkında bilgi verilmiş, görüşmelerin kaydedileceği ve cevaplarının kimlik bilgileri ile eşleştirilmeden gizlilik esasına bağlı olarak sadece bu çalışma kapsamında kullanılacağı belirtilerek onayları istenmiştir. Onay vermeyen herhangi bir katılımcı olmadığından yarı yapılandırılmış görüşme yönergesinde yer alan kişisel bilgiler, gündelik yaşamın planlanmasında değişim ve öğrencilikte değişim başlıkları altında irdelenen araştırma sorularının her biri için doyum sağlanana kadar görüşmelere devam edilmiştir. Derinlemesine görüşmeler 14 Aralık 2020 ile 13 Ocak 2021 tarihleri arasında gerçekleştirilmiş ve 35 dk ila 65 dk arasında sürmüştür. Elde edilen ses kayıtları incelenmiş ve kodlanmıştır. Tekrar eden kodların saptanmasıyla birlikte çalışmanın temaları elde edilmiştir.

### **BULGULAR**

Çalışmaya katılan öğrencilerin tamamı kadındır. Bu eğilimin ortaya çıkmasında temel etken sosyal hizmet lisans ve sosyal hizmetler önlisans programlarında kadın öğrencilerin önemi bir çoğunluğu oluşturmalarıdır. Katılımcıların 4'ü önlisans ve 4'ü lisans öğrencisidir. Katılımcıların yaşları 19 ile 27 arasında değişmektedir. Bir öğrenci (27 yaş) hariç diğer hepsinin ilk üniversite deneyimini yaşadıkları, tamamının İstanbul'da ve ailesi ile birlikte ikamet ettikleri ve ikisinin sosyal hizmeti hedefledikleri bölüm/programı tutturamadıkları ve açıkta kalmamak için tercih ettiği öğrenilmiştir.

Katılımcıların deneyimleri incelendiğinde salgın ile birlikte gündelik yaşamlarında ve öğrencilik hayatlarında yaşanan değişimleri birbirinden oldukça farklı şekillerde değerlendirdikleri/anlamlandırdıkları görülmektedir. Ancak her ne kadar değerlendirme ve anlamlandırmaları birbirlerinden farklılık gösterse de tüm katılımcılar Covid-19 pandemisiyle birlikte gündelik yaşamlarının ve akademik faaliyetlerinin değiştiğini ifade etmektedirler.

Öğrencilerin gündelik yaşamın planlanmasında yaşadıkları değişimler incelendiğinde ilk olarak beslenme konusu gündeme gelmektedir. Pandemi sürecinde iki öğrencinin her zamanki gibi ve



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

her zamanki kadar yemeyi sürdürürken diğer altı öğrencinin beslenme şekil ve sıklıklarında önemli düzeyde değişimin yaşandığı gözlenmiştir. Buna göre sürekli evde olma, sosyal yaşamla bağını sınırlama, yapacak bir şey bulamama gibi nedenlerle dört öğrenci beslenme alışkanlıklarındaki değişimi iştahın artması, sürekli bir şeyler yeme/atıştırma isteği şeklinde ortaya koyarken bir öğrenci yaşadığı stresli durum nedeniyle canının hiçbir şey yemek istemediği ve pandemi sürecinde kilo verdiğini ifade etmiştir. Bir diğer öğrenci ise sürekli evde olmaktan kaynaklı ev yemeğinden bıktığını bu nedenle eskisinden çok daha fazla dışardan hazır yiyeceklerle öğünlerini tamamladığını belirtmiştir:

Katılımcı 4:

“Ben gidemeyince hazır bana rahat rahat geliyor ya böyle yattığım yerden bir şey söylüyorum geliyor. Bunu sık yapmaya başladım biraz kötü oldu o kadar. Yine öğünüm aynı saatlerim değişmiyor. Ama ev yemeklerini bıraktım biraz. Evde sürekli ev yemeği evde evde evde bu sefer de dedim ki biraz dışardan bu sefer de dışarı fazla kaçtı...”

Öğrencilerin uyku alışkanlıklarındaki değişim incelendiğinde bir katılımcının uyku düzeninde herhangi bir değişimin yaşanmadığı ve başka bir öğrencinin her zamankinden daha erken kalkarak günü değerlendirdiği fark edilmiştir. Diğer altı katılımcının ise pandemi nedeniyle uyku düzenleri kendilerinin deyimiyle bozulmuştur. Gündüz çok geç saatlere kadar uydukları ve gece uyuyamadıkları öğrenilmiştir. Benzer deneyimlerden bahseden öğrenciler bu değişimi bir sorun olarak tanımlamış ve uyku alışkanlıklarını eski haline getirmek için mücadele ettiklerini ifade etmişlerdir.

Üniversite öğrencileri arasında sosyal ilişkiler pandemi nedeniyle en fazla değişen yaşam alanıdır. Katılımcıların tamamı sosyal faaliyetlere katılımlarının durma noktasına geldiğinden, arkadaşlarıyla görüşemediklerinden dolayı şikayetlerini dile getirmişlerdir. Pandemi öncesinde var olan aktif bir arkadaşlık ve öğrencilik yaşamı yerini salgın nedeniyle aile üyelerine virüs taşımaktan çekinen ve eve hapsedilen bir yaşama bırakmıştır. Bu doğrultuda katılımcılar; kendini geliştirecek faaliyetlerden geri çekilmek zorunda kalma, sportif faaliyetlerden uzaklaşma, yaşam enerjisini kaybetme gibi olumsuz yaşam deneyimlerinden bahsetmişlerdir. Sosyal faaliyetlerde yaşanan dönüşüm ve bu dönüşümün katılımcılar üzerindeki yansıması incelendiğinde; genel olarak sosyal faaliyetlerinin ev dışından ev içine, arkadaş ilişkilerinden aile üyelerine doğru aktarıldığı söylenebilir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Öğrencilerin, öğrencilik yaşamlarına ilişkin deneyimleri ve pandemide öğrenci olmakla ilgili düşünceleri araştırma kapsamında incelenen bir diğer konudur. Katılımcıların deneyimledikleri zorluklara bakıldığında, evin fiziki şartlarının ders çalışma ve dersi takip etme için yetersiz olması, uzaktan eğitimin farklı öğrenme ihtiyaçlarını karşılayamaması, ders öğretim elemanları ve öğrencilerin sınıf ortamındaki gibi olmaması ve sorumlulukların çok daha kolay ertelenebilmesi konuları dikkat çekmektedir. Ayrıca özellikle üniversitede ilk yılı olan öğrenciler sınıf arkadaşlarını ve ders öğretim elemanlarını tanıyamadığından duyduğu rahatsızlığı dile getirmektedir. Öte yandan üst sosyoekonomik gelir grubuna mensup, eğitimli bir ailenin tek çocuğu olan bir lisans üçüncü sınıf öğrencisi derslerin tamamını sınıftaymışçasına çalışma masasına oturarak takip ettiğini ifade etmiş ve pandemi nedeniyle akademik anlamda herhangi bir sıkıntı ya da zorluk yaşamadığını paylaşmıştır. Aynı öğrenci sınıfta ekonomik anlamda sıkıntı yaşayan kimi arkadaşlarının olduğundan ve bu arkadaşlarının gerekli teknolojik ekipmana sahip olamadığı için derslerden kalma tehlikesi yaşadığından bahsetmiştir. Benzer şekilde lisans dördüncü sınıfa devam eden 22 yaşında ve düşük sosyoekonomik gelir düzeyine mensup bir öğrenci bilgisayarının eski olduğundan sınav sırasında yaşanacak herhangi bir elektrik kesintisi durumunda çaresiz kalacağından dolayı sürekli endişe taşıdığını paylaşmıştır. 19 yaşındaki önlisans birinci sınıf öğrencisi ise bilgisayarının bulunmadığını, dersleri telefonu aracılığıyla takip ettiğini ancak sınavlara telefonla girmenin mümkün olmadığını ifade etmiştir. Öğrenci ayrıca pandeminin aile içinde ekonomik bir kriz yarattığını ve bilgisayar almak gibi bir çözüm üretmediklerinden bahsetmiştir. Bu nedenle sınavdan bir gece öncesinde bilgisayarı olan arkadaşında kalmak ya da sınav sabahı sokağa çıkma yasaklarını delerek arkadaşına gitmek gibi çeşitli stres yaratan alternatif çözümler üretmeye çalıştığını paylaşmıştır.

Pandemide öğrenci olmanın avantajları incelendiğinde ise derslerin kaydediliyor olması dikkat çeken bir bulgudur. Katılımcılar, pandemi öncesinde hocaların ses ya da görüntü kayıtlarını almak mümkün olmazken artık tüm ders sürecinin kaydediliyor olmasını bir avantaj olarak ifade etmektedirler. Ders tekrarları için kullanılan bu kayıtlar uzaktan eğitim sürecinin en büyük kolaylaştırıcıları olarak ifade edilmektedir. Bunun yanı sıra üniversite yerleşkesine uzak bir lokasyonda ikamet eden katılımcılar kolaylık olarak yoldan sağlanan tasarrufu dile getirmektedirler. Kartal'da ikamet eden ve Fatih'te bulunan yerleşkede eğitimine devam eden bir öğrenci, pandemi öncesinde derse katılmak için 2,5 saat önceden yola çıktığını ifade ederek uzaktan eğitim sürecinin oldukça büyük bir zaman kazandırdığını ve bu yolla kolaylık



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

sağladığını ifade etmiştir. Benzer şekilde Çatalca'da oturan ve Beykoz'daki yerleşkede eğitimine devam eden başka bir katılımcı pandeminin sağladığı kolaylıkları:

Katılımcı 2:

“...şimdi yataktan kalkıyorum üşümeden otobüs beklemeden kalkıyorum bilgisayarımı açıyorum dersime giriyorum ve bu beni motive ediyor ve ders çalışırken sıcak evimdeyim. Ya okul kütüphanesi tabii ki ayrı bir dünya ayrı bir çevre ama açıkçası ben daha çok çalışmaya başladım. Kendimi daha çok vermeye başladım hani normalde okulda mesela hoca bize bir ders anlattıktan sonra eve gelince bir tekrar huyum yoktu ama şimdi online dersi kapattıktan sonra tekrar videoyu izliyorum, yazıyorum tekrar çalışıyorum kitap okuyorum yani ne bileyim açıkçası bana iyi anlamda yine etki etti ya.”

şeklinde dile getirmiştir. Bunun yanı sıra derslerin ev konforunda takip edilebiliyor olması, ders sırasında yiyip içebilme imkanı, fiziksel ihtiyaçların ertelenme zorunluluğunun bulunması, özgüven sorunu yaşayan kimi öğrencilerin daha rahat şekilde kendilerini ifade edebilmeleri uzaktan eğitimin ifade edilen kolaylıkları arasındadır. Bir diğer avantaj ise derse katılım sırasında öğrencilerin ders kitaplarından, ders notlarından ve hatta arama motorlarından yardım alabilmeleri, istedikleri zaman derse dahil olup istemediklerinde kamufle olabilmeleri ve çeşitli bahanelerle sorumluluklarından uzaklaşabilmeleridir. Ek olarak öğrencilerin yol, yemek gibi çeşitli harcamalardan uzaklaşarak ekonomik anlamda rahatladıkları, paralarını daha farklı ihtiyaçları için kullanabildikleri ifade bulan avantajlar arasındadır.

Çalışma bulguları uzaktan eğitim sürecinin çeşitli avantaj ve dezavantajları içerdiğini ve öğrencilerin genel olarak avantajlarına rağmen eskisi gibi yüz yüze eğitimi istediklerini göstermektedir. Öğrencilerin yüz yüze ve üniversite ortamında eğitimlerine devam etmek isteme nedenleri; sosyalleşmek, arkadaş ve öğretim elemanlarıyla daha sağlıklı iletişim ve etkileşim kurmak, daha verimli bir ders dönemi geçirmek ve uygulamaya ilişkin daha gerçekçi bilgiler elde etmek içindir. Pandemi nedeniyle kendisini öğrenciden daha çok işsiz birisi gibi hissettiğini ifade eden lisans dördüncü sınıf öğrencisi “*artık vak'a dinlemek değil görmek istiyoruz*” diyerek sosyal hizmet eğitiminde pandemi ile birlikte açılan boşluğa dikkat çekmektedir.

Son olarak salgın sürecinde var olan ilişkisel ve kurumsal destek mekanizmaları incelenmiştir. Bu noktada üniversite bünyesinde çeşitli teknik ve akademik destek birim/faaliyetlerinin olduğu belirtilmelidir. Ancak elde edilen bulgular öğrencilerin ağırlıklı olarak kendi destek



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

mekanizmalarını oluşturup kullandıklarını göstermektedir. Bu destek mekanizmaları arasında sınıf temsilciliği sistemi önemli bir rol üstlenmektedir. Öğrencilerin yaşadıkları sorunları ilettikleri ve tek bir kanal aracılığıyla çözüm arayışının gerçekleştirildiği bu sistem yaşanan teknik ve akademik sorunların çözülmesinde öğrenciler açısından çok etkili görülmektedir. Ayrıca öğrencilerin kurdukları “sınıf whatsapp” grupları iyi bir ilişkisel destek sistemi olarak faaliyet göstermektedir. Nerdeyse tüm öğrencilerin aktif olduğu ve paylaşımda bulunduğu, dayanışmanın ve birlikteliğin yüksek olduğu bu gruplar sorunlar karşısında hep birlikte hareket edebilmelerini kolaylaştırmaktadır. Son olarak birinci sınıf öğrencileri arasında daha küçük whatsapp gruplarının etkin olduğu öğrenilmiştir. Grup sunum ödevleri için oluşturulan ve süreç içinde sınıf gruplaşmalarına benzer bir yakın arkadaşlık ağına dönüşen bu gruplar 8-10 öğrenciden oluşmaktadır. Bu grupların içinde tam bir birlikteliğin kurulduğu ve görüntülü konuşma, görüntülü görüşmeler aracılığıyla birlikte ders çalışma, sohbet ve kahve diyaloglarının gerçekleştirildiği öğrenilmiştir. Bir diğer ifadeyle yüz yüze iletişim kuramama sorunu bu bu gruplar içinde alternatif faaliyetlerle çözüme kavuşturulmuştur.

### TARTIŞMA ve SONUÇ

Küresel bir sağlık krizi olarak tanımlanan Covid-19 pandemisi gündelik yaşamın yeniden düzenlenmesini gerektiren birçok tedbir ve uygulamayı gündeme getirmiştir. Bu kapsamda üniversitelerin sınıf ortamında ve yüz yüze gerçekleştirilen eğitimlerini uzaktan öğretim sürecine entegre etmeleri önemli düzenlemelerden biridir. Kuşkusuz eğitim metodunun değişmesi bu alandaki her birey için oldukça önemli farklılıkları gündeme getirmekte ve yeni sürece adaptasyon dahil olmak üzere çeşitli kritik durumları içermektedir. Öğrencilerin uzaktan eğitim sistemlerine entegrasyonu çeşitli yapısal, teknik ve sosyal zorlukları içermekte var olan sorun çözme stratejilerini işlevsiz kılacak yeni yetkinlikleri gerektirmektedir. Ancak bu ani ve yeni toplumsal düzen dikkatli bakıldığında sadece risk ya da zorluklardan ibaret bir alanı işaret etmemektedir. Bahsedilen ve deneyimlenen zorlukların yanı sıra kolaylıkları, tasarrufları ve yeni keşifler ile belki de ilerlemeyi barındırmaktadır.

Bahsedilen bu çift yönlülük; yeni toplumsal normal içinde eksiklerin yanı sıra öğrencilerin akademik motivasyonlarını da gözler önüne sermektedir. Sosyal hizmetin sorunlarla mücadelede benimsediği güçlendirme perspektifinin de önerdiği üzere güçlerin, yeterliliklerin ve kaynak ve teşviklerin fark edilmesi sosyal refahın ve iyilik hallerinin yükseltilmesinde önemlidir. Sosyal hizmet uygulamalarına bahsedilen avantaj ve kaynaklar dahil edildiğinde kalıcı çözümler daha hızlı ve kolay şekilde tesis edilebilecektir. Bu doğrultuda çalışmanın saha



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

bulguları değerlendirildiğinde, pandemi nedeni ile yaşanan değişim tek bir şekilde ifade edilebilecek ve olumsuz bir değişimi resmedecek nitelikte değildir. Aksine bireylerin sosyal çevreleriyle bağlantılı şekilde organize olan ve farklı örüntüleri barındıran her öğrenci için yeni ve ayrı bir düzeni teşkil etmektedir. Ayrıca pandemi ile işleme hale geldiği düşünülen kimi sosyal destek mekanizmaları sanıldığı gibi yok olmak yerine biçim ve içerikteki değişiklikler ile kullanılmakta ve pandemi öncesi ile benzer sonuçları doğurmaktadır.

Saha bulguları, öğrencilerin pandemi nedeniyle yaşadıkları gündelik ve akademik yaşam değişimlerini nasıl anladığı noktasında üç temel değişkeni gözler önüne sermektedir. Bunlardan ilki öğrencilerin devam ettikleri sınıflarıdır. Üniversitede ilk senesi olan öğrenciler daha çok yeni arkadaşları ve öğretim elemanları ile yüz yüze iletişim kuramadığından yakınırken üçüncü ve dördüncü sınıfa devam eden öğrenciler daha çok akademik konularda endişelerini ifade etmişlerdir. Bir diğer değişken öğrencinin eğitim gördüğü yerleşke ile ikamet adreslerinin yakınlık / uzaklık durumudur. Evi ile yerleşkesi arasında 2 saatten daha uzun mesafe olan katılımcılar pandemi nedeni ile yaşadıkları değişimlerin olumlu olduğunu ya da en azından olumsuz olmadığını belirtirken üniversiteye gitmek için çok fazla hareket etmeleri gerekmeyen öğrenciler yaşadıkları değişimleri çok daha olumsuz ifadelerle tanımlamışlardır. Öğrencilerin gündelik ve akademik yaşamlarında deneyimledikleri değişimleri anlamlandırmalarına etki eden üçüncü değişken ise sosyoekonomik durumlarıdır. Araştırma bulguları sosyoekonomik kaynakları yetersiz olan katılımcıların pandemi nedeni ile daha olumsuz yaşam deneyimlerine sahip olduklarını göstermektedir.

Sonuç olarak İstanbul'da bir vakıf üniversitesinde sosyal hizmet lisans ve önlisans eğitimlerine devam eden öğrenciler pandemi nedeniyle yaşamlarında gerçekleşen değişimleri birbirlerinden çok farklı şekillerde anlamlandırmaktadır. Gündelik yaşam ve akademik faaliyetlerde meydana gelen değişimleri anlamlandırma şekilleri, öğrencilerin devam ettikleri sınıflarına, yerleşke ile ikamet adresleri arasındaki uzaklığa ve sosyoekonomik durumlarına göre farklılık göstermektedir. Bu bulgular ışığında pandeminin olumsuz yaşam deneyimleri ile karakterize olamayacağı söylenebilir. Ayrıca öğrenciler deneyimledikleri yeni durumlar karşısında çeşitli sosyal destek mekanizmalarını kaybeden pasif üyeler değildir. Aksine pandemi koşullarına cevap veren yeni sosyal destek mekanizmalarını üreten aktif üyeler olarak gündelik yaşam ve akademik faaliyetlerini sürdürmektedirler. Bu bulgu, sosyal hizmetin güçlü yönler perspektifi ile uyumludur. Bu perspektif koşullar zorlu olsa da kişi ya da gruba özgü iç ve dış yetenek ve kaynaklarının (güçlerin) bulunduğu, o güçlerden destek alarak daha üst bir sosyal işlevsellik



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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düzeyine ulaşabileceği ve müracaatçıların güçlerini tanımlama ve etiketleme yoluyla artırılabilirliği iddialarını taşımaktadır (Langer ve Lietz, 2021: 90-95). Küresel bir kriz ortamından sosyal hizmet lisans ve önlisans öğrencilerinin deneyimleri onların sosyal hizmet mesleki değerleriyle uyumlu şekilde sahip oldukları güçlerden destek alarak daha üst bir sosyal işlevsellik düzeyine ulaşabileceğini göstermektedir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SERÇEME VALLEY UNIQUE RURAL LANDSCAPE CHARACTER AREAS; POSSIBLE RECREATIONAL TOURISM OPPORTUNITIES

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#### **ABSTRACT**

Rural landscapes are areas with natural, near-natural or cultural landscape characters that differ from urban environments with their unique values. While the natural structure of the rural landscape includes mountains, valleys, plains, streams, natural flora and fauna, village settlements, transportation, agricultural enterprises and folkloric life also constitute its socio-cultural elements. The study area consists of the Serçeme Basin, which is within the borders of Erzurum province. Serçeme valley, located on the Erzurum-İspir highway, has a micro-climatic climate and is one of the recreational resource values of the city. It attracts attention with its topography, unique village settlements, architectural texture, natural vegetation, river resources and folkloric structure. In this study, recreational tourism opportunities in Serçeme Valley were tried to be evaluated. In the study; The originality of village settlements, river banks, mountain and valley ecosystems, natural vegetation and landscape characters has been revealed and folkloric life and architectural texture have been determined through on-site observations. Photographs of the area were made with the help of drones, natural and cultural structure analysis was made based on the visual material obtained and survey studies, and possible ecotourism scenarios were emphasized by creating maps for more effective use of the area.

**Keywords:** Rural tourism, recreational tourism, serçeme valley, landscape character.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

With the industrial revolution in the 19th century, problems such as climate change, environmental and air pollution began to emerge as natural resource use, industrial production, and other activities such as urbanization and transportation began to accelerate and spread (Deniz, 2009) .

Concepts such as rural development, Eco-Tourism, Eco-Village, sustainability and green building have emerged as a result of the increase in population density in cities, lack of green areas and the damage caused to the environment by unhealthy living spaces.

Eco-tourism refers to visiting techniques that will ensure minimal damage to the physical, socio-cultural and many different features of the region (Demir and Çevirgen 2006).

While the word recreation, by definition, is examined more in terms of activity, it is actually a concept that literally means improving health ( Torkildsen , 2006).

Tourism, on the other hand, is the meeting of needs such as traveling, resting, having fun and learning by leaving the places where people live and going to other countries, cities and regions (Uçkun, 2004). For Turkey, the tourism sector is an area that has significant effects on solving the unemployment problem (Yıldız, 2011).

Recreation and tourism are two concepts that support each other. The existence of recreational activities makes a positive contribution to tourism. The difference between recreation and tourism is that recreation is easier to reach. While in tourism, a person has to leave the place where he/she constantly lives, in recreation, a person can do an activity at home without spending money (İskender, 2019).

Tutcu found that although Turkey has serious ecotourism potentials, there are still deficiencies in activating these potentials, and accordingly, he offered suggestions for the effective evaluation of the ecotourism potential in Turkey.

Üzümcü and Koç stated in 2017 that Fethiye has natural, cultural features and endemic plant diversity for various tourism activities, especially ecological tourism. They examined Fethiye and its surroundings, which have a very important potential for alternative tourism activity, in the context of the concept of ecological tourism, which emerged with the combination of organic agriculture, rural life and tourism activities.

In terms of the natural, biological and cultural richness of Hasan Mountain and its surroundings, Eskin et al. Reviewed by in 2017. It has been understood that Hasan Mountain and its surroundings have opportunities in terms of tourism types such as cultural tourism, faith





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

tourism, winter tourism, plateau tourism, botanical tourism and hunting tourism, and suggestions have been made to develop the ecological tourism potential in the region.

In 2020, Çalıkuşu and Güzel Gürbüz examined recreation tourism within the scope of diversifying tourism in the İzmir-Çeşme region. Within the scope of the outputs obtained in the study, suggestions were made for the development of recreational activities in order to diversify tourism in our country, specifically in the Çeşme region.

Kara Küçük and Kül Avan in order to determine the attitudes of local people living in tourism regions towards the recreational activities carried out in the region and to determine the effects of recreational activities on the public. As a result of the study, it was determined that the local people were not disturbed by tourism activities in the region. In addition, it has been determined that among the positive consequences of tourists coming to the region, it has the biggest impact on income and employment, while the negative consequence is that it creates expensive prices. Chumbe Island Coral Park Ltd. (CHICOP) marine protected area is established and managed as the first economically self-sustaining private protected area in the world. Olearnik and Barwicka 2020 study shows that CHICOP, which provides environmentally friendly activities based on ecotourism principles, respects the natural, social and cultural environment, receives many prestigious awards, employee loyalty, appreciation of local communities and positive feedback from returning tourists. It has demonstrated that CHICOP is successful in achieving its goals in a sustainable manner.

In their study dated 2015, Das and Chatterjee stated that ecotourism It compares the vision and current practices. In the article , peer-reviewed journal articles on ecotourism published between 2000 and 2013 were collected and examined. As a result of the study, it was seen that although there were many success stories, the number of failures was high. It has been observed that ecotourism has become a dead end in many places due to structural, operational and cultural problems. As a result, it was concluded that ecotourism areas should be appropriately monitored, evaluated and managed to ensure long-term protection.

The Caribbean, where a large part of its economy depends on tourism ( Scott, 2014), has the largest saltwater sea in the world, consisting of 7000 islands and islets. Many types of ecotourism activities are carried out in the Caribbean, from bird watching to nature walks (Ayhan, 2022). Although the Dominican island has a lack of infrastructure, it has well-preserved places, smoking volcanoes, untouched, clean nature and dense forests. Ecotourism



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

offers eco-accommodations in the form of nature parks and small businesses ( Dehoorne and Tătar, 2013).

Costa Rica, one of the leading countries in ecotourism, is one of the rare countries that implement ecotourism activities in a sustainable manner (Demir and Çevirgen, 2006). The National Ecotourism Certification Program is implemented in Costa Rica ( Kasalak, 2015 ). The country has rainforests, SPAs, accommodation facilities and beaches in tropical environments ( Tontus, 2015). One quarter of the country has national park status and is preferred in ecological tourism (mfa.gov.tr).

Spreading over an area of 100 hectares, Germany's Sieben-Linden eco-village consists of 64 hectares of forest. As of 2020, 145 people live in the village. It aims to be a self-sufficient village in every sense. (siebenlinden.org)

Sieben Linden settlement is divided into different neighborhoods and these neighborhoods have different perspectives. While one neighborhood in Linden has a completely traditional social life style, another neighborhood has a more modern social structure (Güleryüz, 2013).

Westhaven Farm and Kestrel in Ithaca Ecovillage There are two organic farms called Perch Farm. Organic agriculture constitutes one of the Ithaca Ecovillage 's most important sources of income. Farms have both open agricultural fields and indoor greenhouses. Commonly used "Common House" buildings are located in the center of the neighborhoods (Güleryüz, 2013).

Pastoral Vadi is located on a 42-decare land in Yanıklar Village of Fethiye. In the settlement, there are stone, wooden and adobe houses designed in accordance with traditional village architecture and taking into account ecological architectural principles. People who want can stay in these houses (Güleryüz, 2013).

There are 2 hiking trails of 21,700 m in the Mersin Çamlıyayla Baştepe ecotourism area. In addition, daily or accommodation trips can be made to important points rich in scenery and landscape by using paths. Mersin has important mammals and wildlife (www.ogm.gov.tr).

Ecological studies conducted in the world within the scope of ecological tourism have taken ecotourism together with sustainable development and focused on the effects, potential, possibilities, principles, practices and policies of ecotourism ( Eynalov and Mammadov, 2013; Fennel, 2015; Honey, 2008; Wearing and Neil, 2009; Wood, 2002).

The aim of this study is to examine the area of Serçeme Valley, which is used by the people of Erzurum for recreation in daily life, especially on weekends.

Ecotourism;



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

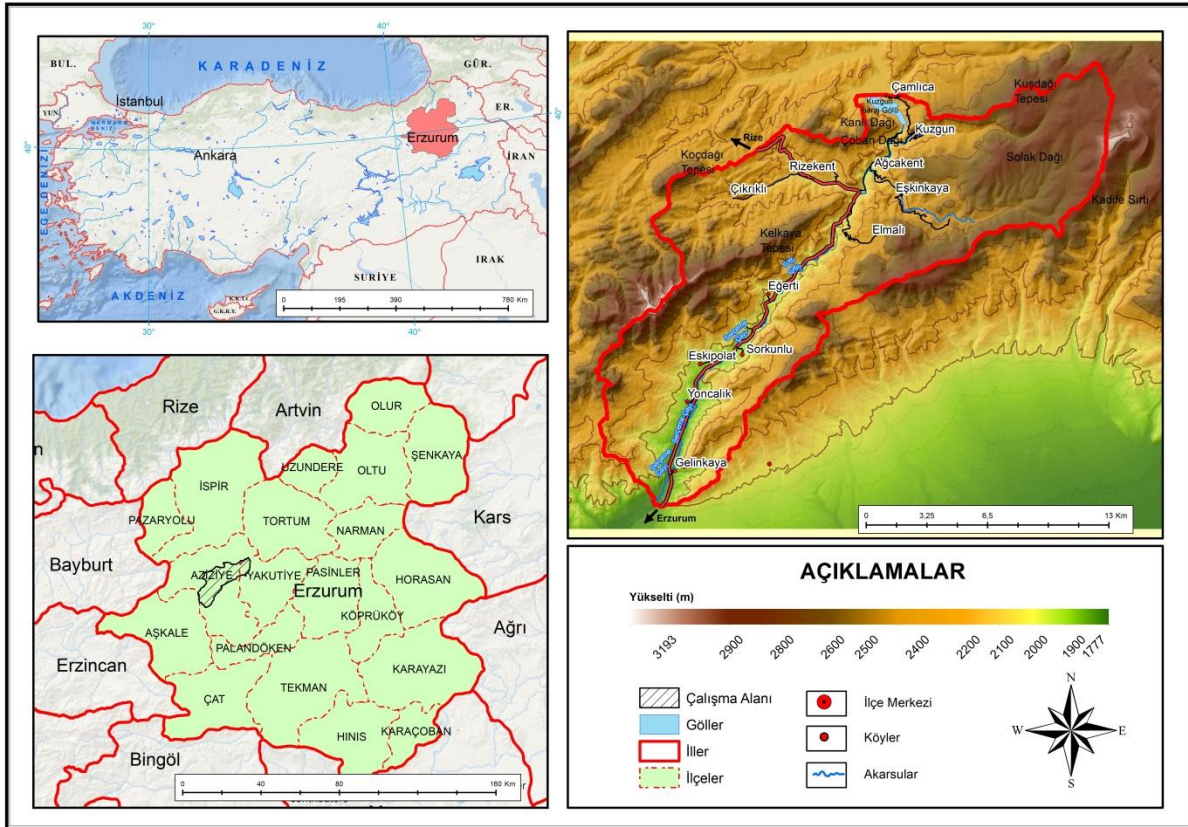
- Contributes to the preservation of biological diversity,
- Sustains the welfare of local people,
- It includes awareness-raising and information experiences,
- Serves primarily to small tourist groups by small-scale businesses,
- It involves responsible activities on the part of the tourism industry and tourists,
- It requires the consumption of non-recyclable resources at the lowest possible level,
- It attaches importance to participation at the local level,
- It provides job opportunities and ownership, especially to local people. (Wood, 2002)

that Sparrow Valley, which is used by the people of Erzurum for recreation in daily life, especially on weekends, is as follows:

- Identifying the original rural landscape
- Suggesting diversification of tourism within the scope of rural tourism
- Diversify by offering alternative recreation opportunities alongside traditional recreational activities (such as picnics)
- It is to put forward proposal plan decisions within the value of using it by protecting it.

### **MATERIALS and METHODS**

The study area consists of the Serçeme Basin, which is within the borders of the Eastern Anatolia Region and Erzurum province. In terms of administrative borders, the basin is located within the borders of Aziziye neighbourhood on a large scale with an area of 20,877 ha, Tortum neighbourhood with an area of 6,033 ha in the north-east, and at least Yakutiye neighbourhood with an area of 290 ha. From a bird's eye view to the center of Erzurum, Gelinkaya, the first village in the south of the basin, is located approximately 33 km away, and Çamlıca village, the northernmost village, is 41 km away (Figure 1).



**Figure 1:** Sparrow Valley Map showing location and basin boundaries.

Serçeme Valley, the Erzurum-İspir road goes through the middle of the basin and divides it into two in the north and south directions. Serçeme stream is fed by the Kuzgun Dam located in the north and flows southwards on the valley floor up to Gelinkaya village (Figure 2).



**Figure 19:** On the valley floor, Yoncalık neighbourhood can be seen on the right and Serçeme Stream can be seen on the left. The Erzurum-İspir road, seen between Serçeme Stream and Yoncalık neighbourhood, divides the basin into two from north to south.



Due to the harsh continental climate in Erzurum, winters are cold and snowy and summers are hot and dry. Since the basin has a microclimate feature, Erzurum has a warmer climate than the center. The average annual temperature in the area is 5.6 °C, the highest temperature is 17.5 °C in July, and the lowest annual temperature is -4.9 °C in December.

the valley has a less harsh climate than Erzurum center, this has affected the vegetation (R.Özey, 1991). The area has a wide variety of flora and fauna.

The plant geography of Serçeme Valley is in the Iran-Turan phytogeographic area of the Holarctic region. A total of 618 taxa belonging to 67 families and 322 genera were identified as flora in the area. The first three richest families: Asteraceae, Fabaceae, Brassicaceae. The top three richest genera: Astragalus L. , Carex L., Potentilla L. (Solak, 2016).

Endemic species by families: Apiaceae, Asteraceae, Boraginaceae, Brassicaceae, Campanulaceae, Caryophyllaceae, Crassulaceae, Euphorbiaceae, Fabaceae, Geraniaceae, Lamiaceae, Lamiaceae, Liliaceae, Malvaceae, Plantaginaceae, Plumbaginaceae, Polygonaceae, Rosaceae, Scrophulariaceae, Papaveraceae (Solak, 2016).

the taxa in Serçeme Valley are classified according to international IUCN endangerment categories, they are classified as "Very Endangered, Critically" in the area. Endangered -CR, In Danger- Endangered -EN, Vulnerable VU and Threatened- Near It has been found that there are plants that are included in the "Threatened -NT" category. Due to this biodiversity, the area is suitable for flora tourism, but the tourism- recreation activities should be planned in a way that will not harm the plant richness in the area and the plants should be protected (Solak, 2016).

Approximately 72% of the basin is covered by sparsely vegetated areas and natural meadows, approximately 12% is agricultural, 3% is forest, and 5% is pasture (Figure 3).



**Figure 20:** Yoncalik neighbourhood and its surrounding agricultural areas and the meadows, pasture areas and mountains behind it can be seen.



Survey studies were carried out by going to Serçeme Valley, and photographs of the area and 12 neighborhoods in the area were taken with a drone in autumn 2022 and spring 2023. The cultural assets, protected areas, Vista, unique rural landscape, original topographic structure, and picnic areas in the area were analyzed and evaluated, and site uses were identified and photographed. Natural and cultural structure analysis was made based on the visual material obtained and the survey studies, and possible ecotourism scenarios for more effective use of the area were emphasized. Some suggestions are included for the area, which has high recreational tourism resource values for the city and the region. Culture Route, Green Way/Trekking, Nature Tourism, Water- Based Recreation maps were created with the Photoshop program and supported by shots taken in the area.

## **FINDINGS and DISCUSSION**

### **1. Sparrow Valley Landscape Characters**

As a result of the study, 5 landscape characters were identified;

- Valley Landscape
- Hillside Landscape
- High mountain ecosystems
- waterside
- Rural village settlements

#### **Valley Landscape**

While the valley is wide in the south, it narrows in the north. It is seen that plant density increases on the waterfront of the valley floor and decreases towards the slopes of the mountains (Figures 4, 5).



**Figure 21:** View of the valley from Gelinkaya neighbourhood, which is the starting point of the valley.



**Figure 22:** The area where the valley narrows is seen near Sorkunlu neighbourhood.

### **Hillside Landscape**

There are forest areas in the hill areas. More *Populus tremula* L. (Aspen) and *Pinus sylvestris* L. (Scots pine) is seen. Trees change color in autumn (Figure 6).



**Figure 23:** Çamlıca neighbourhood and its surroundings are an example of hill landscape.

The forest areas are mostly located near Kuzgun Dam and Rizekent. In existing forest areas, there are generally aspen and Scots pine tree species, and the trees turn yellow and change color in autumn (Figure 7).



**Figure 24:** Kuzgun Dam and the aspen forest area around it in an autumn landscape.

#### High Mountain Ecosystems

Basin elevations: The valley floor around Serçeme stream reaches an altitude of approximately 1800 m, and the mountains around the basin reach an altitude of up to 3000 m. It is seen that the elevations of the mountains generally decrease from east to west and from north to south (Kafalı 1992), (Figure 8).



**Figure 25:** View of high mountain ecosystems from the Erzurum-İspir road near Yoncalık neighbourhood.



### **Waterfront Landscape**

There are two most important places for waterside landscaping. One of them is Kuzgun Dam and the other is Serçeme Stream. The ever-flowing Sırlı Stream, coming from the Kuzgun dam in the north, then flows in the form of Serçeme Stream to the attractive Gelinkaya neighbourhood on the valley floor (Figures 9, 10).



**Figure 26:** Kuzgun dam, the northern border of the basin and the source of Serçeme Stream.



**Figure 27:** Salix along the Serçeme stream triandra L. ( White willow tree) is more common.

### **Village Settlements**

It is seen that the settlements in the basin are affected by the geographical structure and there are mostly settlements from the valley floor plains to the plateau surfaces. It is seen that villages are lined up as two main settlement zones in the southwest and northeast around the Erzurum-İspir highway. The first row, the northeastern settlements, are mostly located on the slopes or plateau plains west of the Dumlu mountains. Sorkunlu, Elmalı, Eşkinkaya and Kuzgun villages are the hillside villages located here. In second place are the villages of Gelinkaya, Yoncalık, İleri, Eskipolat, located at the foothills of the Yeşirçöl mountains (Özey 1995).

Two types of village settlements stand out in particular in the basin. Our first type of villages, Gelinkaya, Eskipolat, İleri, Sorkunlu, located close to the roadside and at the bottom of the valley, have a milder climate, resulting in increased plant diversity. Our second type of villages are located at high altitude, and plant diversity is seen to be less in Ağcakent, Rizekent, Çamlıca, Kuzgun, Eşkinkaya, Elmalı villages due to their harsher climate (Figure 11, 12).

The residential areas between the villages are approximately 4 km away from a bird's eye view and the villages are of mass settlement type. It is seen that the old houses in the neighborhood were made of stone, with swallow roofs and tandoors, in the form of traditional Erzurum houses, while the houses built later were reinforced concrete structures far from traditional architecture. There are village houses, condolence houses and mosques in the villages. Agricultural areas are generally located close to the village settlement area. Villages are of mass settlement type.



**Figure 28:** Yoncalık neighbourhood is an example of the villages located on the valley floor.





**Figure 29:** Çıkıklı neighbourhood is an example of hill villages.

### **Social and Cultural Structure**

The most important source of income for the villagers is cattle and sheep farming. In order to meet the feed of the animals, mostly wheat, barley, sainfoin, clover and corn are grown in the fields. In addition to the use of agricultural machinery, agriculture traditionally done by human power continues. Apart from this, beekeeping activities are also carried out (Figure 13, 14, 15).



**Figure 30:** Livestock activities near Ağcakent.





**Figure 31:** Agricultural works carried out near Yoncalık neighbourhood.



**Figure 32:** Villagers engaged in beekeeping activities are seen.

While tomatoes, cucumbers, peppers, eggplants, zucchinis, beans, corn, cherries, sour cherries, pears, mulberries, apples and strawberries grow in orchards in the villages at the bottom of the valley, product diversity decreases as the altitude increases in the hill villages (Figure 16).





**Figure 33:** A garden in Sorkunlu neighbourhood is seen.

Since animal production is at the forefront, especially animal products are used in local foods. Su pastry, stuffed kadayıf, flour halva, roasted meat, butter, goyermiş cheese, curd, string cheese and many cheese varieties, clotted cream, dried clotted cream, honey, rosehip jam, kete, tandoori bread are among the local foods (Figure 17).



**Figure 34:** Local foods.

It is seen that there is a decreasing and mostly elderly population in the villages due to constant migration out. Although the population density in the villages closer to the city center of

Erzurum is higher than in the remote villages, it is a sparsely populated rural settlement with a population of 938 women, 952 men, a total of 1890 people (ADNKS). The village with the most population is Yoncalık neighbourhood with a total population of 505, and the village with the least population is Çamlıca neighbourhood with 42 people. However, this population increases with the arrival of spring, when people who migrated to the cities come back to the villages to cultivate their fields and orchards, and until the autumn crops are collected. Due to constant migration out of the villages, there is a decreasing and mostly elderly population. People live according to traditions. Women use the fabric called eham, which is made from finely spun sheep wool and obtained by shuttle weaving with a flat surface, through very laborious steps, as outdoor clothing, and they use hand-embroidered scarves as a cover for their heads (Figure 18). While women do the work in the garden in front of their doors and at home, men do the field work. Men come together in front of the village mansion and the mosque and spend their free time chatting.



**Figure 35:** Women in local dress called eham.

## **2. Possible/Suggested Recreational Tourism Types**

- Transportation coastal recreation tourism areas (high altitude sports center, artificial waterfall, bungalows, picnic area, horseback riding, adventure park, camping areas)
- Walking/ trekking , motor vehicle, climbing routes
- Photo safari , flora tourism, paragliding, rappelling, zipline
- Ecovillage ( agrotourism , hostel-accommodation, monitoring and living of seal life)



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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Water-based recreation around Kuzgun Dam (water sports, canoeing, angling, observation terraces, camping areas, festivals)

Four maps showing recreation opportunities in the study area were created, and possible routes, places and areas for recreation types were suggested in these maps.

1. **Green Road/ Trekking, motorized touring Map:** In the study area, different suitable places for trekking and motorcycling, such as in the forest, with mountain views, on flat land, in the village, were identified and the kilometers of the routes were written. Suitable places are shown in the village centers where you can rest and meet your eating and drinking needs during these excursions (Map 1).
2. **Nature Tourism Map:** The places shown in orange on the map show areas suitable for photographing wildlife and flora, and the places in purple show vista areas. The places shown in blue are interesting geological formations similar to fairy chimneys near Gelinkaya neighborhood. Eskipolat village, shown in lilac colour, is a suitable place for designing accommodation as it is in the center of the area and opposite the place where artificial waterfalls are planned to be built. The areas shown in green colour are forest areas and a landscape that changes color in autumn can be observed, and is also an area suitable for adventure park and scouting. The area around Ağcakent and Eşkinkaya villages shown in red colour is the area intended for horseback riding (Map 2).
3. **Water-Based Recreation Map:** The Kuzgun dam shown in green offers recreation opportunities here with its view of the dam and its surroundings, its water and the village nearby. It is a suitable area for recreation opportunities such as camping sites, festivals, canoeing, angling and diving. The areas shown in purple around the Serçeme Stream are a preferred place for picnics, although there is no existing infrastructure. With the creation of the infrastructure, the immediate surroundings of Serçeme Stream will become even more attractive. The rocky area opposite Eskipolat village is a suitable place for an artificial waterfall and a viewing terrace. When the waterfall freezes in winter, it can also be used as ice climbing (Map 3).
4. **Cultural Route Map:** There are places/structures that can be seen in the area, most of which are registered by the Ministry of Culture. There is a registered rock tomb and settlement area, Gelinkaya castle and Erzurum house within the borders of Gelinkaya neighbourhood. There is also the historical Gelinkaya Mosque, which we think is worth registering. There is a 1st Degree archaeological site in the hilly area opposite the Eğirti





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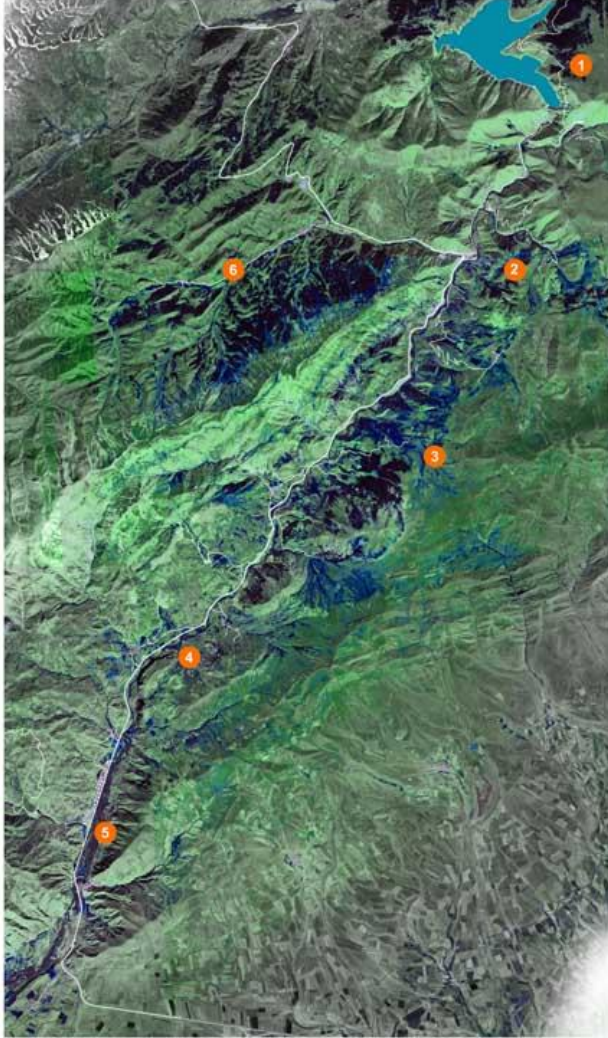
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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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neighbourhood. There is a registered fountain in the Elmalı neighborhood and a registered Eşkinkaya castle near the Eşkinkaya neighborhood. There is a registered girl's bridge on the side of the road within the borders of Rizekent neighborhood on the Erzurum-İspir road. There is also an unregistered historical mosque in Rizekent neighbourhood (Map 4).

## Yesil Yol/ Trekking ve Motorlu Tasit Rotası



1. Çamlıca- Kuzgun 26 km y.
2. Agcakent- Eskinakaya 38 km y.
3. Elmalı- Egerti 26 km y.
4. Sorkunlu- Eskipolat 38 km y.
5. Yoncalık- Gelinkaya 30 km y.
6. Rize- Çikrikli 30 km y.



1. Çamlıca-Kuzgun Trekking ve Motorlu Tasit Rotası 26 km y.



2. Agcakent-Eskinakaya Trekking ve Motorlu Tasit Rotası 38 km y.



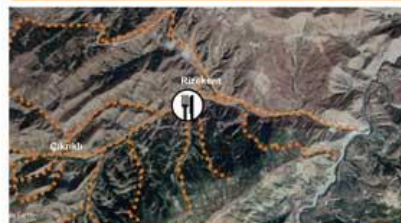
3. Elmalı-Egerti Trekking ve Motorlu Tasit Rotası 26 km y.



4. Sorkunlu-Eskipolat Trekking ve Motorlu Tasit Rotası 38 km y.



5. Yoncalık-Gelinkaya Trekking ve Motorlu Tasit Rotası 30 km y.

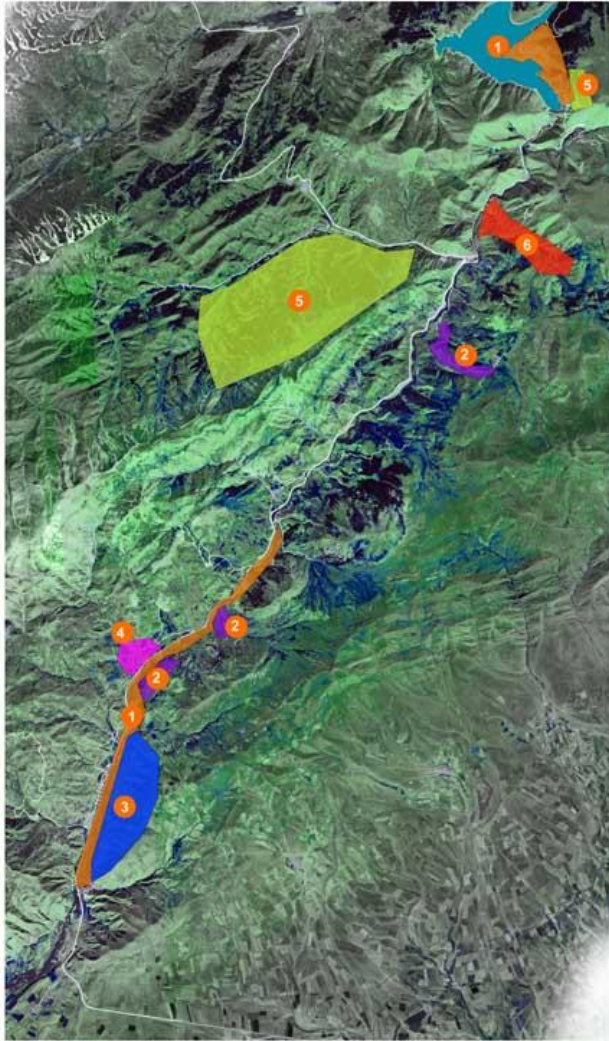


6. Rize-Çikrikli Trekking ve Motorlu Tasit Rotası 30 km y.

**Map 1:** Shows trekking and motor vehicle routes , resting and eating and drinking places.



## Doga Turizm



1. Yaban hayatı izleme, foto safari



2. Vista, manzara yerleri



3. İlginç Topoğrafik oluşumlar



5. Sonbaharda değişen peyzaj, macera parkı, izcilik.



6. Atlı gezinti

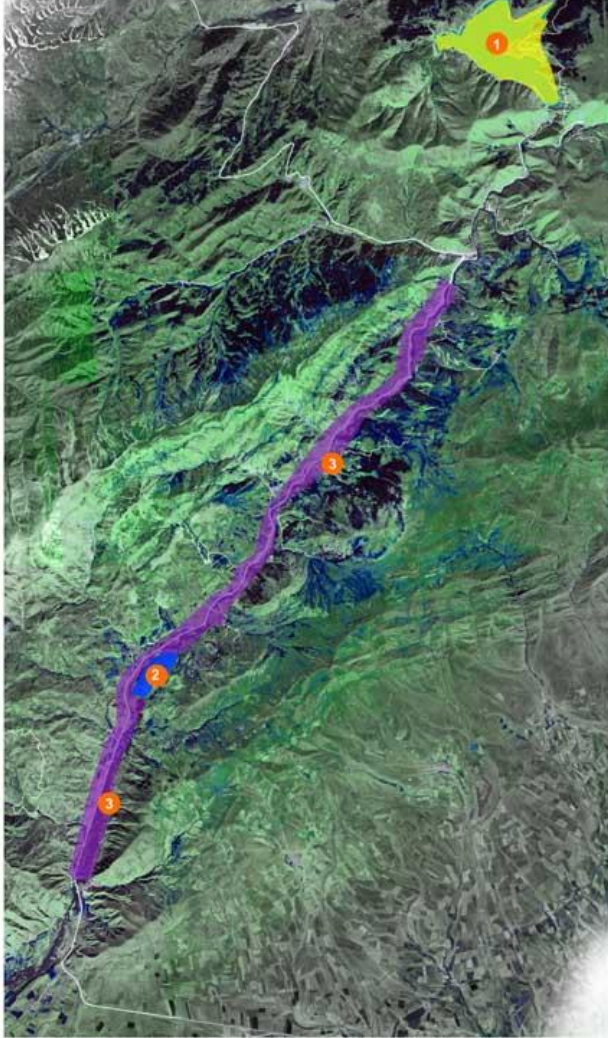


4. Konaklama yerleri

Map 2: Nature Tourism map.



## Suya Dayalı Rekreasyon



1. Kuzgun Barajı (kano, kamp, dalgıç, alabalık lokantası, olta bakıçlığı, festival)



2. Eskipolat mah. karşısı kaya ( selale, buz tırmanışı, seyir terası)

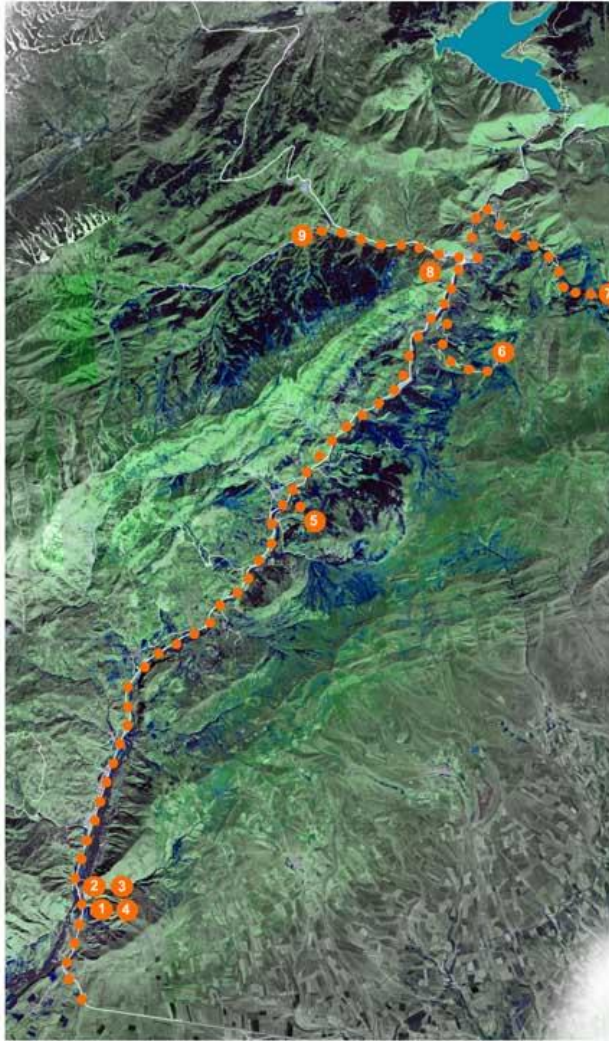


3. Serçeme Çayı etrafı (piknik alanları)

**Map 3:** Water-based recreation map.



## Kültür Rotası



1. Kaya Mezarı ve Kaya Yerlesim Alanı



2. Gelinkaya Kalesi



3. Gelinkaya Köyü Camisi



3. Gelinkaya Köyü Camisi



4. İlhan Karadağ Evi



4. İlhan Karadağ Evi



5. 1. Derece Arkeolojik Sit Alanı



6. Elmalı Mahalle Çesmesi



7. Eskinakaya Kalesi



8. Kız Köprüsü



9. Rizekent Köyü Camisi



9. Rizekent Köyü Camisi

Map 4: Cultural route map.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CONCLUSION and RECOMMENDATIONS

Erzurum is a winter country and summers are short. Local people, who have to spend their time indoors throughout the long winter, prefer to spend their time in areas that offer recreational activities in the summer. The area and variety of available recreational activities are not even sufficient for the use of local people in Erzurum. Areas offering various recreational activities are a necessity in Erzurum.

Serçeme Valley's proximity to the center of Erzurum, being on the road to Rize, the beauty of its nature, flora and fauna diversity, folkloric life, microclimate, and its use by local people for picnic purposes despite the lack of existing infrastructure make the area a high potential place for recreational activities. brings.

Ecological solutions need to be found in many different areas to environmental problems resulting from today's human lifestyle. The world of architecture has an important place in the emergence of these problems and finding solutions. For this reason, living spaces compatible with nature should be designed and implemented in order to minimize the damage to nature as much as possible.

In order to utilize Sparrow Valley within the scope of eco-tourism, master plans will be prepared that will preserve the original structure, and planning recreational activities such as water sports, festivals, picnic areas, camping areas and adventure parks will contribute to the economy of this place.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A FIELD STUDY ON THE EFFECT OF CROWN AREA OF INDIVIDUAL TREES ON THROUGHFALL

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#### ABSTRACT

Interception, which is the part of precipitation that captured by plants and evaporates before reaching the ground, is an important part of the hydrological cycle. It is difficult to measure the amount of precipitation evaporated by interception. Therefore, the difference between total precipitation and the amount reaching the ground surface is mostly used to determine interception. There are many meteorological and vegetative factors affecting throughfall. One of these vegetative factors is crown characteristics. One of these characteristics is the crown area, and in this study, the effect of crown area size on throughfall was investigated. Throughfall was determined using pluviometers under ten individual trees consisting of hornbeam (*Carpinus betulus* L.) and oaks (*Quercus cerris* L.) with different crown areas. Three groups ( $< 30 \text{ m}^2$ ,  $30 \text{ m}^2\text{-}70 \text{ m}^2$  and  $> 70 \text{ m}^2$ ) were effectuated according to the crown area. In the period of November 2022-January 2023, rainfall in open area and throughfall was measured in a total of 12 rain events. After each precipitation, the ratio between the amount of rainfall in the open area and the amount of throughfall was determined. In this way, the results obtained from a total of 120 rain events measured under ten different trees were grouped according to the crown area and it was determined that the crown area influenced throughfall. During the study, 192.6 mm of precipitation was measured in the open area. In trees with a crown area of less than  $30 \text{ m}^2$ , 88.49% of the total precipitation reached the ground as throughfall. This rate was 73.43% for trees with a crown area between  $30 \text{ m}^2$  and  $70 \text{ m}^2$ , while it was 67.61% for trees with a crown area larger than  $70 \text{ m}^2$ . The results signify a negative correlation between crown area size and throughfall.

**Keywords:** Throughfall, crown area, rainfall, *Carpinus betulus* L., *Quercus cerris* L.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

Throughfall is the precipitation that reaches the ground surface directly by dripping from the leaves, branches, and trunks of trees and passing through the canopy gaps. (Özhan, 1982). More briefly, throughfall is called precipitation that falls from the trees to the ground surface (Black, 1996; Özhan, 2004). Throughfall also plays a role in determining interception, of which it is considered a component (Özhan, 1982; 2004; Carlyle-Moses, 2004).

Throughfall, which is an important part of not only interception but also the hydrological cycle, also affects stream flow (Inamdar et al., 2013; Fan et al., 2015). Net precipitation, which is the most important source of streamflow, consists of throughfall and stemflow under forest vegetation (Staelens et al., 2008), and much of the net precipitation comes from throughfall (Levia & Frost, 2003; Staelens et al., 2008).

Throughfall is a determining factor on interception and the hydrological cycle. On the other hand, throughfall is also under the influence of many factors. These are meteorological factors such as precipitation type, rainfall intensity, rainfall amount, rainfall duration, drop size, wind speed, wind direction, (Crockford & Richardson, 2000; Brooks et al., 2003; Levia Jr. & Frost 2006; Van Stan et al., 2011; Fan et al., 2015) and vegetative factors such as total leaf area, stand age, stand density, canopy cover characteristics, and leaf type (Crockford & Richardson, 2000; Brooks et al., 2003; Ziegler et al., 2009; Levia et al., 2019).

Canopy characteristics, which are one of the vegetative factors affecting throughfall, are a dynamic factor. The variability of factors such as crown architecture and crown area, which are among the canopy characteristics, makes this dynamic situation understandable. Perhaps that is why it is stated that the role of canopy characteristics on throughfall is among the issues that are not understood (Levia Jr. & Frost, 2006). Based on these evaluated principles, in this study, the effects of crown area, one of the canopy characteristics, on throughfall were investigated.

### 2. MATERIALS and METHODS

#### Study Site

The study was carried out in the mixed forest on the border of Dallica-Kocareis villages in Bartın city center. The study area is located approximately 3 km away from the city center and at an average altitude of 35 m. The annual precipitation in the region is more than 1000 mm (Şensoy & Ateşoğlu, 2018) and the distribution of rainfall throughout the year is relatively proportional (Şensoy, 2010). While designing such a study on throughfall, the precipitation characteristics of the region were effective in determining the study area. In the study area,





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

*Carpinus betulus* L. and *Quercus cerris* L. are the two main species that form the mixed forest stand.

### Determination of Sample Trees and Crown Area

In the study, a total of ten trees were sampled to determine the throughfall. These trees are five hornbeams and five Turkey oaks, considering the vegetation mix in the area. Sample trees were divided into three groups according to crown area in accordance with the aim of the study. They were grouped as those with a crown cover area of less than 30 m<sup>2</sup> (C1), those with a crown cover area between 30 m<sup>2</sup> and 70 m<sup>2</sup> (C2), and those with a crown cover area of more than 70 m<sup>2</sup> (C3). There are two Turkey oaks and one hornbeam in groups G1 and G3, and one Turkey oak and three hornbeams in group G2. Details about the groups are shown in Table 1.

**Table 1.** Some values for groups based on crown area

Groups	Number of Sample Trees	Average Diameter (cm)	Average Height (m)	Average Crown Area (m <sup>2</sup> )
C1	3	21.6	12.0	24.54
C2	4	34.8	18.6	53.64
C3	3	43.0	21.0	124.4

The crown area was determined for each tree based on its horizontal projection onto the ground surface (Bellot & Escarre, 1998; Ahmadi et al., 2009). For this purpose, the endpoints where the canopy projections overlap on the ground were determined for a total of eight points on a circular plane at 45° intervals. The distance between these endpoints and the stem was measured and the crown diameter value was determined by taking the average. This value was used in computing the cover area.

### Determination of Rainfall and Throughfall

The study was effectuated between November 2022 and December 2002. Rainfall in open areas and throughfall were determined using a total of 11 pluviometers. Total rainfall was determined by a pluviometer installed in a clearing in the study site. Total rainfall and throughfall were converted to mm/m<sup>2</sup>. Throughfall was determined by pluviometers installed under sample trees, 1.5 meters above the ground (Figure 1). After each rainfall event, total rainfall and throughfall were measured and recorded. Throughfall data used in the study were taken as a percentage of the total rainfall measured in open areas.



**Figure 1.** Pluviometers used to measure throughfall

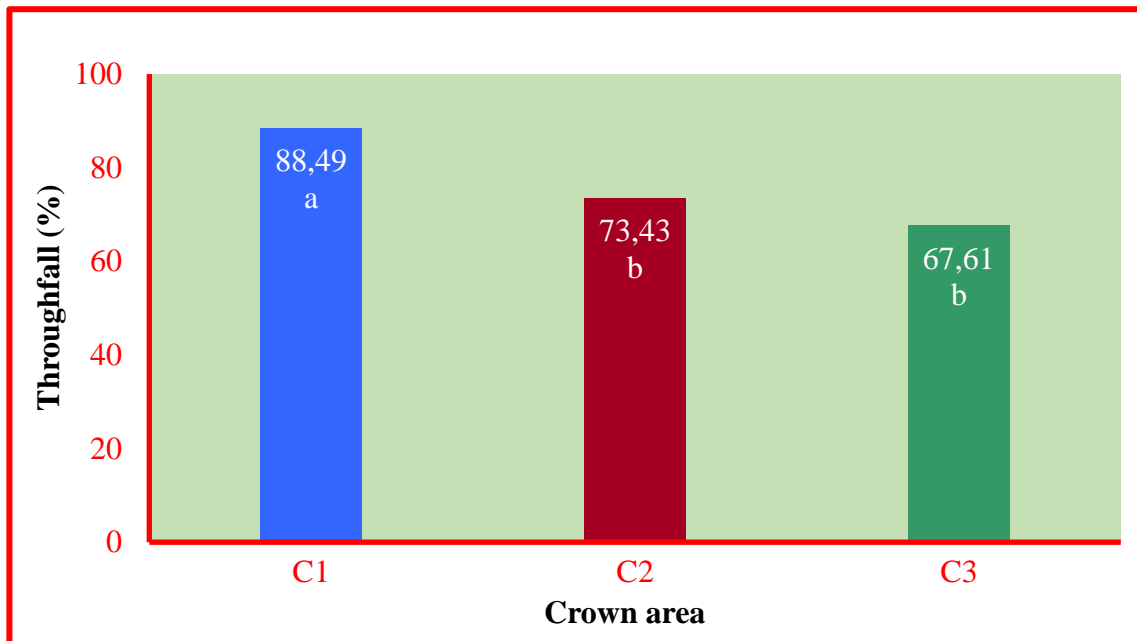
In the study, total rainfall and throughfall were evaluated as rain events. As in many similar studies, the study was based on a period of at least four hours without rainfall between two rain events (Xiao et al. 2000; Nytech et al. 2019; Şensoy & Tanyel 2021). Accordingly, a total of 12 rain events occurred during the study period.

#### Statistical Analysis

A homogeneity test was performed to reveal whether the data in the groups were distributed homogeneously or not. Whether there was a difference between the data of the groups formed according to the crown area was determined by the one-way analysis of variance. Duncan's test was applied to determine the different groups. SPSS 24 software program was used in the statistical analysis.

### 3. RESULTS and DISCUSSION

During the study period, 12 rain events occurred and a total of 192.6 mm of rainfall was recorded. In these rain events, a total of 12 throughfall occurred, with amounts ranging from 1.3 mm to 68.3 mm. The amount of throughfall occurring after a total of 120 rain events on ten sample trees was measured and its ratio to the total rainfall was determined. The group (C1) with a crown area of less than 30 m<sup>2</sup> produced an average of 88.49% of throughfall in 36 rain events. The group with a crown area between 30 m<sup>2</sup> and 70 m<sup>2</sup> (C2) produced an average of 73.43% of the throughfall in 48 rain events, and the group with a crown area of more than 70 m<sup>2</sup> (C3) produced an average of 67.61% of the throughfall in 36 rain events (Figure 2).



**Figure 2.** Throughfall values in different groups. Different letters indicate a statistical difference ( $p \leq 0.05$ ) between groups.

The homogeneity test revealed that the throughfall data showed a homogeneous distribution. As a result of the one-way analysis of variance, it was determined that the crown area influenced throughfall and there was a difference between the groups ( $P \leq 0.05$ ). Duncan's test showed that C1 was in a different category than the other two groups, C2 and C3. The group with a crown area of less than  $30 \text{ m}^2$  produces a higher rate of throughfall, and this amount creates a statistical difference. However, although there is a proportional difference between C2 and C3 in terms of throughfall, this result does not constitute statistical significance.

Throughfall generally accounts for 70% of the total precipitation in open areas (Levia & Germer 2015). Yue et al. (2021) state more clearly that 73% of the precipitation on a global scale consists of throughfall. In addition, it has been reported that throughfall can vary between 56% and 84% in different plantations (Shukla et al., 2022). In this study, an average of 76.5% throughfall value was obtained in the study area, regardless of the crown factor. This result can be considered a little high compared to general data. The fact that the trees were leafless during a certain part of the study period may also influence this result because of the fact that there are two different types of throughfall: free falls and release throughfall (Dunkerley, 2000; Abrahams et al. 2003). Free fall throughfall is defined as rain that passes directly over the top of the canopy gap without contacting any vegetative surface, while release throughfall is defined as rain that first contacts the vegetal surface and then reaches the ground from there in the form of drops (Levia Jr. & Frost, 2006). The leafy period provides less throughfall under



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

the forest as it provides an additional surface to retain precipitation (Nanko et al., 2016). Since the study was carried out in November and December, it can be predicted that in the second half of the study, during the leafless period, the throughfall will largely be of the free fall type. This will bring about an increase in the amount of throughfall.

It has been reported by many researchers that canopy characteristics have an impact on throughfall (Park & Cameron, 2008; Inkilainen et al., 2013; Zabret & Sraj, 2019). Inkilainen et al. (2013) state that canopy characteristics are more effective on throughfall than the leaf area index. In this study, it was determined that throughfall decreased proportionally as the crown area increased. This relationship also shows statistical significance up to a certain point ( $P \leq 0.05$ ). The increase of the crown area provides a layered water retention surface. This will reduce the throughfall as it will create the opportunity for evaporation. In the study, the throughfall value produced by C1 is statistically different from the other two groups. However, there is no statistical difference between C2 and C3 in terms of throughfall (Figure 2). Although there was a difference of more than 70 m<sup>2</sup> between average crown areas, the throughfall rate between C2 and C3 was 5.82%. This can be explained as the precipitation that does not reach the ground depends on many factors (Zabret et al., 2018), and the nature of the throughfall is also quite variable (Levia Jr. & Frost, 2006).

#### 4. CONCLUSION and RECOMMENDATIONS

The crown area has an impact on throughfall. Due to the canopy's expansion and the crown area's growth, there is a decrease in the amount of throughfall. The relationship between crown area and throughfall is affected by many parameters. Therefore, it is important to continue such research to better understand the crown area-throughfall relationships. Enriching such studies with more time and more species diversity will allow us to know more details in the throughfall-crown area relationships.

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### IMPORTANCE OF INTEGRATED USE OF GEOGRAPHICAL INFORMATION SYSTEMS AND REMOTE SENSING METHODS IN THE PLANNING OF RURAL AREAS

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#### ABSTRACT

The presence of rural areas in human life is steadily diminishing globally. A similar scenario unfolds in Türkiye, where the proportion of rural areas in human life is decreasing day by day. According to the Turkish Statistical Institute's 2012 data, the distribution of life in rural areas in Turkey was 23.2%, while the distribution in urban areas was 76.8%. According to Turkish Statistical Institute's data for 2022, 17.3% of this distribution consists of rural areas and 82.7% of urban areas. Therefore, it is necessary to utilize the decreasing rural areas in the most efficient way with the opportunities offered by technology. Nowadays, constantly developing Geographical Information Systems (GIS) technology and remote sensing methods (such as satellite images, drone shots) enable the most efficient planning, utilization and monitoring of rural areas. Because GIS plays an important role in storing, processing, analyzing, and presenting earth-related data to users via computer. Moreover, remote sensing methods facilitate the swift and current generation of data essential for GIS. The combination of these two technologies allows rural areas to be analyzed quickly and efficiently in the most up-to-date form and in many ways (such as temporal change of areas, land use status, identification of vacant areas, density status, etc.). Thus, the combined use of GIS and remote sensing enables the most efficient and sustainable utilization of diminishing rural areas. In this context, the study's objective is to reveal the contributions of the integrated use of GIS technology and remote sensing methods into the rural area planning process. Within the scope of the study, some of the studies using both GIS and remote sensing methods in literature were examined. Based on these reviews, the advantages and disadvantages of GIS and remote sensing methods in the rural area planning process were evaluated, and recommendations were provided to ensure sustainable planning of rural areas.

**Keywords:** Geographical Information Systems, Remote Sensing, Planning of Rural Areas



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Cities have a complex structure encompassing urban centers, rural areas, and suburbs, and the interactions between these regions can affect different parts of cities because of positive or negative events. In Turkey, the migration from rural areas to urban areas gained momentum after the 1950s, reducing the attractiveness of rural areas and increasing the population density of cities.

Rural areas, with a presence dating back further in time than urban areas, possess unique values such as agricultural and livestock activities, as well as natural and cultural landscape components (Gül et al., 2019). These settlements differ from urban areas in terms of population density, economic resources, social and cultural structure, environmental relationships, and various other aspects (Aydemir & Gül, 2023). Undeveloped infrastructure, low population, and inadequate infrastructure conditions distinguish these areas from urban areas and classify them as rural areas (Erdem, 2012). According to Keleş (1996), rural areas are settlements that stand apart from urban areas due to characteristics such as having an economy primarily based on agriculture, an extended family structure, and strong face-to-face neighborly relationships.

The spread of urban uses into rural areas due to reasons such as tourism and second home developments can lead to the erosion of the unique identities of rural areas. In this context, there is a need for planning efforts that strengthen the local texture of both cities and rural areas, bridging the gap between the past and the future, and contributing to the preservation, development, renewal, and sustainability of the identity concept (Kiper, 2013).

In Turkey, starting from the 1980s, with the acceleration of urbanization movements, there has been a greater emphasis on urban area planning, while rural area planning has not received sufficient attention (Çevik & Eminağaoğlu, 2007). Since the early years of the Republic of Turkey, various legal frameworks have been established for the spatial development of rural areas. The Law No. 442 dated 1924, known as the "Köy Kanunu" (Village Law), holds significance as one of the initial steps taken in this regard and is still in effect today. In 1960, with the establishment of the European Community, efforts to develop common agricultural policies began to address the issues of low productivity and production deficiencies in the agricultural sector (Küçüköğül, 2017). In 1963, Turkey transitioned to a planned period, and as a result, the country's development plans were formulated. These plans included strategies for rural areas. However, the planning challenges related to rural areas were not fully resolved. Then, in 2012, with the enactment of the Metropolitan Municipality Law, villages were



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

reclassified as neighborhoods and zoning plans were prepared for rural areas within metropolitan boundaries, following an urban approach (Çakıroğlu & Öztürk, 2020).

The speed and convenience brought about by technology have also revealed the applications of Geographic Information Systems (GIS) and Remote Sensing in planning studies (Yörüklü, 2009). GIS emerged from the need to work with multiple maps in planning studies, and it is based on the mapping of data to be used in analysis and decision-making in planning, as well as the method of overlaying different maps (Orhan, 2007; Yörüklü, 2009; Uzun et al., 2010a; Kurdoğlu et al., 2020). Remote Sensing is defined as "acquiring information about the physical and positional characteristics of objects without physical contact with them and perceiving objects spatially and qualitatively." Satellite imagery is commonly used in obtaining such information (Lillesand & Kiefer, 1994; Eastman, 2003; Jensen, 2005). Remote sensing provides data for GIS. Together, GIS and remote sensing offer cost-effective and efficient methods for generating and organizing spatial data for land use planning (Şatır, 2013). Maps commonly used in planning studies are typically information-rich maps that show basic data such as highways, administrative boundaries, geology, vegetation, etc., without providing interpretations or establishing relationships between events (Kurum, 2000). GIS and remote sensing methods assist in establishing these relationships between maps. Furthermore, with the widespread integration of these technologies, they are extensively utilized in planning studies (Uzun et al., 2010b; Gözükara et al., 2015).

The aim of the study is to highlight the contributions of the integrated use of GIS technology and remote sensing methods in the planning process of rural areas. Through the examination of specific case studies within the scope of the study, advantages and disadvantages of GIS and remote sensing methods in the planning of rural areas are evaluated, and recommendations are provided to facilitate the sustainable planning of rural areas.

### **MATERIALS and METHODS**

In this study, academic research from both domestic and international sources that utilize GIS and remote sensing methods has been relied upon as source material. Given the wide range of applications in both landscape architecture and geomatics due to the integrated use of GIS and remote sensing methods, the focus of the study has been specifically on academic research related to the planning of rural areas.





## **FINDINGS and DISCUSSION**

The findings obtained from the literature review conducted within the scope of this study are as follows:

Cengiz (2003) conducted research on a Rural Development Model for the Conservation of Landscape Values in the Seben district. In this study, rapid rural assessment, and the Analytic Hierarchy Process (AHP) were employed to digitize natural and cultural landscape elements in a GIS environment. All data were stored in grid cells of 250x250 meters, and these data were used to determine suitability levels for the Alpogut village and its surroundings. Throughout the study, the effective use of GIS as a tool was emphasized.

In Topay's (2003) study in the Bartın-Uluyayla region, natural and cultural factors were identified for activities such as horseback riding, hunting, mountain biking, mountaineering, hiking, golf, camping/tent camping, skiing, climatology, bird watching, caving, trekking, and paragliding. These criteria were transferred into a GIS environment, and queries were conducted within the GIS environment for each activity to determine which areas were suitable for the specified uses.

In Ergin's (2006) study conducted in the Çandarlı Gulf, which includes the settlements of Çandarlı, Şakran, and Aliğa, 1/25,000 scale topographic maps and Landsat satellite images from 1987 and 2002 were utilized. The IDRISI GIS Analysis program was employed for processing the maps and satellite images. Subsequently, a CORINE land cover classification was carried out within a GIS environment. Based on all the data, a comparison of supervised and unsupervised classification was performed for the entire watershed. The study demonstrated the effective use of GIS and remote sensing in all stages.

In the study conducted by Akıncı et al. (2013) in the Yusufeli district of Artvin, GIS was employed to determine suitable areas for agricultural activities. In this research, suitability criteria for agricultural activities were first defined by experts. Then, experts conducted pairwise comparisons using the Analytic Hierarchy Process (AHP) to calculate the weights for these criteria. The parameters identified were integrated in the ArcGIS environment to identify suitable areas for agricultural activities. Subsequently, grazing and forest areas within the region were overlaid and subtracted, resulting in the creation of a suitability map for agricultural activities.

In the study conducted by Demirel et al. (2013) in the Meryemana Valley, located within the boundaries of the Maçka district of Trabzon province, existing and potential tourism types were



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

identified. Relevant infrastructure elements were digitized, and a continuously updatable database was created within a GIS environment to produce maps.

In Gözükara et al.'s (2015) study, the role of remote sensing and GIS was highlighted in organic and traditional agriculture areas. Remote sensing technology was used to determine land use in areas with organic farming and/or watersheds, identify plant types and crop diversity, monitor plant health and growth, and estimate yield, in addition to identifying some important soil properties for organic farming, such as soil moisture. GIS was employed to analyze and query the relationships between the quality and quantity of environmental components in organic farming areas, with the aim of making decisions for sustainable land and soil management. It also facilitated location-based decision-making in areas such as plant nutrition, disease, and pest management.

In Geymen's (2017) study, the Elmalı Watershed was examined, and land use change in the watershed was assessed using Landsat satellite images from the years 1995, 2005, and 2013. The results obtained from the evaluation of satellite images were transferred into a GIS environment. The study concluded that monitoring land use change with the support of GIS and remote sensing could enable better planning of water basins by municipalities.

In the study by Kurdoğlu et al. (2018), ecological sensitivity was determined to reduce the pressure on national parks that are rich in biodiversity and cultural activities and require conservation. In determining ecological sensitivity, GIS was used to analyze data such as slope, forest structure, proximity to water sources, elevation, and land pattern. The weights of the criteria to be used in determining ecological sensitivity were first calculated using the Analytic Hierarchy Process (AHP) technique. Then, these weights were combined in the ArcGIS environment to perform an ecological sensitivity analysis. Based on the analysis, recommendations were made for visitor management to ensure the preservation and continuity of the natural and cultural resource values of the national park.

In Utuş's (2022) study, landscape analysis was conducted in the Drağna Valley by determining the natural and cultural values of six villages, significant landscape points, ecotourism values, water uses, and the presence of agricultural areas using GIS. Using a 1/25,000 scale topographic map, important landscape points, ecotourism classes, and land use maps for the area were created within a GIS environment. Recommendations were made for rural area planning and management based on the study's findings.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Kılıç and Arslan (2022) evaluated the topography and land use of the Burdur Basin using remote sensing and geographic information systems (GIS) in an infrastructure approach. In the GIS environment, maps of slope, aspect, and elevation classes were created for the area. The study area was categorized into gray, yellow, green, and blue infrastructures and analyzed in relation to slope, aspect, elevation, and climatic characteristics. Controlled classification was performed using Sentinel-2A satellite images, and the study utilized NDVI, NDWI, and SAVI indices to analyze the potential for infrastructure identification.

### CONCLUSION and RECOMMENDATIONS

In planning studies, remote sensing methods contribute significantly to a better understanding of the landscape when used to determine existing land cover, identify changes in landscape structure over different years, and evaluate processes occurring within the landscape. In this context, selecting the appropriate satellite imagery based on the scale of the planning is essential for the success of the planning process. Otherwise, images obtained outside the planning scale will not serve the planning purpose. In Turkey, the use of remote sensing methods has become increasingly widespread since the 1990s. In recent years, technological advancements have simplified the techniques related to the processing and interpretation of satellite imagery.

In recent years, there are almost negligible planning studies or approaches conducted without the use of GIS (Geographic Information Systems). GIS programs, with their data updating capabilities and compatibility with various programs that work in conjunction with GIS, provide significant convenience in understanding landscape functions, structure, and changes in planning studies.

In most of the rural area planning studies examined, accessing ready-made databases is almost impossible. Therefore, planning studies require a significant amount of time and effort to transfer data into a computerized environment. In planning studies, GIS and remote sensing methods should be used at every scale, and all generated data should be collected at both regional and national levels.

In the scope of this study, there are both advantages and disadvantages of the integrated use of GIS technology and remote sensing methods in the planning process of rural areas. Advantages include the following:



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- **Data Collection and Analysis Capability:** GIS provides the capability to collect, store, and analyze geographic data in rural areas, thereby enhancing the informed decision-making process in planning.
- **Decision Support Tool:** GIS facilitates decision-making processes in rural area planning. By visualizing geographic data on maps, it provides planners with the ability to make better decisions.
- **Multiple Layers:** GIS enables the integration of various data layers. By combining different data such as land use, water resources, and population distribution, it offers a more comprehensive view.
- When integrated with remote sensing technologies, GIS can be used to monitor changes in rural areas and manage natural resources.

In the planning process of rural areas, the disadvantages of the integrated use of GIS technology and remote sensing methods are as follows:

- **High Costs:** The development and training costs for GIS applications can be high, which may limit its use in small rural areas.
- **Infrastructure Issues:** In rural areas, the lack of a reliable internet connection and computer infrastructure can make it challenging to effectively use GIS.
- **Data Collection Challenges:** Gathering up-to-date and accurate geographic data in rural areas can be difficult. This can render GIS ineffective due to data deficiencies.
- **Social Acceptance:** The societal acceptance of the technologies used by GIS can sometimes be low in rural areas, leading to local resistance to GIS projects.

In conclusion, the integrated use of GIS and remote sensing methods offers significant advantages in rural area planning. However, it may also present challenges such as costs, infrastructure limitations, and data collection difficulties. It is important to consider these factors for a successful implementation.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE TEMPORAL DYNAMICS OF SOLID WASTE POLLUTION IN RURAL TOURISM AREAS OF THE SOUTHEASTERN BLACK SEA

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#### ABSTRACT

This study aims to investigate the state of solid waste pollution in a rural area in the Southeastern Black Sea Region of Turkey. In this context, Arpalı village in Köprübaşı district in Trabzon Province was chosen as the pilot study area. Three stations were selected to determine the state of solid waste pollution in the study area. These stations represent recreational areas that people commonly use, such as plateaus and stream sides. All man-made waste, defined as macro waste (litter) (greater than 2.5 cm), was collected over four seasons in 2021. The collected garbage was then classified into nine different waste categories according to waste types and uses in order to determine the waste composition and distribution in the study area, both qualitatively and quantitatively. As a result, 825 pieces, equivalent to 16,548 grams of waste, were collected and removed from the locations. It has been determined that plastic waste is the dominant material in terms of quantity and quality. Significant increases were also observed in other types of waste, such as metal, textile, and paper. It has been determined that most of the collected waste consists of disposable items such as food and beverage packages, plastic bottles, face masks, and wet wipes offered for individual use or consumption by visitors. It has been observed that the density of waste is higher in the spring and summer seasons in rural areas due to the high activity in these two seasons. Determining the waste composition and solid waste distribution is important for determining and reducing the state of pollution in the environment. The findings of this study support the conclusion that better waste management is required to reduce the amount of solid waste in rural areas.

**Keywords:** Pollution, Solid waste, Plastic, Rural area, Black Sea



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Rural area tourism has gained popularity in recent times due to people's desire to escape the urban environment, reconnect with nature, and engage with the unique traditions and culture of rural communities. This form of tourism provides visitors with a range of options, such as exploring remote locations, engaging in local activities, and fully experiencing the countryside (Christou, 2018; Kuşat, 2016; UNWTO, 2020). The emergence of the COVID-19 pandemic, which imposes restrictions on close direct human interaction, has further strengthened the attractiveness of rural area tourism. During periods of self-isolation or quarantine, people seek solace in the relaxing nature, opting to spend their time in isolated and secure destinations, such as rural areas. Studies have indicated an increasing attraction towards the serenity and openness provided by rural areas, which serve as refuge away from bustling urban centers (Gurbuz & Ozkan, 2020; Slater et al., 2020).

In recent years, the Southeast Black Sea Region has become increasingly popular among both domestic and international tourists as a captivating natural tourism destination. With its breathtaking blend of blue seas and lush green mountains, the region offers a distinctive and captivating natural beauty. The Southeast Black Sea Region offers a diverse range of destinations that appeal to tourists throughout the year. Despite the challenges posed by the COVID-19 pandemic, tourism in the Southeast Black Sea Region has remained resilient, as evidenced by the influx of hundreds of thousands of visitors to Trabzon (Trabzon Otelciliği Birliği, 2021).

Anthropogenic activities in the environment have significant implications, leading to alterations that can result in both temporary and permanent degradation (Mugilarasan et al., 2023; Rhind, 2009). Tourism, as a human activity in the environment, exemplifies the potential for both positive and negative impacts on the environment. Ecotourism, in particular, relies heavily on the natural preservation of destinations to attract visitors. However, tourism activities can also have detrimental effects on the environment, primarily due to the irresponsible behavior of visitors who litter and pollute the natural surroundings (Cordova et al., 2021). Consequently, increased pollution in tourist destinations leads to a decline in visitors, negatively impacting the socio-economic aspects of the region and causing a decline in income for the local community (Brouwer et al., 2017).

The exponential increase in the world's population and heightened consumption rates, coupled with the depletion of natural resources, have compelled the industrial sector to enhance its



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

efficiency and cost-effectiveness in material production. This drive has led to the creation of economical and adaptable materials such as plastics, which have become prevalent in various human-made products (North & Halden, 2013). Nevertheless, the rate at which these materials degrade cannot match their rapid production, resulting in the accumulation of solid waste in the environment (Bergmann et al., 2015; Jambeck et al., 2015).

The presence of solid waste pollution in the environment has negative consequences for both ecological and socio-economic aspects. It has been reported that organisms ingest litter, leading to health problems and the introduction of microplastic contamination into their systems (Barnes et al., 2009; Dahms et al., 2019; Landrigan et al., 2020). Moreover, solid waste pollution contributes to visual pollution, which affects the visual appeal of an area and can potentially impact livelihoods (Krelling et al., 2017). In the context of tourism, visitors exhibit a preference for cleaner destinations. Several studies have provided evidence that solid waste pollution has caused a decline in the number of tourists visiting popular tourist locations (Ballance et al., 2000; Krelling et al., 2017; Qiang et al., 2020; Schuhmann, 2011). Consequently, it is crucial to monitor the extent of solid waste pollution in order to mitigate its impact on the community.

The primary objective of this study is to analyze the effects of human activities on rural areas, with a specific focus on the Southeast Black Sea Region. The investigation centers on understanding the impact of anthropogenic activities, primarily through assessing the level of solid waste pollution in the study area. The main result of this study is to produce data that demonstrates the extent of solid waste pollution currently occurring and offers insightful suggestions to promote better waste management practices. By doing so, the study aims to mitigate the adverse impact of solid waste pollution in rural areas and facilitate the adoption of more effective strategies for waste management. In the end, our research aims to promote sustainable practices and develop a healthier coexistence between human activities and their natural surroundings in order to contribute to the preservation and improvement of the rural environment.

### **MATERIALS and METHODS**

#### **Study area**

In order to conduct a comprehensive investigation into solid waste pollution in rural areas, the village of Arpalı in the Southeast Black Sea Region of Turkiye was selected as the pilot study location. Arpalı village is administratively a part of the Koprubaşı district, situated in Trabzon





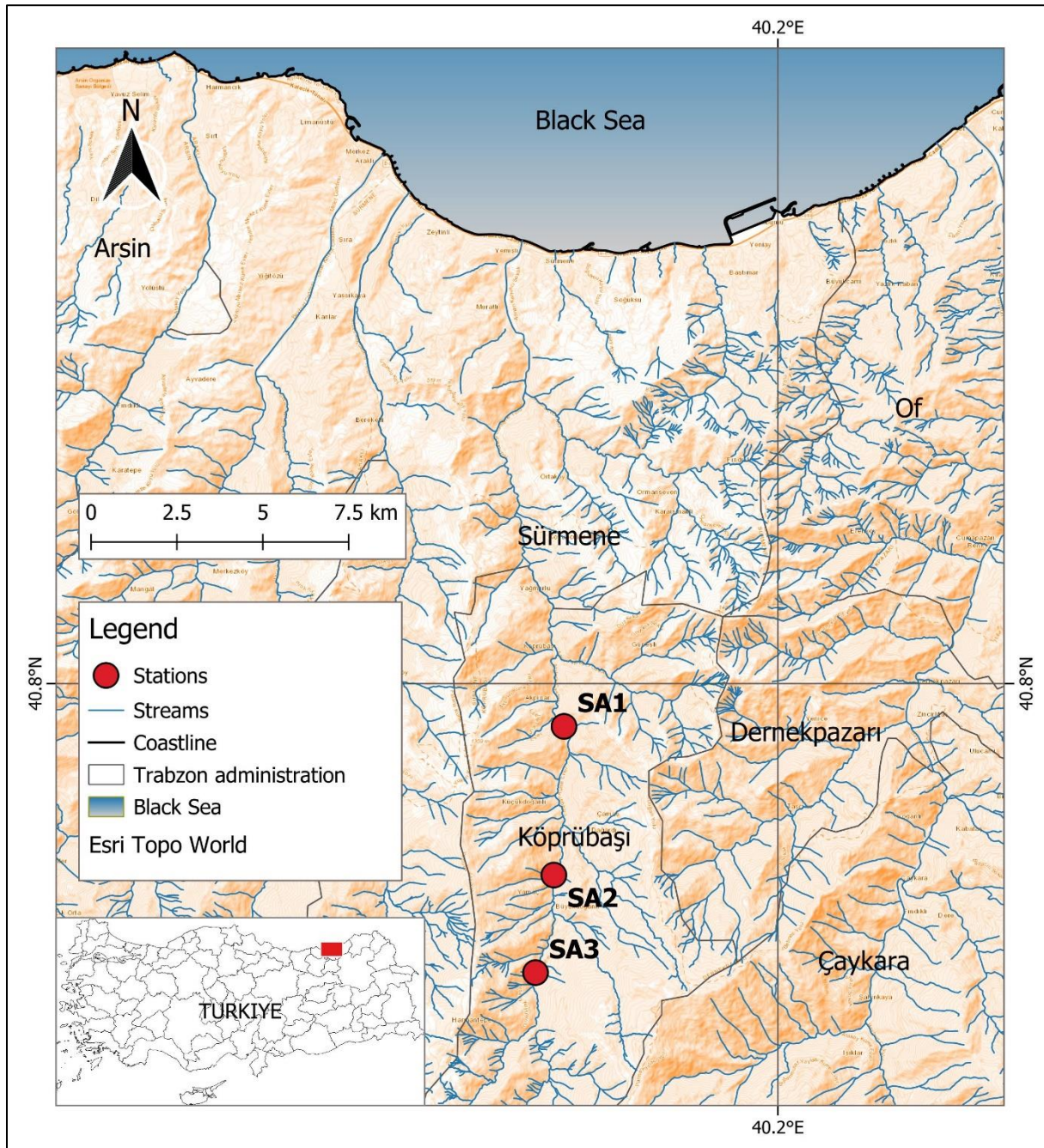
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Province, Turkey. Notably, Arpalı village stands at an elevation of 1,850 meters above sea level. It is positioned approximately 39 kilometers away from the Black Sea coast in the Sürmene district and about 71 kilometers away from the city center of Trabzon Province. According to the latest census conducted in 2022, the village has a population of 126 individuals (TUIK, 2022). However, it is worth mentioning that the population of Arpalı village typically fluctuates and is more prominent during the spring and summer months.

Trabzon has experienced a surge in popularity as a natural and cultural tourism destination in recent years. The city has witnessed a steady increase in the number of visitors from both national and international origins. While there was a temporary decline in the number of visitors during the pandemic, the tourism sector never completely halted (Trabzon Otelciliği Birliği, 2021). Despite restrictions on gatherings, residents still sought outdoor activities, particularly during the summer months, ensuring that the tourism sector remained active throughout the pandemic period.

In order to investigate solid waste pollution in the rural area, three stations were selected. Three locations were determined based on distance to rural areas; SA3 represents the closest point, while SA1 represents the farthest from rural areas. All stations were situated on the riverbank, where potentially visited by people stop by for leisure and recreation purposes such as, landscape viewing, picnics, and amateur fishing in the area. The study was conducted in 2021, over four seasons. Except for autumn, data at stations SA2 and SA3 were limited due to weather conditions of ice and snow. *Figure 2* represents the study area map.



**Figure 2. Study area covering three sampling location in rural tourism area**

### **Solid waste collection**

This study involved collecting and removing all human-made litter classified as macro litter with a size larger than 2.5 cm within transects measuring 30, 50, or 75 m<sup>2</sup>, depending on the area of the riverbank, from specific stations. Organic litter, such as leaves, branches, trunks, or natural wood, and animal bones were not taken into account. The classification of solid waste



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

items was simplified into nine primary categories: plastic, rubber, metal, glass, paper, cloth, wood, medical waste, and sanitary waste (Özşeker et al., 2022; Terzi et al., 2020; Wenneker et al., 2010). All the collected solid waste was collected and deposited in the closest garbage container.

### Data analysis

In order to estimate the solid waste pollution state in the study area, solid waste composition, distribution, and density in all stations and over four seasons were calculated. Solid waste compositions were calculated using percentages of overall collected solid waste. The density of solid waste items (D) is calculated based on the total number (items) of solid waste collected from the transect (N), the width of the transect (w), and the length of the transect (l) measured in meters. Solid waste density was then calculated using the provided Eq. (1), measured in items per square meter (items/m<sup>2</sup>).

$$D = N / (w * l) \quad (1)$$

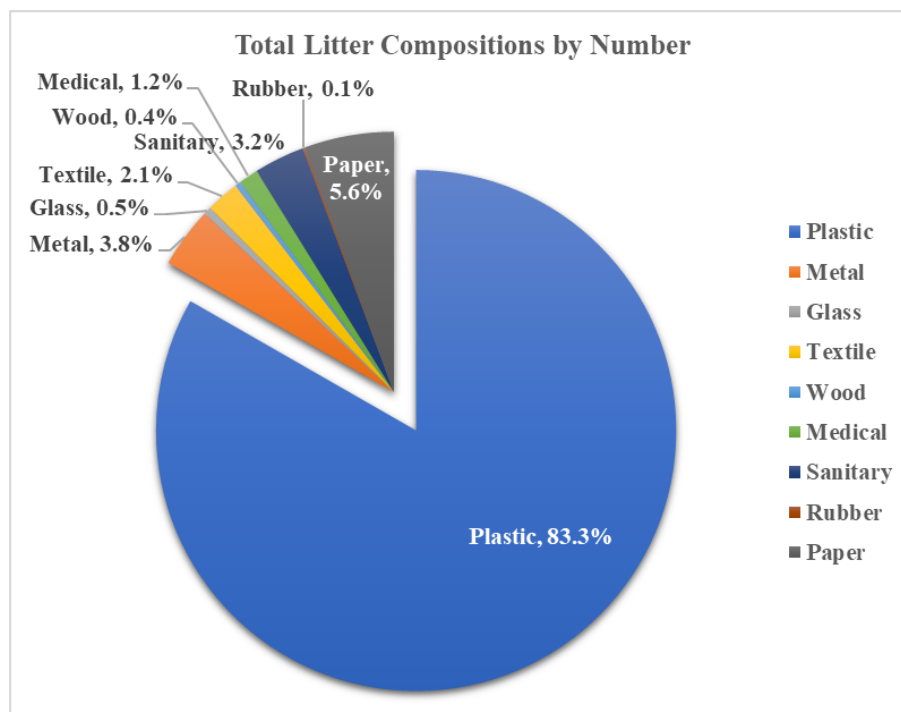
### FINDINGS and DISCUSSION

In this study, we conducted the sampling collection of solid waste from the riverbed throughout all four seasons, namely Autumn, Winter, Spring, and Summer, spanning from 2020 to 2021. The primary objective of this research was to investigate the abundance of the collected solid waste in terms of both number of items and their respective weight. To achieve this, the solid waste that was retrieved was classified into nine distinct groups based on their material composition and application, which included plastics, metal, glass, textile, wood, medical waste, sanitary waste, rubber, and paper.

The findings of this study revealed that a total of 825 items, weighing approximately 16.548 grams, were collected, and removed from the study area throughout the course of the four seasons. Furthermore, it was determined that the average weight density of the solid waste collected during these periods amounted to 3.2 grams per square meter.

Based on the quantity (count) of items, the collected and recorded solid waste was divided into categories, and the analysis of these results revealed the distribution of various materials within the collected solid waste. Plastics accounted for the largest proportion, comprising 83.3% of the total count. The paper followed with a contribution of 5.6%, while metal constituted 3.8%

of the solid waste. Sanitary waste and textile materials accounted for 3.2% and 2.1%, respectively. Medical waste represented 1.2% of the count, with glass, wood, and rubber materials making up smaller percentages of 0.5%, 0.4%, and 0.1%, respectively. Plastics were clearly the most prevalent material in the collected solid waste, accounting for the majority in terms of count, according to the analysis. However, other elements such as paper, metal, glass, and cloth also made considerable contributions to the total composition of solid waste in the study area. *Figure 3* illustrates the distribution of solid waste compositions in terms of quality (based on the number/count).

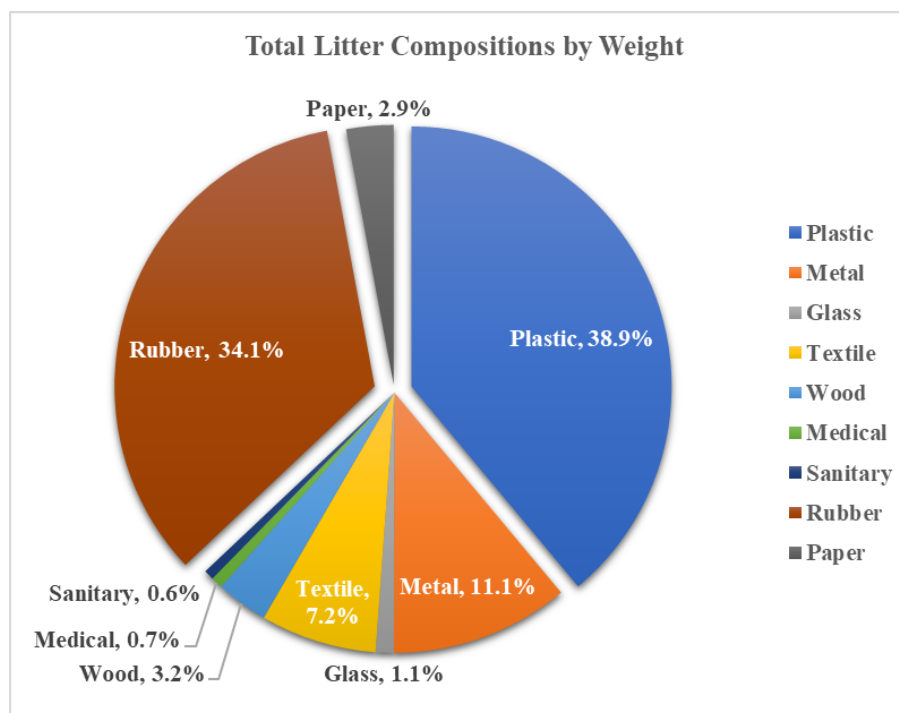


**Figure 3. Total solid waste compositions based on number (count)**

Weighed solid waste's composition showed that various elements were present in varying concentrations. With 38.9% of the total weight made up of plastics, they were found to be the most prevalent element, followed by 34.1% of rubber. Textiles came in second place with 7.2 percent of the weight, followed by metals at 11.1 percent. The weight was primarily made up of wood (3.2%), paper (2.9%), and other materials. Glass was found to make up 1.1 percent of the total weight, whereas medical waste and sanitary waste items made up 0.7 percent and 0.6 percent, respectively.



The provided data convincingly highlights the dominant presence of materials with substantial mass, specifically rubber, metal, and wood, in the distribution of solid waste based on weight in the study area. These findings suggest that these materials contribute significantly to the overall weight of the collected solid waste. The comprehension of weight distribution across different items provides valuable insights into the solid waste composition and underscores the importance of implementing measures to address the management and disposal of these specific materials. Such actions are important for effective solid waste control and environmental preservation. The weight-based distribution of solid waste compositions is depicted in *Figure 4*.



**Figure 4. Total l solid waste compositions based on weight**

The findings of this study are in line with previous studies conducted at both the regional and global levels, which also examined solid waste composition in various environments (Erüz et al., 2023; Galgani, 2014; Jambeck et al., 2015; Pogojeva et al., 2023). Notably, this study reinforces the prevailing understanding that plastic materials are the predominant components found in the environment. In the past few years, there has been a significant rise in the volume of plastic waste found in river environments. Streams, rivers and other bodies of water are increasingly being affected by the accumulation of plastic waste, which threatens aquatic





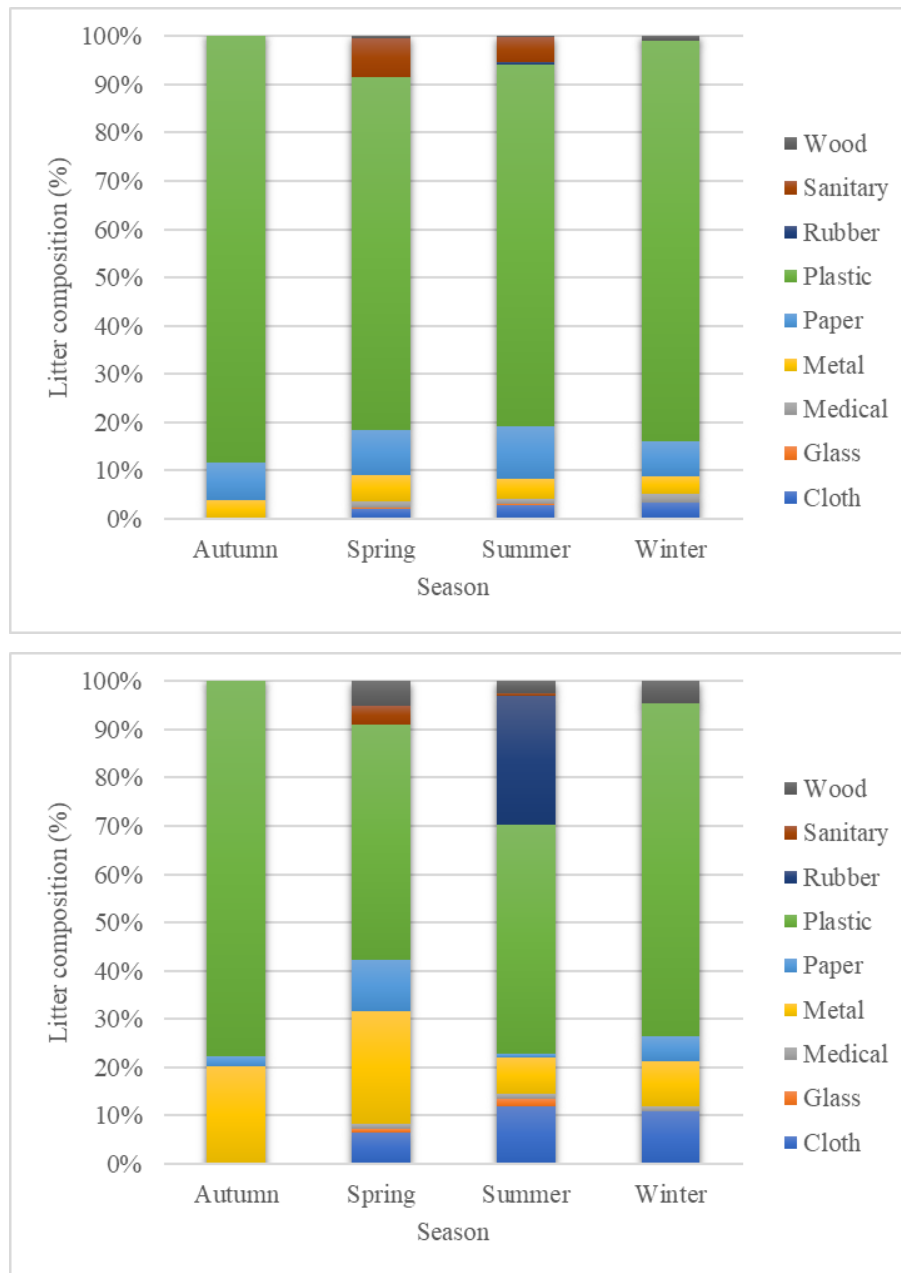
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

ecosystems and biodiversity. Several factors can contribute to the accumulation of plastic debris in rivers, including inefficient waste management practices, littering, runoff from rain, and incorrect waste disposal. When entering river environments, plastic items have the potential to be carried downstream and contribute to debris accumulation in aquatic environments (Rech et al., 2014; van Emmerik et al., 2022).

An examination was carried out to assess the distribution of different material types and uses within the solid waste collected over the four seasons in the study area. To ascertain the percentage composition of the various elements present, this analysis was considered based on the number (count) and weight of the collected solid waste. Notably, the results revealed a consistent distribution of materials across the seasons in terms of number (count). While in terms of weight varies.

Remarkably, plastic materials consistently emerged as the dominant component in the solid waste composition based on number (count) and weight throughout the entire duration of the study. Noteworthy observations revealed a notable increase in the proportion of plastics during the Autumn and Winter seasons. This phenomenon may be attributed to increased rainfall, which potentially facilitates the transportation of lighter mass solid waste into the study area through runoff. Although the study recognized the seasonal variation in the abundance of plastic solid waste, the precise patterns and variations on a monthly or seasonal basis remained uncertain. *Figure 5* illustrates the distribution of solid waste based on the number (count) and weight throughout four seasons.



**Figure 5. Seasonal total solid waste compositions based on number (upper) and weight (lower)**

In order to examine the solid waste composition, the study also focused on investigating the distribution of solid waste density at different stations throughout the four seasons. Collecting data at stations SA2 and SA3 during autumn posed challenges due to weather constraints, particularly the presence of snow and ice, hindering the researchers' ability to perform measurements or assessments. Consequently, the amount of solid waste observed at those stations during autumn was incomparable to other seasons.

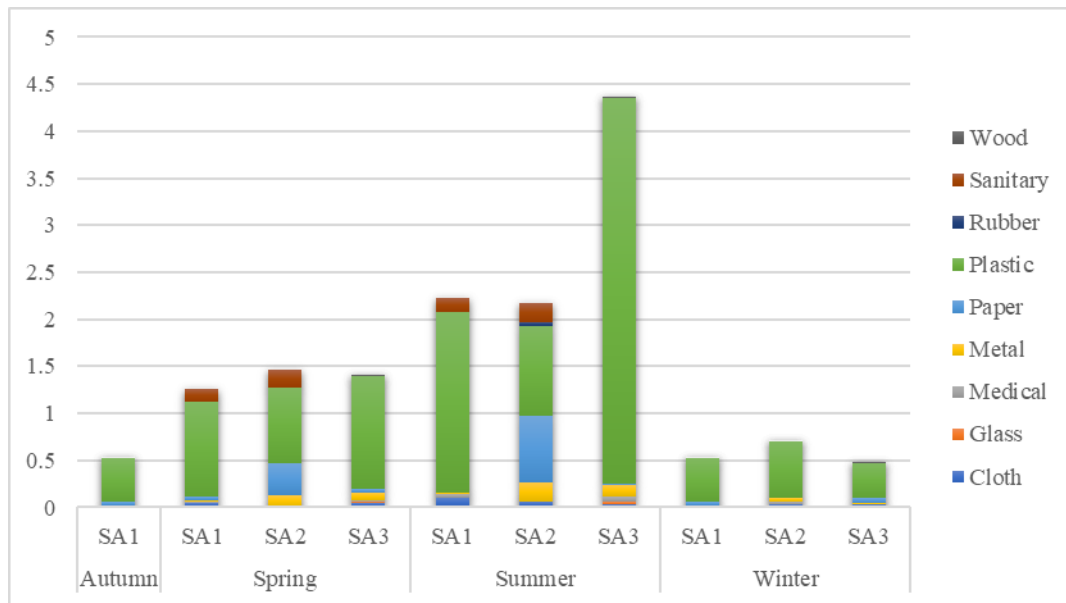


## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Notably, there was a significant higher density in solid waste density during summer months (July-September). The summer season exhibits a substantial surge in solid waste density, particularly at the SA3 station. Plastic materials exhibited significantly higher density compared to other types of solid waste materials at all stations. The higher abundance of solid waste during the spring and summer seasons can be attributed to high human activities in rural areas. Despite the study being conducted during the pandemic Covid-19, there was still significant movements of people in rural areas. As people engage in outdoor activities during the summer months, the generation of waste increases, leading to a greater amount and variety of solid waste entering the environment.

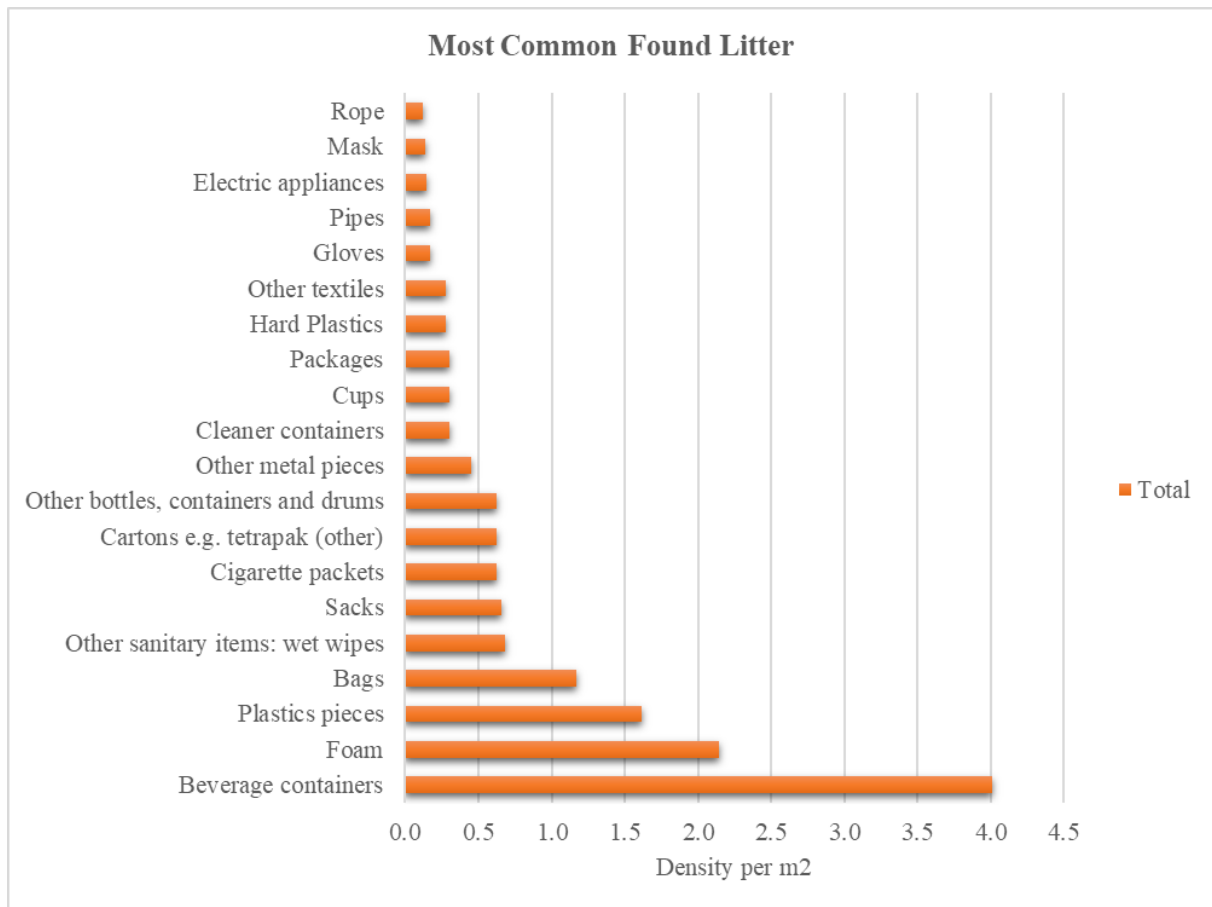
The findings of this study align with previous research conducted in the Black Sea region, contributing to the existing knowledge on solid waste densities in the Black Sea region. Previous studies in this region have reported solid waste densities spanning from 0.05 to 5.05 items per square meter on the coasts (Aytan et al., 2019; Erüz et al., 2023; González-Fernández et al., 2022; Pogojeva et al., 2023). Understanding the density of solid waste compositions is important for assessing the extent and severity of pollution in the region. By quantifying solid waste densities, researchers and policymakers gain valuable insights into the magnitude of the problem and can design targeted interventions to mitigate the impact of solid waste on the environment. High solid waste densities can adversely affect terrestrial and marine ecosystems, endangering wildlife, degrading habitats, and compromising overall environmental health and human well-being. *Figure 6* visually represents the solid waste density based on number at three study stations throughout the four seasons.



**Figure 6. Total solid waste distribution based on number.**

The majority of the solid waste discovered in the stream is linked to single-use plastic packaging, primarily resulting from individual consumption. The presence of a significant quantity of plastic materials in the study area can be strongly indicative of the accumulation or transportation of plastic solid waste possibly carried by winds, rainfall, and currents far away from its initial source and ultimately entering the stream environment. This observation suggests a relatively low level of awareness among individuals, leading to the leakage of solid waste into the stream environment. *Figure 7* illustrates the list of the twenty most prevalent solid waste items identified in the study area.

Plastics have become universally recognized as one of the most popular and extensively manufactured materials in modern times, serving a multitude of purposes. It is widely used in packaging, particularly for beverages and drinks, which are frequently transported from one place to another. The properties of plastic, such as their slow degradation in the natural environment and lightweight nature, make them highly convenient for transportation and contribute to their widespread accumulation. Consequently, plastics have emerged as the most abundant waste item in terms of quantity and quality. Despite the prevalence of plastic materials, their abundance often goes unnoticed due to their lightweight properties (Barnes et al., 2009; Beaumont et al., 2019; Castro-Jiménez et al., 2019).



**Figure 7. Twenty most found solid waste in the study area**

Turkey has implemented regulations aimed at reducing the usage of single-use plastic bags through pricing plastic bags starting from 2019 (Çevre ve Şehircilik Bakanlığı, 2019; Dursun, 2020). The same practice on other continents has been proven triggered change in consumption behavior and reduce the number of plastics used by up to 85% (Cabrera et al., 2021). However, despite these regulations, the price of plastic bags in Turkey remains considerably low, and in some cases, vendors even willingly provide them for free. This practice possibly creates a potential incentive for uncontrolled and excessive use of plastic bags, undermining the intended purpose of the regulations. The continued availability and affordability of single-use plastic bags can contribute to the persistent plastic waste problem in the country.

During the pandemic, a substantial amount of single-use face masks was discovered in the study area, reflecting the significant impact of Covid-19 related waste on the environment. In addition to face masks, other items like wet wipes and hand sanitizer bottles are frequently found littering in the study area. These pandemic-related items pose a new and pressing challenge in terms of





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

waste management and environmental conservation. The Covid-19 pandemic has imposed restrictions on people's movements and activities. However, the demand for plastic products, particularly those related to hygiene, has witnessed an increase. This surge in demand can be attributed to heightened hygiene concerns and the necessity for disposable items to mitigate the spread of the virus during the pandemic. Unfortunately, the consequence of this increased demand is the proliferation of Covid-19 related litter in the environment. Single-use face masks, wet wipes, and hand sanitizer bottles, which are designed for short-term use, are now being discarded improperly and ending up as litter. This poses a threat to the environment, as these items are made of materials that are slow to degrade, contributing to long-term pollution. (Aragaw, 2020; Chowdhury et al., 2021).

Trabzon has recently emerged as a prominent destination for nature tourism. The tourism sector in Trabzon heavily relies on its natural and cultural attractions to attract both domestic and international visitors. The success and sustainability of the tourism industry in Trabzon rely heavily on the condition of its natural resources. Solid waste pollution plays a significant role in impacting the tourism sector and the rural areas, affecting both the environment and the quality of life for local communities. The presence of solid waste can have detrimental effects on the charm and desirability of a tourist destination, resulting in fewer tourists and reduced economic benefits from tourism (Beaumont et al., 2019; Garcés-Ordóñez et al., 2020; Krelling et al., 2017; Qiang et al., 2019). Travelers are drawn to pristine and clean locations, and the sight of trash can create a negative impression, dissuading potential visitors from exploring and experiencing a particular area. Consequently, this can result in lost revenue for local businesses, reduced employment opportunities, and a negative impact on the livelihoods of those working in the tourism industry.

Rural communities in Trabzon also face the consequences of solid waste pollution. These communities depend on a clean and healthy environment for their livelihoods, particularly in agriculture and animal husbandry. Litter contamination can directly affect agricultural productivity by polluting the soil and water resources. Chemicals and pollutants from solid waste can seep into the soil, compromising crop quality and yield. Furthermore, when livestock consume solid waste, it poses health risks and can lead to negative impacts on the health and well-being of the animals. Rural landscapes lose some of their natural charm due to solid waste, which also lessens their aesthetic appeal and could lower property values. In rural places, solid waste can also harm ecosystems and wildlife, disrupting sensitive ecological balances. Additionally,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

visitors and locals in rural areas may experience health issues as a result of solid waste pollution. In particular, when sharp or dangerous objects are inappropriately disposed of, it can attract bugs and rodents, raise the risk of disease transmissions and result in hazardous situations. This can result in economic losses and threaten the sustainability of rural communities (Mihai et al., 2021).

The findings of this study highlight the pressing need to mitigate the impact of solid waste pollution on rural tourism; it is important to implement effective waste management strategies. Regular cleaning and proper disposal of waste are important in maintaining cleanliness in rural areas. In addition, educational campaigns and community involvement can raise awareness about the importance of keeping rural areas clean and preserving their natural and cultural heritage. Through actively addressing solid waste pollution, rural tourism destinations can enhance their appeal, attract more visitors, and ensure the long-term sustainability of the industry also preventing litter from entering the environment.

### CONCLUSION

In this study, the level of solid waste pollution in a rural area in Turkey's Southeastern Black Sea Region, more specifically in the village of Arpalı in the Köprübaşı district was examined. Three representative areas frequently used for recreational purposes were chosen as observation sites. Throughout the year 2021, macro waste was sampled from these locations over four different seasons, enabling a detailed analysis of the composition and distribution of waste in terms of quality and quantity. The study's findings showed a significant amount of plastic waste, along with observable increases in other waste types like metal, textile, and paper. Disposable items like face masks, wet wipes, plastic bottles, and food and beverage packaging made up a sizable portion of the waste that was collected. Additionally, the research highlighted that waste generation was higher during the spring and summer seasons due to increased activities in rural areas. Overall, these results highlight the urgent need for better waste management techniques to reduce solid waste pollution in rural environments.



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BEACH LITTER POLLUTION POST PANDEMIC COVID-19 PERIOD (2020-2022) IN THE SOUTHEAST BLACK SEA

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#### ABSTRACT

The outbreak of the COVID-19 pandemic in 2019-2020 has had widespread impacts on various aspects of our social lives. One of the negative consequences has been the environmental damage caused during this period. Notably, the emergence of personal-use hygiene and medical-related solid waste, which were previously uncommon in the environment, has become prevalent following the pandemic. Given these circumstances, our study seeks to explore the spatial and temporal variations in beach litter along the Southeastern Black Sea coast after the pandemic period. In this regard, coastal areas in the Sürmene and Of districts in Trabzon province were selected as pilot study locations. Three stations were chosen to represent different coastal areas within each district. Sampling was conducted during the autumn seasons from 2020 to 2022. The marine litter was categorized according to the OSPAR 2010 classification system, and its distribution was evaluated across nine different categories. The results revealed a total of 4,648 litter items collected and removed from the beaches during the study period. Among the marine litter, plastic materials, and single-use products, such as beverage packages, plastic bottles, and plastic bags, dominated the composition. Particularly noteworthy was the identification of 83 items categorized as COVID-19-related items, consisting of medical and sanitary waste. The data indicated a significant increase in this specific litter category during the first year of the pandemic, with a higher number of COVID-19-related litter items observed during the initial phase. However, the following year showed a decline in the number of COVID-19-related litter items. The findings of our study shed light on the lack of awareness regarding marine litter pollution issues, especially concerning the impact of COVID-19-related waste. These outcomes underscore the importance of implementing regulations to reduce and limit the use of single-use products to enhance waste management in the region.

**Keywords:** Pollution, Marine litter, Plastic, COVID-19, Black Sea



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

The rise of plastic materials in recent history has brought about significant changes in contemporary human consumption and purchasing behaviors (Kautish et al., 2021; Northen et al., 2023). The invention of plastic has revolutionized production processes, allowing manufacturers to produce goods on a larger scale, at a faster pace, and with reduced costs (Geyer et al., 2017; Nielsen et al., 2020). This, in turn, has provided consumers with greater opportunities to engage in more frequent and substantial purchases (Sun & He, 2023). Consequently, the generation of solid waste has become an inevitable outcome of modern consumer practices (Kibria et al., 2023; Rhodes, 2018). Despite efforts by authorities to establish improved waste management systems, a notable portion of waste still manages to escape these systems, finding its way into the environment and causing pollution (Ioakeimidis et al., 2014; UNEP-WCMC, 2011). The consequences of solid waste pollution encompass a wide range of impacts, affecting ecological systems, social well-being, and the economy (Jambeck et al., 2015; Kibria et al., 2023). From the visual detriment it poses to the tangible economic losses it incurs, solid waste pollution presents significant challenges that demand immediate attention and pragmatic solutions.

Solid waste generated on land can find its way into the marine environment through various means such as improper dumping, weather conditions, and runoff from rivers (van Emmerik et al., 2022). The term "marine litter" was widely used among scientific community when litter that has entered the marine environment has accumulated in various places, from the shoreline to the seafloor (Bergmann et al., 2015). It is thought that the slow rate of degradation of plastic exacerbates the issue, leading to an accumulation of trash in sediments, deep ocean regions, seawater, and even the atmosphere (Galgani et al., 2015; Rech et al., 2014; Ryan, 2014). Marine litter poses significant adverse impacts on various forms of marine life. Organisms in the marine ecosystem are exposed to marine litter through ingestion and subsequent transfer of pollutants through the food chain (Bergmann et al., 2015; Dahms et al., 2019). This transfer can occur from smaller organisms to larger predators, including humans, who occupy the top predator in the food chain (Tuuri & Leterme, 2023). As a result, the consequences of marine are far-reaching, affecting both the ecological balance of marine ecosystems and the potential risks posed to marine organisms and human populations (Brouwer et al., 2017; Dahms et al., 2019; Garcés-Ordóñez et al., 2020).



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The Black Sea is characterized by its distinct marine environment, defined as a semi-enclosed water body that is only connected through the Istanbul Strait System. With large populations residing in the coastal regions and along the riverbanks, the region is influenced by a number of rivers that run into the Black Sea (Bakan & Büyükgüngör, 2000; Bat et al., 2018). River runoff is the primary source of marine debris which considerably increases pollution in this area (Erüz et al., 2023; González-Fernández et al., 2022; Guneroglu, 2010; Simeonova et al., 2017; Terzi et al., 2020). As a result, the Black Sea is regarded to be the European most contaminated sea, even more so than the Mediterranean Sea (Radulescu, 2023).

The emergence of the COVID-19 virus was initially observed in December 2019 within Wuhan city in China, and it rapidly spread to various parts of the world through human transmission (Patrício Silva et al., 2021). Within a short span of time, the World Health Organization (WHO) declared it a pandemic and issued guidelines for self-protection and protection of healthcare professionals against the virus (Cucinotta & Vanelli, 2020). This global phenomenon has significantly heightened awareness regarding individual protection measures. Consequently, there has been a surge in demand for single-use protective equipment such as facemasks, gloves, as well as sanitary products including wet wipes and hand sanitizers (Benson et al., 2021; Dharmaraj et al., 2021; Francis et al., 2020). There is an increase in single-use plastic as well as individual protective materials during pandemic (Özşeker et al., 2022). This situation is further complicated by the fact that only 40% of the plastic produced is recyclable, as highlighted by the European Commission's findings (European Environmental Agency (EEA), 2020), resulting in a substantial amount of non-recyclable plastic waste entering the ecosystem. Moreover, the pandemic has influenced behavior, leading to a reluctance to recycle plastic products for hygiene reasons, aggravating the plastic waste issue (Aragaw, 2020; Dharmaraj et al., 2021). While medical waste generated in public health services, such as hospitals, is properly managed and treated, most personal medical and sanitary products end up being mismanaged, exposing them to the environment (Patrício Silva et al., 2021).

Turkey, like several other European countries, implemented partial lockdown measures to curb the spread of the virus. These restrictions have curtailed people's mobility and limited social interactions, serving as precautionary measures to minimize the transmission of the virus (Yukseltan et al., 2022). However, even with these measures in place, the region has experienced a significant influx of visitors, indicating that people's movement remains notably high (Shakibaei et al., 2021).





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The objective of this study was to examine the influence of the COVID-19 pandemic on beach marine litter pollution in the Southeast Black Sea Region of Turkey. This paper specifically investigates the relationship between COVID-19-related waste and its contribution to beach marine litter, particularly in terms of beach pollution. The findings of this study will contribute to expanding knowledge on the consequences of the post pandemic on coastal ecosystems and help inform future mitigation strategies to address the environmental challenges posed by COVID-19-related waste.

### **MATERIALS and METHODS**

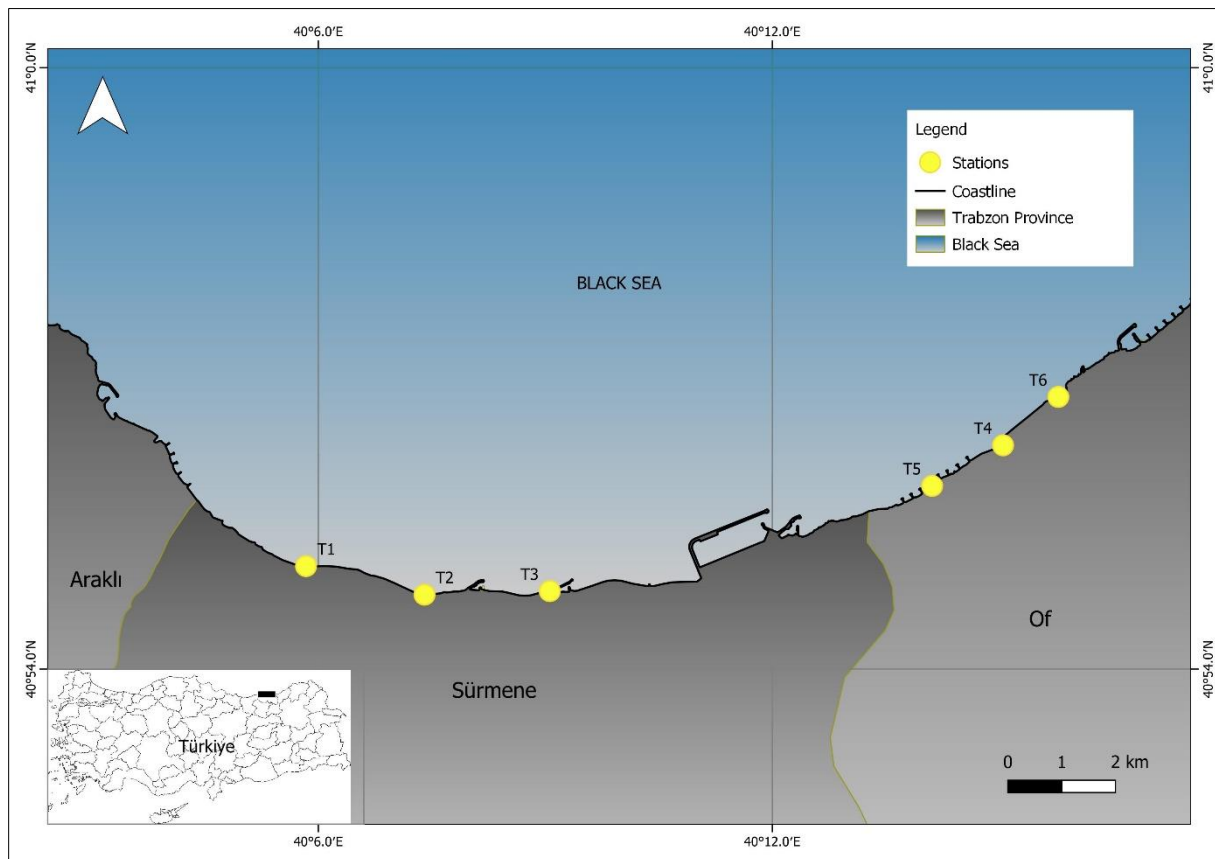
#### *Study area*

The research was carried out in the coastal region of Sürmene and Of, which is part of Trabzon Province, situated within the Southeast Black Sea Region of Turkey. Sürmene and Of districts, both located along the coastline of Trabzon Province, were selected as the focal points for this study. Notably, these districts are among the ten districts that border the coastal areas of Trabzon Province, making them significant locations for investigating beach marine litter pollution in the region.

Human activities in the coastal areas of the Southeast Black Sea Region of Turkey are notably intense. The region has experienced continuous coastal development projects involving land reclamation, resulting in significant alterations to the natural coastal landscape (Alpak et al., 2016; Erüz & Ismail, 2015). Additionally, a substantial portion of the regional population resides near the coastal areas and riverbanks. According to statistical data from 2022, the population in Sürmene was recorded at 25,950, while Of had a population of 43,591 (TUIK, 2022). However, it is essential to acknowledge that the population in this region experiences fluctuations with the changing seasons. The population tends to be lower during the winter, but significantly increases in the summer, due to the influx of both domestic and international tourists visiting the rural tourism destinations in the region (Efe et al., 2022). The region's primary economic activities include fishing, mariculture, agriculture, and tourism. Residents rely significantly on natural resources acquired from both the land and the sea for a living (Erüz et al., 2023).

Sampling of marine litter was carried out at six data stations situated along the Sürmene and Of coasts. The collection of beach litter samples was done during the Autumn seasons of 2020, 2021, and 2022, which were chosen following the outbreaks of COVID-19. Additionally, the

Autumn season was selected due to higher amount of litter observed during heavy rain in this period (Erüz et al., 2023; Terzi & Seyhan, 2017). The selection of data stations considered various factors, such as their proximity to recreational beaches, river mouths, and artificial structures like ports or jetties (T1 and T4 were designated as recreational beaches, T3 and T5 are natural, undeveloped beaches, while T2 and T6 are situated at river mouths).



**Figure 1.** Location map of the study area includes six stations along in the Southeast Black Sea coast of Türkiye

### *Beach litter collection*

All human-generated litter discovered within the designated transect areas of 100 square meters was carefully collected at each data station. This study focuses on macro beach litter; thus, only litter larger than 2.5 cm was collected. However, it is important to note that natural debris such as seaweed, animal bones, and untreated wood were excluded from the litter collection process. Following the OSPAR (Aytan et al., 2019; Terzi et al., 2020; Terzi & Seyhan, 2017; Wenneker et al., 2010) classification system, the collected litter was categorized into 42 subcategories and



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

nine primary categories (plastic, rubber, fabric, wood, paper, metal, glass, sanitary waste, and medical waste). Specifically, in relation to litter associated with COVID-19 pandemic, items were classified under the categories of sanitary and medical waste. Single-use face masks, gloves, wet wipes, bottles for liquid hand sanitizers, packaging for soap, and alcohol-based cologne were all included in this category. To estimate the litter density in terms of number, the items that were gathered were counted.

### *Beach marine litter analysis*

An analysis was conducted to evaluate the extent of litter pollution in the study area, focusing on the litter composition, distribution, and density at all stations over the study period. To determine the litter composition, the percentages of each litter category were calculated in relation to the total collected litter. The measurement was expressed as items per square meter (items/m<sup>2</sup>). The litter density was calculated using the provided equation (Eq. 1). The total number of litter items collected from the transect (N), the width of the transect (w), and the length of the transect (l), which were measured in meters were used to estimate the density of litter items (D) (Terzi et al., 2020; Terzi & Seyhan, 2017).

$$D = N / (w * l) \quad (1)$$

The Clean Coast Index (CCI) developed by Alkalay et al. was employed to evaluate the cleanliness status of the beaches ((Alkalay et al., 2007). CCI is defined by Eq (2):

$$CCI = \left( \frac{\text{Total litter on transect}}{\text{Total area of transect}} \right) * K \quad (2)$$

The CCI scale is divided into four categories: very clean (0-2), clean (2-5), clean (5-10), filthy (10-20), and highly unclean (>20). K was used as a multiplier with a coefficient of 20, to ensure that the values produced did not fall between 0 and 1 (Akarsu et al., 2022; Alkalay et al., 2007; Chen et al., 2020).

## **FINDINGS and DISCUSSIONS**

### *Beach marine litter composition*

During the autumns of 2020, 2021, and 2022, a comprehensive beach marine litter collection was carried out at six distinct beach stations within the study area situated in the Sürmene and



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Of districts of Trabzon Province, which is located in the Southeast Black Sea region of Turkey. Each item found within the designated transect area was meticulously documented and counted, facilitating its subsequent classification into 42 subcategories and 9 major litter categories following the OSPAR classification system. Upon completing this categorization process, the entire litter collection was promptly removed from the beaches and properly disposed of in garbage bins. This action aimed to reduce litter pollution in the area and protect the coastal and marine environment.

Over the three-year study period, a total of 4648 items of beach marine litter items were collected from six stations. The analysis revealed that plastic materials were the most dominant type of litter, making up a significant majority of the litter composition in the study area in terms of number of items (quantity). Additionally, other materials such as paper and cloth were also prevalent, making up the rest of the beach marine litter discovered at the study sites (Figure 2).

Over the course of the observation years, notable changes in the composition of beach marine litter have been observed. In the autumn of 2020, when the beach marine litter was categorized based on item count, plastics dominated, accounting for 82% of the litter. Cloth comprised 5%, metals constituted 4%, paper made up 3%, while medical waste and rubber each represented 2% and 1% of the litter, respectively. Glass and sanitary waste also constituted 1% each. Moving on to the autumn of 2021, an item count analysis of beach marine litter revealed that plastics remained the prominent litter material, comprising 73% of the total litter. Metals increased to 12%, cloth constituted 5%, and paper accounted for 3% of the litter. Both rubber and glass represented 3%, while medical waste contributed 2%, and sanitary waste made up 1% of the litter. In the following autumn of 2022, a comprehensive item count analysis of beach marine litter demonstrated that plastics still constituted a significant portion, comprising 67% of the litter. Paper increased to 28%, and metals accounted for 2%. Cloth, medical waste, and sanitary waste each represented 1% of the total litter collected (Figure 2). The observed changes in litter composition highlight the dynamic nature of marine litter, emphasizing the need for continuous monitoring and effective waste management strategies to address the environmental impact of different litter materials on beaches.

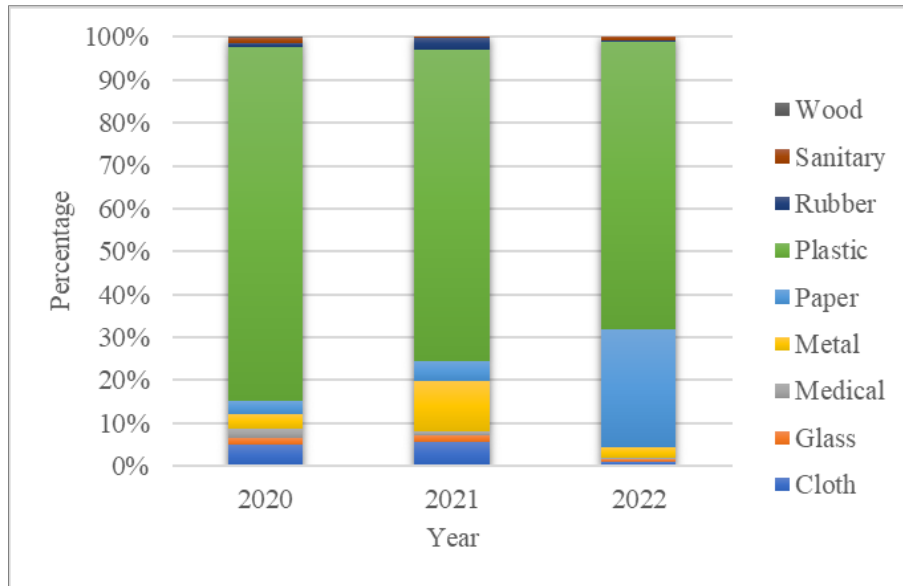


Figure 2. Beach marine litter composition

Although the composition of plastic materials in the study area has shown noticeable changes over the course of the study, plastics remain the dominant type of litter in both locations. These study findings consistent with previous research on beach marine litter conducted at both regional and global levels, consistently highlighting plastics as the primary component in beach marine litter (Aytan et al., 2019; Erüz et al., 2023; Galgani, 2014; Galgani et al., 2015; Ioakeimidis et al., 2014; Terzi et al., 2020; Terzi & Seyhan, 2017). However, it is important to highlight that the proportion of plastic materials in marine litter recorded in the current study area is relatively lower compared to more recent investigations on beach marine litter at both regional and global scales. Plastics have been claimed to account for up to 85 percent of total beach marine litter in some studies. The prevalence of plastics as the primary litter type in coastal regions highlights the critical need for effective methods and tactics to prevent plastic pollution and its negative effects on marine ecosystems. Also, it is worth mentioning that single-use disposable items such as beverage containers, plastic bottles and bags were found to be the prevalent types of beach marine litter found in the study area.

#### *Beach marine litter density and Clean Coast Index (CCI)*

The evaluation of litter density, measured as items per square meter (items/m<sup>2</sup>), revealed a concerning level of beach litter pollution along the Southeast Black Sea coast of Turkey. Both Sürmene and Of beaches displayed high litter densities ranging from 0.21 to 6.55 items per





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

square meter throughout the study period. In contrast, litter densities on the Black Sea coasts typically range from 0 to 5 items per square meter in previous studies (Aytan et al., 2019; Erüz et al., 2023; Terzi et al., 2020; Terzi & Seyhan, 2017). These beaches categories ranged from “clean” to “extremely dirty” according to the Clean Coast Index (CCI) (Tabel 1). Sürmene and Of coasts CCI’s were varied ranged from very clean to extremely dirty based on a long term study of marine litter in the area (Terzi et al., 2020). This suggests that these items contribute to the pollution problem. These results emphasize the increasing pollution of beach marine litter in the study area, indicating an urgent requirement for efficient waste management and pollution control measures to preserve the coastal environment's well-being and protect marine ecosystems. Implementing strategies to minimize litter and encouraging responsible waste disposal practices will be essential in tackling this critical environmental concern and securing the sustainability of the Black Sea region in Turkey.

**Table 1.** Clean Coast Index (CCI) of the designated station over autumn 2020, 2021, and 2022

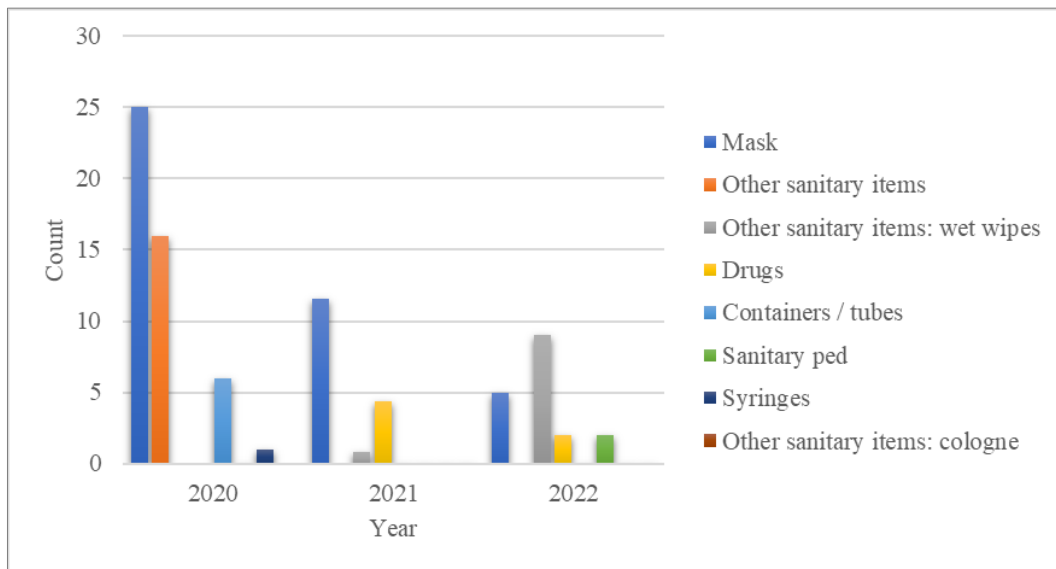
Year	Stations					
	T1	T2	T3	T4	T5	T6
2020	ED*	ED*	ED*	ED*	ED*	ED*
2021	ED*	ED*	ED*	ED*	ED*	ED*
2022	ED*	ED*	ED*	C*	D*	ED*

\*\*“V”\*\*: very clean “C”\*\*: clean, “MC”\*\*: moderately clean, “D”\*\*: dirty, and “ED”\*\*: extremely dirty

### *COVID-19 related litter*

The present study indicated that the beach marine litter pollution in the Southeast Black Sea region of Türkiye has been impacted by the COVID 19 pandemic. Prior to 2019, the beach marine environment did not commonly encounter such waste types, but they have become prevalent following the pandemic COVID-19 (Erüz et al., 2021, 2023; Özşeker et al., 2022). Specifically, among the litter collected, a total of 83 items were classified as medical waste and sanitary waste, particularly COVID-19 related items. It was evident that the first year of the pandemic experienced an increase in this specific litter category, with a higher number of

COVID-19 related items observed during the initial phase. However, the number of COVID-19 related litter items decreased in the subsequent year, possibly due to improved waste management practices and public awareness (Figure 3).



**Figure 3.** Medical and sanitary waste count in the area



**Figure 4.** Single-use plastic such as face masks are commonly found litter category in the study area (Source: field study)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

During the pandemic COVID-19 Turkish government has applied partial lockdown to limit individual interaction (Celik & Gul, 2022; Yaylak, 2022). This practice has shown a reduction in beach litter following the beach closure due to restriction (Okuku et al., 2021; Souza Filho et al., 2023). However, there are growing amount of solid waste specifically single use product for individual protection (Canning-Clode et al., 2020; Peng et al., 2021; Roberts et al., 2021). Litter originating from land inevitably finds its way into the ocean through surface runoff and dumping (Kibria et al., 2023b; Mai et al., 2020; Rech et al., 2014). The study findings indicate that despite the implementation of solid waste management by the authority, failed to prevent beach marine litter accumulation along the coasts of Sürmene and Of districts (Özşeker et al., 2022). Although waste dumping in the river catchment is prohibited, these practices are still illegally done by irresponsible people. This condition brought pressure to marine litter pollution in the region.

These results emphasize the importance of raising awareness and addressing marine litter pollution, with specific attention to the impact of COVID-19-related waste. The study underscores the significance of implementing measures and policies to reduce the usage of single-use products, which would greatly improve waste management practices in the area. Addressing these issues will enable us to efficiently alleviate the impacts of beach marine litter pollution and protect the coastal environment for the benefit of future generations.

### CONCLUSION

The outbreak of the COVID-19 pandemic has had wide-ranging effects on various aspects of today's society, including the marine environment. One of the negative consequences of the pandemic COVID-19 has been the increased environmental damage caused by personal-use hygiene and medical-related solid waste. This study focused on investigating the spatial and temporal variations in marine litter along the coasts of the Southeastern Black Sea region following the pandemic period. Through sampling and assessment at selected beaches in the Sürmene and Of districts of Trabzon Province, the research revealed a concerning prevalence of beach marine litter dominated by plastic materials and single-use products. These results underscore the importance of developing proper waste management and regulations to limit the use of single use items, and raising awareness regarding the impact of marine litter pollution. This will ensure the long-term survival of coastal ecosystems and the resources they support for present and future generations.



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **RECOMMENDATIONS**

Several recommendations can be generated based on the study's findings to address the problem of beach marine litter pollution, which is becoming more and more significant in Turkiye's Southeast Black Sea region.

First and foremost, public awareness-raising efforts and educational programs should be developed and implemented to enlighten both tourists and residents about the negative environmental effects of marine litter. Promoting ethical waste management practices and highlighting the negative consequences of single-use items including hazardous waste can sway people to adopt more sustainable lifestyles.

Local government, federal agencies, and other pertinent stakeholders must adopt and put into effect policies that restrict the use of single-use plastics and non-recyclable items in coastal areas. Even though the use of single-use protective items has decreased in the post-pandemic era, monitoring their use is still necessary to achieve sustainable waste management. The amount of waste affecting marine ecology will be greatly reduced by implementing policies that promote recycling and the use of eco-friendly alternatives.

Regular beach clean-up programs that involve participation from the local population and collaboration with non-governmental organizations should also be organized and encouraged. By including locals and volunteers in these cleanup operations, a sense of ownership and responsibility for the preservation of the coastal environment is generated. It is also crucial to make investments in waste management infrastructure development to ensure proper garbage disposal and treatment. Notably, medical waste classified as hazardous waste and require special waste treatment measures.

In order to reduce the effects of litter pollution, waste collection points and recycling facilities should be established to serve both locals and visitors. It is important to support ongoing research and monitoring to evaluate the success of adopted strategies and spot new problems. Monitoring the composition, distribution, and density of the litter on a regular basis will help to inform adaptive measures and offer insightful information for policymaking regarding marine litter pollution.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### İKLİM DEĞİŞİKLİĞİ BAĞLAMINDA BİNALARDA SOĞUTMA YÜKÜ: LİTERATÜR TARAMASI

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#### ÖZET

İklim değişikliği, dünya genelinde sıcaklık artışına yol açmakta ve binaların enerji tüketimlerini etkileyerek soğutma gereksinimlerini artırmaktadır. Nitekim yapılan araştırmalar, iklim değişikliğine bağlı olarak binalarda soğutma yükünün gelecek yıllarda %50'den fazla artış göstereceğini öngörmektedir. Dolayısıyla uluslararası literatürde binalarda soğutma yükü ile ilgili yapılan araştırmalar giderek daha fazla önem kazanmaktadır. Bu çalışmanın amacı, binalarda artan soğutma yükü ihtiyacı ile ilgili yapılan çalışmaların incelenmesi ve analiz edilmesidir. Bu kapsamda son 10 yıllık süreç içerisinde ulusal ve uluslararası literatürde yer alan 6.000'den fazla çalışma, başlıklar ve özetler üzerinden taranmıştır. Tarama sonucunda çalışmanın amacıyla doğrudan bağlantılı olacak şekilde ulusal literatürde 39 adet, uluslararası literatürde 121 adet çalışma, araştırma kapsamına dahil edilmiştir. Elde edilen bulgular, binalarda soğutma yükü ile ilgili konuların birçok farklı alanda ele alındığını göstermektedir. Bu çalışmalar yıllara göre yayın sayısı, soğutma yükünün ele alınma biçimi, programlama dillerinin kullanılma durumu, etki parametreleri, çalışmanın amacı ve yapı tipolojisi olacak şekilde 6 ana başlık altında analiz edilmiştir. Daha sonra ulusal literatür ile uluslararası literatürün bir karşılaştırması yapılmıştır. Uluslararası literatürde yapılan çalışmalar her geçen yıl artış gösterirken bu konunun ulusal literatürde yeterince ele alınmadığı saptanmıştır. Sonuç olarak bu çalışma, binalarda soğutma yükü ile ortaya çıkan enerji ihtiyacının ulusal literatürde daha fazla önemsenmesi gerektiğini ortaya koymaktadır.

**Anahtar Kelimeler:** İklim değişikliği, soğutma yükü, enerji, sürdürülebilirlik, sürdürülebilir kalkınma



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### COOLING LOAD IN BUILDINGS IN THE CONTEXT OF CLIMATE CHANGE: LITERATURE REVIEW

#### ABSTRACT

Climate change causes an increase in temperature worldwide and increases the cooling requirements of buildings by affecting their energy consumption. As a matter of fact, research predicts that the cooling load in buildings will increase by more than 50% in the coming years due to climate change. Therefore, recent research on cooling load in buildings in the international literature is becoming increasingly important. The purpose of this study is to examine and analyze the studies on the increasing cooling load need in buildings. In this context, more than 6,000 studies in the national and international literature over the last 10 years have been reviewed through their titles and abstracts. As a result of the reviewing, 39 studies in the national literature and 121 studies in the international literature have been included in the scope of this research, which have directly related to the purpose of the study. The findings show that issues related to cooling load in buildings are addressed in many different areas. These studies have been analyzed under 6 main headings: the number of publications by year, the way cooling load is handled, the usage of the programming language, impact parameters, purpose of the study and building typology. Then, national and international literatures have been compared. While studies in the international literature increase every year, it has been determined that this issue is not adequately addressed in the national literature. As a result, this study reveals that the energy need arising from the cooling load in buildings should be given more importance in the national literature.

**Keywords:** Climate change, cooling load, building, energy, sustainability, sustainable development



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Uluslararası Enerji Ajansı (IEA) tarafından yapılan arařtırmalar, küresel ölçekte enerji tüketiminin yaklaşık 30 yıldır giderek arttığını göstermektedir (IEA, 2023). Benzer şekilde CO<sub>2</sub> emisyon miktarları incelendiğinde aynı artışın yaşandığı ve 100 yılı aşkın süredir belirli bir seviyenin altına düşmediği görülmektedir (NASA, 2023). Diğer yandan ekonomik ve demografik büyümelerin, küresel ölçekteki enerji talebini gelecek 30 yılda yaklaşık %50 oranında artırması beklenmektedir (Li ve diğ., 2023).

IEA (2019) tarafından yayınlanan rapora göre bina ve inřaat sektörü küresel enerji tüketiminin %36'sından, küresel CO<sub>2</sub> emisyon miktarının yaklaşık %40'ından sorumludur. Ulusal Enerji Denge Tabloları'na göre Türkiye'de konut sektörü enerji tüketiminin yaklaşık %25'inden sorumludur (Enerji ve Tabii Kaynaklar Bakanlığı, 2022). Bu durum, Türkiye özelinde bina sektörünün sanayi ve ulařtırma sektörlerinden sonra en çok enerji tüketen 3. sektör olduğunu göstermektedir.

Binalar özelinde temel enerji tüketim alanları; mekansal ısıtma, mekansal soğutma, sıcak su temini, aydınlatma, yemek piřirme ve diğeri elektronik ev aletlerinin kullanımınıdır. Bununla birlikte binalarda birincil enerji tüketim alanları mekansal ısıtmaya, sıcak su teminine ve yemek piřirmeye yönelik ihtiyaçlar olsa da, en hızlı büyüyen son kullanım alanlarından biri mekansal soğutmadır (IEA, 2019). Bu durum, küresel ısınmanın da etkisiyle artan dış ortam hava sıcaklıklarının iç ortam ısı koşullarını etkilemesiyle açıklanabilmektedir. Bu etkinin azaltılabilmesi için pasif ve aktif olmak üzere çeşitli sistemler kullanılmaktadır. Fakat artan hava sıcaklıkları nedeniyle pasif sistemlerin yetersiz kalması ve dolayısıyla aktif sistemlerin daha çok tercih edilmesi söz konusudur (Huang & Hwang, 2016). Bu bağlamda HVAC sistemleri, iç ortam ısı koşullarının iyileştirilmesinde etkili bir yöntem olmasına karşın binalarda enerji tüketiminin yaklaşık %50'sini oluşturmaktadır (Costa ve diğ., 2013). Ancak gelecek 50 yılda küresel ısınmanın etkisiyle mekansal soğutma yükünün ve HVAC sistemleri tarafından kullanılan enerjinin %50'den fazla artabileceği öngörülmektedir (Huang & Hwang, 2016).

Bu doğrultuda soğutma yüklerinin azaltılması, iklim deęişikliğine baęlı küresel ısınmanın binalar üzerindeki etkisi ve buna yönelik sergilenen enerji etkin yaklaşımlar açısından önemli bir konudur. Nitekim literatürde, uluslararası alanda binalarda soğutma yükü konusunu farklı yönlerden ele alan birçok çalışma bulunmaktadır. Ancak ulusal düzeyde, standartlar ve yönetmelikler yoluyla ısıtma enerjisinin azaltılmasına yönelik verilen önemin binalarda



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

soğutma yükünün azaltılmasıyla ilgili konulara verilmediği görülmektedir. Bu nedenle Türkiye özelinde hem küresel ısınmanın artan etkisi hem de bina sektöründe kullanılan enerjinin büyük bir paya sahip olması, ulusal literatürde de konuya daha fazla önem verilmesini gerekli kılmaktadır. Bu doğrultuda ulusal literatürde bulunan ve binalarda soğutma yükünü konu alan mevcut çalışmaların, uluslararası literatür ile ne derece örtüştüğüne ve binalarda soğutma yükünün hangi yönlerden ele alındığına yönelik değerlendirmeler önem kazanmaktadır. Tüm bu tespitlerden yola çıkarak bu çalışmanın amacı, ulusal ve uluslararası literatürde yer alan ve binalarda soğutma yükü ile ilgili yapılmış çalışmaları karşılaştırmak, analiz etmek ve ulusal literatürdeki eksik noktaları ortaya koyarak Türkiye özelinde binalarda soğutma yüküne verilmesi gereken önemi vurgulamaktır.

### 2. MATERYAL ve YÖNTEM

Çalışma kapsamında yapılan literatür taraması, belirli anahtar kavramlar üzerinden yürütülmüştür. Buna göre “soğutma yükü + ısıtma yükü + bina” anahtar kavramları, hem ulusal hem de uluslararası veri tabanlarında Türkçe ve İngilizce olmak üzere aratılmıştır. Ulusal literatürde taranan çalışmalar, TS825 standardının son olarak revize edildiği 2008 yılından 2023 yılının Eylül ayına kadarki süreci kapsamaktadır. Veri tabanları olarak Yüksek Öğretim Kurulu Başkanlığı Ulusal Tez Merkezi, DergiPark ve Google Akademik arama motorları kullanılmıştır. Uluslararası literatürdeki çalışmalar ise 2013-2023 yılları arasında son 10 yılda yapılmış olan yayınları kapsamaktadır. Bu kapsamda da ScienceDirect veri tabanı kullanılmıştır. Tarama sonucunda her iki alanda ulaşılan toplam 6.000’den fazla çalışmaya 2 aşamalı filtreleme işlemi uygulanmıştır. Söz konusu çalışmalar öncelikle başlıklarının anahtar kavramları içerip içermeme durumlarına göre ayrıştırılmıştır. İlk filtrelemede ulusal ve uluslararası literatürde toplam 191 adet çalışma belirlenmiştir. Ardından ikinci filtrelemede bu çalışmalar, özetleri kapsamında incelenerek konuyla ilgili olup olmama durumlarına göre ayrılmıştır. Buna göre araştırma alanı ile doğrudan ilişkili olan ulusal literatürde 39 adet, uluslararası literatürde 121 adet olmak üzere toplamda 160 adet çalışma elde edilmiştir. Söz konusu çalışmalar Tablo 1 ve Tablo 2’de gösterilmektedir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 1.** Ulusal literatür taraması sonucu analiz edilen çalışmalar (Alfabetik sıraya göre).

Yayın Türü	No.	Yazar	Yayın yılı	Yayın Türü	No.	Yazar	Yayın yılı
Doktora Tezleri	1	Bayraktar, N. T.	2008	Makale ve Bildiriler	21	Dağdır, C. & Bolattürk, A.	2011
	2	Caner, İ.	2020		22	Dilber, B. & Özdemir, A. F.	2022
	3	Kalfa, S. M.	2014		23	Dombaycı, A. ve diğ.	2009
	4	Kon, O.	2014		24	Erten, M. Y. & İnanç, N.	2021
	5	Özdemir, H. Ç.	2021		25	Ertürk, M. & Coşkun, C.	2019
	6	Yıldız, Y.	2012		26	Gümüşçü, A. ve diğ.	2018
	7	Zainal, O. A.	2015		27	Gürel, A. E. & Daşdemir, A.	2011
Yüksek Lisans Tezleri	8	Anaç, M.	2019		28	Kalfa, S. M. & Yaşar, Y.	2015
	9	Bilki, T. B.	2016		29	Keçebaş, A. ve diğ.	2022
	10	Demirtaş, A.	2011		30	Kerestecioğlu, F. Ö. ve diğ.	2015
	11	Kaya, Y.	2020		31	Kürekci, N. A. & Kaplam, S.	2014
	12	Kınalı, M.	2013		32	Oktay, H. ve diğ.	2020
	13	Maviş, K.	2023		33	Orhan, G. & Ekici, B. B.	2022
	14	Turan, B. K.	2019		34	Özbek, K. & Özyurt, Ö.	2022
	15	Ünsal, B.	2012		35	Özgören, M. ve diğ.	2011
Makale ve Bildiriler	16	Acılar A. M.	2020		36	Peker, M. ve diğ.	2017
	17	Algburi, O. & Beyhan, F.	2019		37	Yıldız Y & Arsan, Z. D.	2011
	18	Aydın, N. & Bıyıklıoğlu, A.	2020		38	Yıldız, A. ve diğ.	2015
	19	Bekdaş, G. ve diğ.	2023		39	Yıldız, M. E. ve diğ.	2021
	20	Canbay, P. & Taş. H.	2022				



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 2.** Uluslararası literatür taraması sonucu analiz edilen çalışmalar (Alfabetik sıraya göre).

No.	Yazar(lar)	Yayın yılı	No.	Yazar(lar)	Yayın yılı	No.	Yazar(lar)	Yayın yılı	No.	Yazar(lar)	Yayın yılı
1	Abdou, N ve diğ.	2022	32	Harvey, L D	2020	62	Lima, I ve diğ.	2019	92	Spandagos, C , & Ng, T	2017
2	Ahn, B ve diğ.	2014	33	Hu, J ve diğ.	2021	63	Lin, X ve diğ.	2019	93	Tabadkani, A ve diğ.	2021
3	Alyakoob, A ve diğ.	2023	34	Huang, K T ve diğ.	2016	64	Liu, Z ve diğ.	2023	94	Terashima, K ve diğ.	2023
4	Baneshi, M	2016	35	Huang, Y , & Li, C	2021	65	Lu, C ve diğ.	2023	95	Vaghefi, A ve diğ.	2014
5	Cao, J ve diğ.	2017	36	Huang, Y , & Niu, J	2015	66	Lu, C ve diğ.	2023	96	Vallejo-Coral, E C ve diğ.	2019
6	Čekon, M	2019	37	Hwang, R L ve diğ.	2022	67	Lu, Y ve diğ.	2021	97	Venkiteswaran, V K ve diğ.	2017
7	Chen, S ve diğ.	2023	38	Jalali, Z ve diğ.	2023	68	Luo, X J ve diğ.	2020	98	Wan Mohd Nazi, W I ve diğ.	2017
8	Chen, S ve diğ.	2022	39	Javanroodi, K ve diğ.	2018	69	Lv, R ve diğ.	2022	99	Wang, F ve diğ.	2022
9	Chen, Z ve diğ.	2023	40	Jenkins, D P ve diğ.	2013	70	Lyu, W ve diğ.	2021	100	Wang, H ve diğ.	2023
10	Chung, W ve diğ.	2023	41	Ji, Y ve diğ.	2016	71	Manioglu, G & Koçlar Oral, G.	2015	101	Wang, L ve diğ.	2018
11	Deb, C ve diğ.	2016	42	Jie, J , & Lee, W	2016	72	Mao, Y ve diğ.	2023	102	Wang, Y ve diğ.	2017
12	DeBlois, J ve diğ.	2013	43	Jung, S ve diğ.	2022	73	Meng, F ve diğ.	2023	103	Wang, Z ve diğ.	2020
13	Ding, Y ve diğ.	2018	44	Kaasalainen, T ve diğ.	2020	74	Moayedi, H ve diğ.	2020	104	Wu, H ve diğ.	2017
14	Dong, X ve diğ.	2014	45	Kamal, A ve diğ.	2021	75	Mokheimer, E M ve diğ.	2017	105	Xiong, J ve diğ.	2023
15	Du, J ve diğ.	2016	46	Kapetanakis, D S ve diğ.	2017	76	Muhieldeem, M W ve diğ.	2015	106	Xu, F ve diğ.	2022
16	Duan, J ve diğ.	2023	47	Kapetanakis, D S ve diğ.	2015	77	Nazi, W I ve diğ.	2015	107	Yan, C ve diğ.	2015
17	Duanmu, L ve diğ.	2013	48	Kavaklioglu, K	2018	78	Ngo, N T	2019	108	Yang, X ve diğ.	2017
18	Dutta, A , & Samanta, A	2018	49	Kavitha, R J ve diğ.	2022	79	Nunes, A I ve diğ.	2013	109	Yang, Z , & Becerik-Gerber, B	2017
19	Evola, G , & Marletta, L	2015	50	Kishore, R A ve diğ.	2021	80	Ogunsola, O T ve diğ.	2015	110	Yau, Y H ve diğ.	2017
20	Fan, C ve diğ.	2020	51	Kumar, S ve diğ.	2018	81	Oropeza-Perez, I	2017	111	Ye, J , & Qian, H	2017
21	Fan, Z ve diğ.	2022	52	Lei, J ve diğ.	2017	82	Qiang, G ve diğ.	2015	112	Yeon, S ve diğ.	2019
22	Fang, Z ve diğ.	2023	53	Lei, J ve diğ.	2016	83	Qiu, L ve diğ.	2021	113	Yu, M ve diğ.	2023
23	Farajollahi, A ve diğ.	2022	54	Li, H ve diğ.	2015	84	Quevedo, T C ve diğ.	2022	114	Yuan, J ve diğ.	2016
24	Farouk, N	2023	55	Li, L ve diğ.	2023	85	Raftery, P ve diğ.	2014	115	Zhang, C ve diğ.	2020
25	Fouladfar, M H ve diğ.	2023	56	Li, W ve diğ.	2020	86	Romani, J ve diğ.	2018	116	Zhang, C ve diğ.	2017
26	Frattolillo, A ve diğ.	2019	57	Li, W ve diğ.	2023	87	Sabzi, D ve diğ.	2015	117	Zhang, X ve diğ.	2023
27	G, K ve diğ.	2018	58	Li, X , & Yao, R	2020	88	Salameh, T ve diğ.	2020	118	Zhang, X ve diğ.	2022



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 2.** Uluslararası literatür taraması sonucu analiz edilen çalışmalar (Alfabetik sıraya göre) (Devamı).

28	Gao, Y ve diğ.	2021	59	Li, Z, & Huang, G	2013	89	Shan, R	2014	119	Zhao, J, & Liu, X	2018
29	Gao, Z ve diğ.	2022	60	Liang, C ve diğ.	2019	90	Shen, P ve diğ.	2019	120	Zhao, R C ve diğ.	2022
30	Geekiyanae, D, & Ramachandra, T	2018	61	Lim, H S ve diğ.	2017	91	Shukla, A K ve diğ.	2023	121	Zhu, L ve diğ.	2022
31	Gholamibozanjani, G, & Farid, M	2020									

Yapılan literatür taramasına göre, binalarda giderek önem kazanan soğutma yükünün tek başına veya ısıtma yüküyle birlikte ele alındığı görülmektedir. Baneshi & Maruyama (2016) tarafından yapılan bir çalışma, soğutma yüklerini azaltmak için gerçekleştirilen uygulamaların ısıtma yüklerini artırabileceğini ortaya koymaktadır. Bu nedenle soğutma yükleri azaltılırken ısıtma yüklerinin de kontrol altında tutulması ve optimum kararın verilmesi önemli bir konudur. Dolayısıyla bu çalışma kapsamında binalarda soğutma yükü ile ilgili yapılan çalışmalar, yalnızca soğutma yükünü ele alan veya hem soğutma hem de ısıtma yüklerini ele alan çalışmalar şeklinde sınıflandırılmaktadır. Diğer yandan son yıllarda gelişen teknoloji ile birlikte binalarda soğutma yükü ile ilgili yapılan çalışmalarda programlama dilleri ve yapay zeka gibi çeşitli yöntemler kullanılması söz konusudur. Bu gibi yenilikçi yöntemler, geleneksel enerji simülasyonu araçlarının aksine maliyet, zaman ve uzmanlık açısından tasarruf sağladığından daha etkin sonuçlar elde edilebilmesine imkan vermektedir (Acılar, 2020). Bu nedenle literatür taraması sonucu elde edilen çalışmalar, programlama dilleri kullanıp kullanmama durumlarına göre de sınıflandırılmaktadır.

Taranmış olan yayınlar, binalarda soğutma yükünün çeşitli faktörlere bağlı olduğunu göstermektedir. Bu faktörleri fiziksel, sosyal ve mühendislik/tasarımla ilgili olan faktörler olarak sınıflandırmak mümkündür. Fiziksel faktörler nüfus, iklim koşulları ve kullanıcı sayısı olarak nitelendirilebilirken sosyal faktörler insan davranışları ve iklimlendirme sistemlerinin kullanım alışkanlıkları ile ilgilidir. Mühendislik/tasarımla ilgili olan faktörler ise iklimlendirme sistemlerinin enerji performansı ve yapı kabuğu yoluyla elde edilen ısı kazancıdır (Jie & Lee, 2016).

Tüm bu elde edilen veriler ışığında, bu çalışma kapsamında literatürde kullanılan etki parametrelerini aşağıdaki şekilde sınıflandırmak mümkündür;

- Fiziksel parametreler:
  - İklim değişikliği



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Sosyal parametreler:
  - Kullanıcı özellikleri
- Mühendislik/tasarımla ilgili olan parametreler:
  - Opak yüzeyler,
  - Saydam yüzeyler,
  - Kütleli özellikler,
  - PCM kullanımı,
  - Gölgeleme elemanlarının kullanımı,
  - Sistemsel yaklaşımlar,
  - Kent morfolojisi,
  - Veri girişi,
  - PV sistem kullanımı ve
  - Aydınlatma

Diğer yandan literatürdeki çalışmalar incelendiğinde çalışma amaçlarının genel olarak;

- Faktörlerin soğutma yükleri üzerindeki etki durumlarının incelenmesi,
- Soğutma yükünün çeşitli tasarımsal ve/veya sistemsel müdahaleler ile azaltılması,
- Faktörleri oluşturan parametrelerin optimizasyonu,
- Soğutma yükünün vaka çalışması olarak bir örnek üzerinden hesaplanması ve
- Soğutma yükünün hesaplanması için yeni yöntemlerin geliştirilmesi

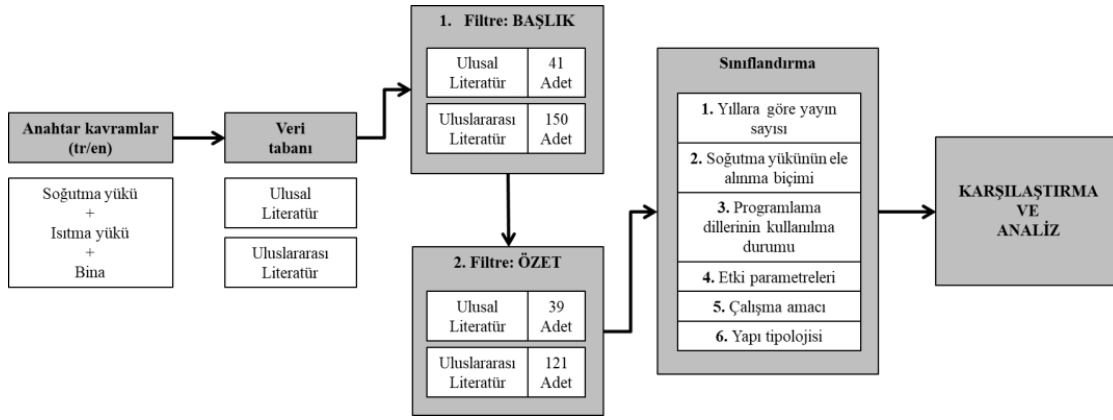
şeklinde olduğu görülmektedir. Dolayısıyla bu çalışma kapsamında tarama sonucu elde edilen yayınlar, çalışma amaçlarına göre de sınıflandırılmaktadır.

Son olarak ulusal ve uluslararası literatür incelendiğinde, yapılan çalışmalarda farklı tipolojilerdeki binaların da ele alındığı saptanmıştır. Bu sebeple yapı tipolojileri de, bu çalışma kapsamında kullanılan sınıflandırma başlıklarından biridir. Yapı tipolojileri, yaygın olarak aşağıdaki başlıklar altında toplanmaktadır:

- Genel kullanım
- Konut
- Ofis
- Eğitim yapısı
- Akıllı/sıfır enerjili bina
- Otel

Diğer yandan yalnızca bir adet çalışmada ele alınan bina tipolojileri, çalışma kapsamında “Diğer” kategorisinde belirtilmektedir.

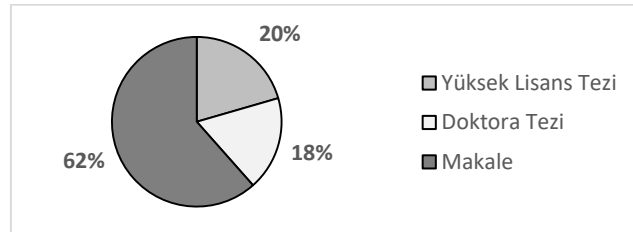
Tüm bu değerlendirmeler ışığında; yıllara göre yayın sayısı, soğutma yükünün ele alınma biçimi, programlama dillerinin kullanılma durumu, etki parametreleri, çalışmanın amacı ve yapı tipolojisi olmak üzere 6 ana başlık altında sınıflandırılan yayınlar, ulusal ve uluslararası literatür temelinde karşılaştırılmış ve analiz edilmiştir. Çalışmada benimsenen yöntem ait şema, Şekil 1’de gösterilmektedir.



Şekil 1. Çalışma kapsamında benimsenen yöntem şeması.

### 3. BULGULAR ve TARTIŞMA

Yüksek Öğretim Kurulu Başkanlığı Ulusal Tez Merkezi, DergiPark ve Google Akademik veri tabanları üzerinden yapılan ulusal literatür taramasına göre, binalarda soğutma yükünü konu alan çalışmaların %60’tan fazlasını makale türü oluşturmaktadır. Yüksek lisans ve doktora tezleri sırasıyla %20 ile %18 oranında olup birbirlerine yakın değerlere sahiptir (Şekil 2).

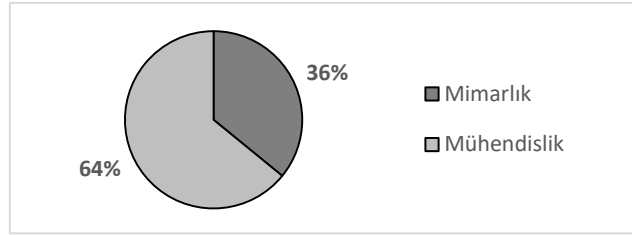


Şekil 2. Ulusal literatürdeki yayınların türlerine göre dağılımı (2008-2023).

Hem ulusal hem de uluslararası literatürde yapılan çalışmalar, ilk yazarlar göz önünde bulundurularak, ele alındığı disiplinlere göre de değerlendirilmektedir. Buna göre ulusal

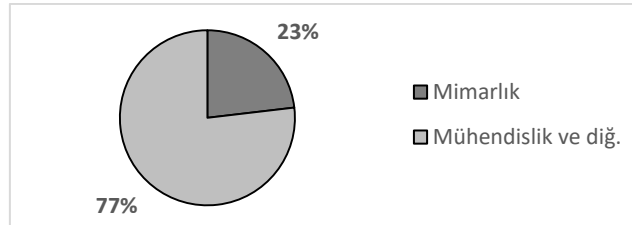


literatürdeki binalarda soğutma yükü ile ilgili yayınlanmış olan çalışmaların %64'ü mühendislik disiplinleri tarafından yapılmışken %36'sı mimarlık disiplini tarafından gerçekleştirilmiştir (Şekil 3). Bu durum, binalarda soğutma yükü konusunun ulusal literatürde mimarlık disiplini tarafından yeterince ele alınmadığını açıkça göstermektedir.



**Şekil 3.** Ulusal literatürdeki yayınların ele alındığı disiplinlere göre dağılımı (2008-2023).

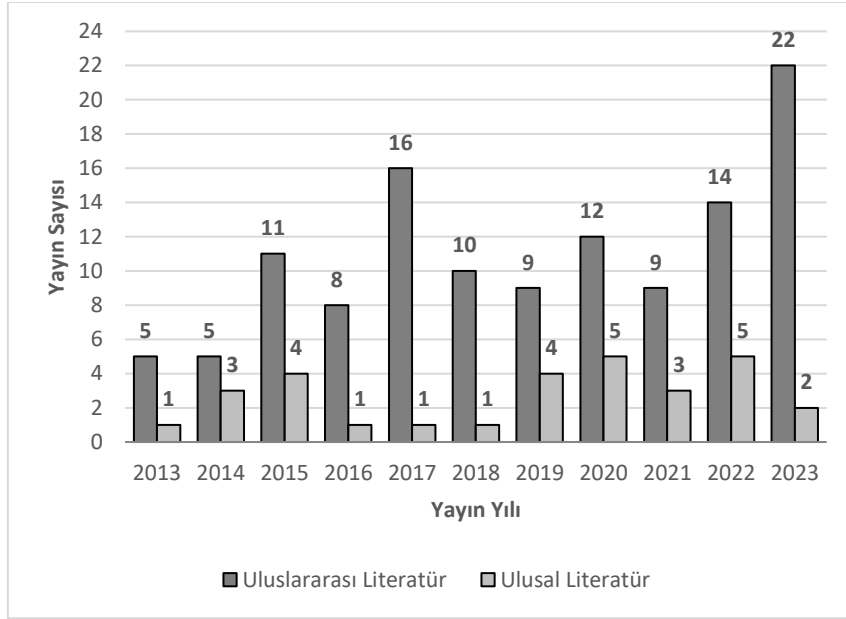
ScienceDirect veri tabanı üzerinden yapılan uluslararası literatür taramasında da ilk yazara göre disiplinler arası dağılım, ulusal literatürdekine benzer bir tablo sergilemektedir. Buna göre binalarda soğutma yükü konusu uluslararası literatürde de mimarlık disiplini tarafından mühendislik ve diğer disiplinlere kıyasla daha az ele alınmaktadır. Oransal açıdan bakıldığında mimarlık disiplini tarafından ele alınan çalışmaların oranı %23 iken mühendislik ve diğer disiplinler tarafından ele alınan çalışmaların oranı %77'dir (Şekil 4).



**Şekil 4.** Uluslararası literatürdeki yayınların ele alındığı disiplinlere göre dağılımı (2013-2023).

### 3.1 Yıllara Göre Yayın Sayısı Kapsamında Literatürlerin Karşılaştırılması

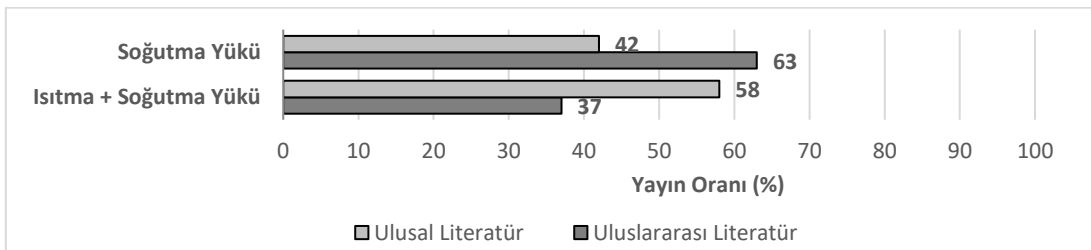
2013-2023 yılları arasında yayınlanan çalışmalar incelendiğinde, ulusal literatürdeki çalışma sayısının uluslararası literatürdeki çalışma sayısından daha az olduğu görülmektedir. Diğer yandan uluslararası literatürde son 10 yılda binalarda soğutma yükü ile ilgili yapılan çalışmaların genel olarak bir artış gösterdiği söylenebilse de aynı durum ulusal literatür için söz konusu değildir (Şekil 5).



Şekil 5. Ulusal ve uluslararası literatürlerin yayın sayısına göre karşılaştırılması.

### 3.2 Soğutma Yükünü Ele Alma Biçimine Göre Literatürlerin Karşılaştırılması

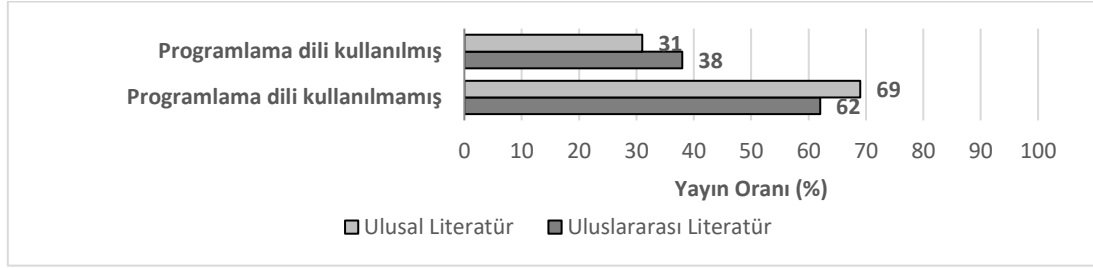
Ulusal ve uluslararası literatür yalnızca soğutma yükünü veya hem soğutma hem de ısıtma yüklerini ele alma durumlarına göre karşılaştırıldığında, ulusal literatürde yalnızca soğutma yükünü ele alan çalışmaların oranı %42, uluslararası literatürde ise %63'tür. Hem ısıtma hem de soğutma yüklerinin ele alındığı çalışma oranı ulusal literatürde %58, uluslararası literatürde %37'dir (Şekil 6). Bu durum yalnızca soğutma yükü konusunun uluslararası literatürde, hem ısıtma hem de soğutma yükü konusunun ise ulusal literatürde daha çok çalışıldığını göstermektedir. Ancak uluslararası literatürde soğutma yüklerinin hesaplanmasına yönelik yeni yöntem önerilerinin geliştirildiği çalışmaların da ön planda olması, yalnızca soğutma yükünün ele alındığı çalışmaların oranını artıran bir etken olarak öngörülebilmektedir.



Şekil 6. Ulusal ve uluslararası literatürdeki yayınların soğutma yükünü ele alma biçimine göre karşılaştırılması.

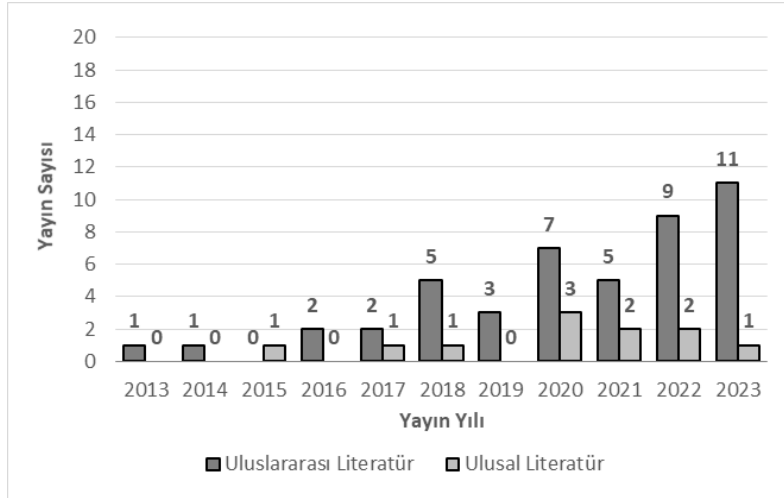
### 3.3 Programlama Dilleri Kullanma Durumuna Göre Literatürlerin Karşılaştırılması

Çeşitli programlama dillerinin ve yapay zeka destekli yeni yöntemlerin kullanılma oranı açısından literatürler değerlendirildiğinde, programlama dillerinin kullanıldığı çalışmaların oranı ulusal literatürde %31, uluslararası literatürde %38'dir. Dolayısıyla ulusal literatürde programlama dili kullanmayan çalışmaların oranı, uluslararası literatürden daha fazladır (Şekil 7). Buradan hareketle ulusal düzeyde programlama dilleri kullanılarak yapılan çalışmaların uluslararası literatürün gerisinde kaldığı açıkça görülmektedir.



**Şekil 7.** Ulusal ve uluslararası yayınların programlama dilleri kullanma durumuna göre karşılaştırılması.

Programlama dilleri kullanılarak ulusal ve uluslararası alanda yürütülen çalışmaların yıllara göre sayısı ise Şekil 8'de gösterilmektedir. Buna göre uluslararası literatürde programlama dilleri kullanılan çalışmaların sayısında genel olarak bir artış olduğu görülebilirken aynı durum ulusal literatür için geçerli değildir. Dolayısıyla ulusal literatürde binalarda soğutma yükü konularında çeşitli programlama dillerinin ve yenilikçi yöntemlerin kullanılması noktasında eksiklikler olduğu söylenebilmektedir.



**Şekil 8.** Programlama dillerini kullanan ulusal ve uluslararası literatürdeki yayın sayılarının yıllara göre karşılaştırılması.



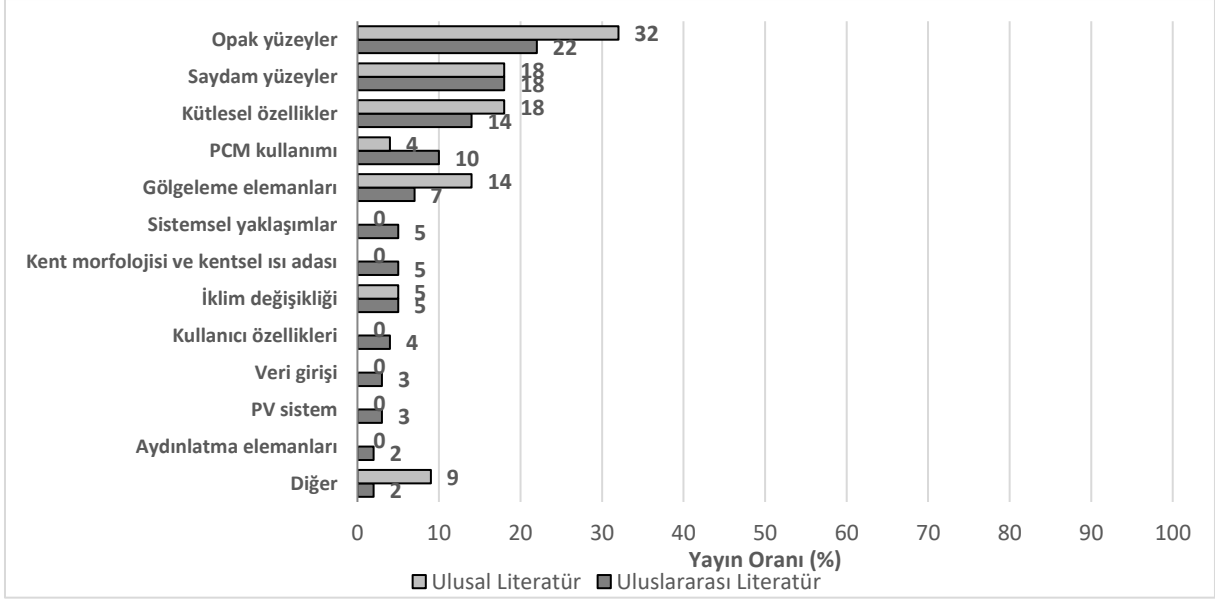
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 3.4 Ele Alınan Etki Parametrelerine Göre Literatürlerin Karşılaştırılması

Ulusal ve uluslararası literatür; fiziksel, sosyal ve mühendislik/tasarımla ilgili çeşitli parametrelerin bina soğutma yükü üzerindeki etkilerinin incelendiği ve parametreler üzerinden çeşitli optimizasyon uygulamalarının yürütüldüğü çalışmalar açısından da değerlendirilmiştir. Buna göre ulusal ve uluslararası literatürde en çok ele alınan parametre, duvar ve yalıtım malzemelerini, malzemelerin yansıtıcılığını ve cepheyle ilgili faktörleri içeren “opak yüzeyler” parametresidir. “Opak yüzeyler parametresi”, ulusal literatürde uluslararası literatüre kıyasla daha çok çalışılmıştır. Bu durum, ulusal düzeyde ısıtma yükleriyle ilgili olarak, standarda dayalı yalıtım uygulamalarının zorunlu tutulmasıyla ilişkilendirilebilmektedir. En çok ele alınan ikinci parametre ise her iki literatürde de pencere/duvar oranı, cam özellikleri ve pencere boyutu gibi konuları kapsayan “saydam yüzeyler” parametresidir. Saydam yüzeylerin en çok çalışılan konulardan biri olması ise camla ilgili termal özelliklerin yapıda karşılaşılan ısı kazancını ve dolayısıyla soğutma yükünü doğrudan etkilemesiyle açıklanabilmektedir. Ulusal literatürde yönlenme ve yapı formu gibi faktörleri tanımlayan “kütlesel özellikler” parametresinin uluslararası literatüre kıyasla daha çok çalışıldığı saptanmıştır. Ancak ulusal literatürde PCM kullanımının soğutma yükü üzerindeki etkisini inceleyen çalışmalar uluslararası literatürün gerisinde kalmaktadır. (Şekil 9). Diğer yandan uluslararası literatürde çalışılan ancak ulusal literatürde ele alınmayan bazı konular olduğu da görülmektedir. Bu açıdan bakıldığında;

- Doğal havalandırma, evaporatif soğutma ve mekanik havalandırma gibi konuları kapsayan sistemsel yaklaşımlar,
- Kent morfolojisi ve kentsel ısı adası konularını içeren kentsel parametreler,
- Kullanıcıların davranışlarını ve fiziksel özelliklerini içeren kullanıcı özellikleri,
- Soğutma yükü hesabında kullanılan veri girişi
- PV sistemler ve
- Aydınlatma elemanları, uluslararası literatürde çalışılan ancak ulusal literatürde ele alınmayan başlıca konulardır.

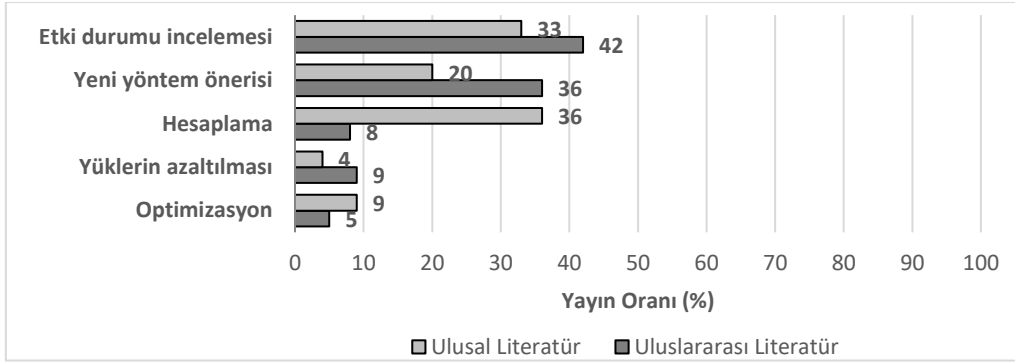


**Şekil 9.** Ulusal ve uluslararası literatürdeki yayınların kullandıkları etki parametrelerine göre karşılaştırılması.

### 3.5 Çalışmanın Amacına Göre Literatürlerin Karşılaştırılması

Bu karşılaştırmada, yayınlarda başlıklar ve çalışma amacının açıkça belirtildiği ifadeler dikkate alınmaktadır. Buna göre ulusal ve uluslararası alanda yapılan çalışmalar amaçlarına göre 5 başlık altında sınıflandırıldığında ulusal literatürde bulunan çalışmaların, %36 ile bir vaka çalışması olarak “bina soğutma yükünün hesaplanması” konusuna yoğunlaştığı görülmektedir. Buna karşın ulusal literatürde üzerinde en az durulan konu, binalarda soğutma yüklerinin azaltılmasını amaçlayan yaklaşımlardır. Diğer yandan uluslararası literatürde belirli parametrelerin soğutma yükü üzerindeki etki durumunun incelenmesine yönelik çalışmaların %42 ile en fazla çalışılan konu olduğu saptanmıştır. Ardından en çok ele alınan ikinci konu ise %36 ile soğutma yükü hesapları için yeni yöntem önerisinin geliştirilmesidir. (Şekil 10). Buradan hareketle uluslararası literatüre kıyasla ulusal düzeyde belirli parametrelerin soğutma yükü üzerindeki etkilerinin daha az ele alındığı ve soğutma yükü hesaplarına yönelik yeni yöntem önerilerinin daha az geliştirildiği çıkarımı yapılabilmektedir.

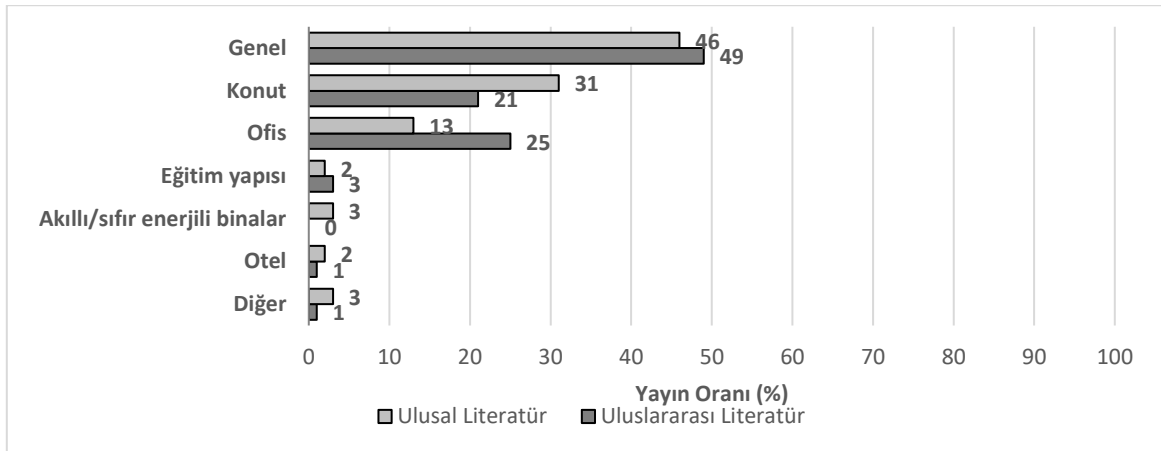




**Şekil 10.** Ulusal ve uluslararası literatürdeki yayınların çalışma amacına göre karşılaştırılması.

### 3.6 Ele Alınan Yapı Tipolojisine Göre Literatürlerin Karşılaştırılması

Ulusal ve uluslararası literatürde yer alan çalışmalar ele aldıkları yapı tipolojilerine göre incelendiğinde, çoğunlukla her iki alanda da özel bir bina tipolojisinin belirtilmediği görülmektedir. Dolayısıyla genel olarak tüm binaları kapsayan yaklaşımların sergilendiği çalışmaların oranı daha fazladır. Bununla birlikte ulusal literatürde konut tipolojisinin, uluslararası literatürde ise ofis tipolojisinin daha çok ele alındığı görülmektedir (Şekil 11). Bu durum, küresel ölçekte yapı stoğunun büyük bir bölümünü oluşturan binaların konutlar olmasıyla ve kullanıcıların zamanlarının çoğunu konutlarda geçirmesiyle ilişkilendirilebilmektedir. Diğer yandan ofis tipolojisinin de en çok ele alınan tipolojilerden olması, kullanıcı yoğunluğunun fazla olduğu ve iklimlendirme sistemlerinin en çok bulunduğu ortamlar olmasıyla açıklanabilmektedir. Ayrıca hem ulusal hem de uluslararası literatürde en az ele alınan tipolojilerin eğitim ve otel yapıları ile akıllı/sıfır enerjili binalar olduğu görülmektedir.



**Şekil 11.** Uluslararası ve ulusal literatürdeki yayınların ele aldıkları yapı tipolojisine göre karşılaştırılması.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 4. SONUÇ ve ÖNERİLER

İklim değişikliğine bağlı olarak artan sıcaklıklar, binalarda iç ortam sıcaklıklarını da artırmaktadır. Bu durum, gelecek iklim senaryoları açısından düşünüldüğünde uygun iç ortam koşulları elde edilebilmesi açısından çeşitli sistemlerin kullanımını gerekli kılmaktadır. HVAC sistemleri, binalarda iç ortam koşullarının uygun hale getirilmesi için kullanılan en yaygın yöntemlerden biridir. Artan hava sıcaklıkları bu sistemlere ve özellikle iç ortamın soğutulmasına duyulan ihtiyacı da artıracığından, enerji tüketimlerinin de bunlara paralel olarak artması beklenmektedir. Dolayısıyla binalarda artan soğutma yükünün ve enerji tüketimlerinin azaltılması, CO<sub>2</sub> emisyonlarının azaltılarak sürdürülebilir çevreler oluşturulması açısından önemlidir.

Ulusal ve uluslararası literatürde binalarda soğutma yükünü konu alan yayınların taranmasını, karşılaştırılmasını ve analiz edilmesini amaçlayan bu çalışmada, tarama sonucu elde edilen yayınlar 6 ana başlık altında sınıflandırılmıştır. Buna göre, iklim değişikliğine bağlı olarak gelişen sıcaklık artışlarının aksine ulusal düzeyde binalarda soğutma yüküne gereken önemin yeterince verilmediği görülmektedir. Diğer yandan ulusal literatürde bazı boşluklar olduğu saptanmıştır. Bu boşluklar:

- Ulusal literatürde yer alan yayınların, uluslararası alanda yapılan yayınlardan sayısal olarak ve yıllık artış bazında geride kalması,
- Ulusal literatürde yer alan çalışmaların programlama dillerini kullanma açısından uluslararası literatürü yakalayamaması,
- Sistemsel yaklaşımlar, veri girişi, PV sistemler ve aydınlatma elemanları gibi mühendislik/tasarımla ilgili parametrelerin, kentsel parametrelerin ve kullanıcı özelliklerini kapsayan sosyal parametrelerin bina soğutma yükleri üzerindeki etkilerinin ulusal literatürde ele alınmamış olması,
- Ulusal literatürde optimizasyonu amaçlayan çalışmaların, ulusal düzeyde diğer konuları amaçlayan çalışmaların gerisinde kalması,
- Ulusal literatürde etki durumu incelemesini ve yeni yöntem önerisini amaçlayan çalışmaların uluslararası literatürün gerisinde kalması
- Eğitim yapısı, akıllı/sıfır enerjili binalar ve otel gibi farklı yapı tipolojilerinin diğer tipolojilere oranla çok fazla çalışılmamış olması

şeklinde belirtilebilmektedir. Tüm bu boşlukların aynı zamanda binalarda soğutma yükünün ulusal alanda çalışılma potansiyelini de ifade ettiği söylenebilir. Diğer bir deyişle bu gibi



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

alanlarda ulusal düzeyde çalışmaların yapılması; uluslararası literatürün yakalanması, Türkiye özelinde iklim değişikliğine bağlı artan soğutma yükü konusuna gereken önemin verilmesi ve sürdürülebilir kalkınma hedeflerinin gerçekleştirilmesi açısından önem arz etmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ARCHAEO-VILLAGE AS A RURAL DEVELOPMENT STRATEGY

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#### ABSTRACT

Population decline is defined as an absolute decrease in the total population of an area-region caused by the migration process. Similarly, rural depopulation can be defined as migration from rural to urban areas, especially the migration of younger generations. The reasons for the population decline in rural areas may basically be defined as economic factors. Besides economic factors, social factors such as well-being or quality of life are also critical reasons. In this context, rural development models offer suggestions that will increase the quality of rural life in addition to economic strategies to prevent population decline. Within the scope of this study, the concept of archaeo-village is considered as a rural development model. The ancient city of Diocaesarea, located within the borders of Silifke, Mersin, is intertwined with the rural settlement of Uzuncaburç. The entire settlement is within the first and the third degree archaeological and natural protected area. Uzuncaburç rural settlement; It is an old village settlement developed above the ancient city of Diocaesarea. As a result, the strategy guide prepared for Mersin Metropolitan Municipality provides a trigger for the management and long-term planning of the area. These suggestions can be evaluated within the framework of sustainable tourism and rural development model.

**Keywords:** Uzuncaburç, Archaeo-Village, Rural Development



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

The ancient city of Diocaesarea, located within the borders of Silifke District of Mersin Province, is intertwined with the rural settlement of Uzuncaburç. The entire settlement is the 1st Degree Archaeological Protected Area and the 3rd Degree Archaeological and Natural Protected Area. The region, where monumental structures belonging to the ancient city are especially concentrated, is a 1st Degree Archaeological Site. Uzuncaburç rural settlement; It is an old village settlement developed above the ancient city of Diocaesarea. In the old village center, which has been in active use for more than a century, there are dense ancient building ruins such as sacred areas, temples, ceremonial gates, theatre, fountain building and ancient streets and traditional village houses, mosques, squares and fountains and different cultural areas. Historical and cultural continuity with the traditional village settlement has continued. Uzuncaburç rural settlement is one of the oldest historical villages in the region, with its traditional houses still preserved. Rural houses, among the traditional examples that reflect the construction technology and architectural features of the period, are remarkable with both their architectural plans and the woodwork inside. This shows that the same agricultural activities continue even though hundreds of years have passed. With this feature, Uzuncaburç is a very important rural/cultural landscape area.

Although the ancient city of Uzuncaburç has been opened to visitors as an archaeological site for many years, there are problems regarding the presentation of the site. A Site Plan has been prepared to solve such problems of the archaeological site. There are deficiencies in terms of quality of life for the local people as well as for the visitors in the settled village area, which is outside the services that can be accessed with paid entrance within the archaeological site itself. Considering the priority needs, there is a need for a high-capacity parking area for visitors. There is no visitor welcome center and service facilities. There are no services for visitors, including toilets. There are no walking paths, routes or information-guidance boards in the area. The archaeo-village project aims to develop the Uzuncaburç neighborhood as a whole, to carry out studies that will guide its protection and presentation, to ensure visitor management in areas outside the archaeological site, to develop a holistic conservation and visitor presentation strategy for the area, and to transform the area into an important tourism focus while preserving the archaeological heritage.



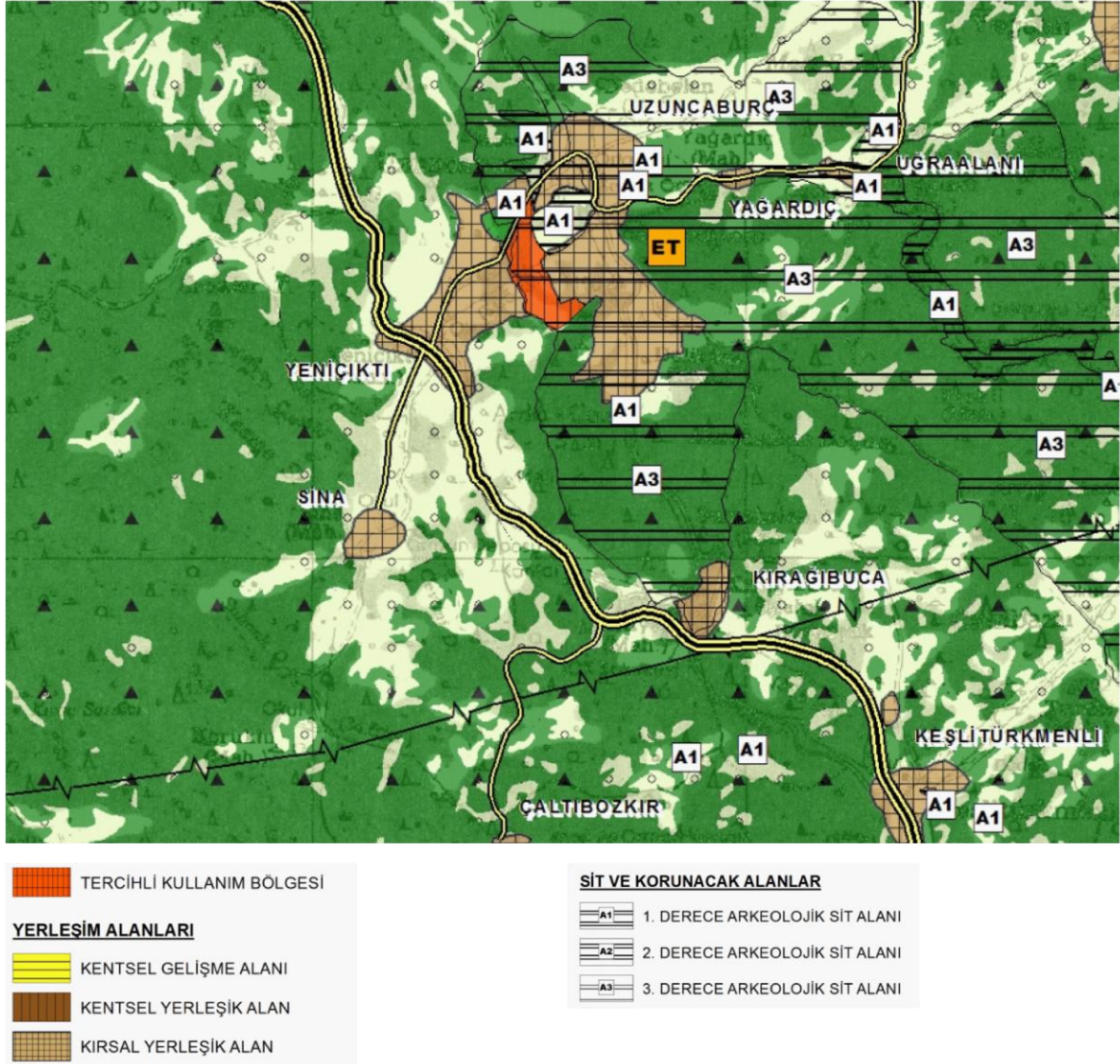
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### Existing Situation

Uzuncaburç plays the role of administrative and religious center of the region called Olba, which is located between Silifke and Erdemli and was ruled by a Priestly Kingdom Dynasty in the Hellenistic Period. It is thought that the ancient city developed within the framework of a plan focused on the Zeus Olbios Sanctuary, starting from the Hellenistic Period (Aydınöğlü and Belge, 2023). The existence of very important monumental buildings in the city has been known for many years (Keil-Wilhelm, 1931; 71-73). During the recent excavations carried out in the city, many finds were unearthed indicating that the magnificence of the city continued in the Late Antique Period. Data obtained during recent excavations provide evidence of a destruction that occurred approximately in the mid-7th century AD (Aydınöğlü and Uygun, 2023). This situation must be related to the Arab raids in the region. Excavations are continuing to understand the subsequent process.

In the current Mersin Adana Planning Region 1/100.000 Scale Environmental Plan, the residential area of Uzuncaburç District and its near surroundings are planned as "Rural Settled Area" and partly as "Preferential Use Areas/Region" (Figure 1). In the Environmental Plan, there are Forest Areas and Agricultural Areas around the settlement. The archaeological sites around the ancient cities of Uzuncaburç and Olba are shown schematically on the Regional Plan. When the boundaries of the area marked as rural settlement area are examined, it is seen that a much larger area than the current residential area is envisaged as rural settlement area. The plan proposed 5000-10000 that is very higher than current population, which is 889 people according to the 2021 Address-Based Population Registration System (TUIK, 2023) data.



**Figure 1.** 1/100.000 scaled Regional Plan (URL-1)

Uzuncaburç Conservation Plan was prepared by Uzuncaburç Municipality and approved by the decision of Adana Cultural and Natural Heritage Preservation Board dated 09.02.1999 and numbered 3300. Later, with the decision of Adana Preservation Board dated 31.01.2002 and numbered 4576, Uzuncaburç Conservation Plan Revision were revised. In the context of the archaeo-village project, it is seen that the conservation plan decisions do not develop binding and/or supportive definitions in terms of archaeo-village practices and the protection of the archaeological heritage. However, it is necessary to develop strategies to increase the spatial quality in the Uzuncaburç neighborhood simultaneously with ongoing scientific research and projects for the protection of the archaeological heritage. For this reason, strategies and





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

suggestions for new construction have been developed within the scope of the archaeo-village project.

The village center of Uzuncaburç neighborhood, which is evaluated within the scope of the archaeo-village project, basically consists of four sub-regions. The 1st Degree Archaeological Site, located in the middle of Uzuncaburç neighborhood and containing monumental archaeological heritage items, is the focal point within the archaeo-village project. The area includes the monumental Sanctuary of Zeus Olbios, the Temple of Zeus, the Temple of Tyche, the Propylon, the Nymphaion (Monumental Fountain), the Theater and the Street with Two Columns. In addition, there are 12 registered village houses within the area, which are considered as rural architectural heritage. These houses are being repaired and functionalized gradually. The four houses restored within the scope of the ongoing landscaping project will be used for souvenir sales units, cafe-security-WC and cinema-vision-meeting purposes.

The other sub-region to the north of the 1st Degree Archaeological Site is the Uzuncaburç residential area around the village square. In this area, the village square is the focal point for settlement. The village square is used as a marketplace once a week. There is a village cemetery to the east of the village square. When we consider the village square as the focus, the areas to the north, west and east of the square constitute the settled area of the village. These areas are also specified as residential areas in the current development plans. The development areas in the Conservation Plans are around the connection road between the Uzuncaburç village settlement area and the ancient city of Olba in the east, and around the Kırağıbucağı location connected to the Silifke Road. However, no evaluation has been made for this area, which lies outside the archaeo-village context. The areas outside the built environment within the Uzuncaburç residential area are largely used as vineyards and partly as orchards. There are also maquis areas in the area where agricultural activities are not carried out or cannot be carried out. Agricultural areas within the settled area continue to be used. Wine grapes are produced through vineyards. Additionally, sumac that grows naturally in the area is collected.

### **Strategies for Archaeo-Village**

As a result of the evaluation made on the spatial history of the settlement, planning history, conservation works carried out in the project area and its near surroundings, and the current status of the area, it was observed that character zones, which are critical for varying strategies, were formed within the borders of the project area. The areas within the Uzuncaburç residential



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

area and in the vicinity of the 1st Degree Archaeological Site need to be supported with social, economic and physical improvements within the archaeo-village.

The problem-potential analysis regarding the current situation of the area was decisive in the development of the Uzuncaburç archaeo-village project. Considering the locations of the basic uses of the village, such as the Yörük houses within the Uzuncaburç village settlement area, the old square within the ruins, and the public buildings used as excavation houses, the importance of ensuring the integrity between the ruins and the village settlement area comes to the fore. Uzuncaburç is a ruin known for its rural texture integrated with the archaeological heritage. For this reason, the site plan is not limited to intervention in archaeological monuments, but also envisages the protection and functionality of rural structures.

In this context, with the archaeo-village project, it is envisaged that interventions that will enrich the experiences of visitors in the area, as well as the preservation of the archaeological heritage, will be decisive in rural development. The archaeo-village project should not be considered merely as improving the quality of space for local people and visitors. The archaeo-village project should be considered as an economic model focused on social and local - rural development, aimed at raising awareness of the local people and informing visitors. Therefore, it is important to ensure cooperation, responsibility and role sharing between institutions and local actors (Figure 2). During the project design process, the basic needs and expectations of the local people were tried to be determined through meetings held between Mersin Metropolitan Municipality, Archaeological Excavation Team and Neighborhood's Headman. During the implementation phase, the cooperation model needs to be developed by taking into account the details included in the project packages.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus



**Figure 2.** Basic components of the Archaeo-Village Project

In this context, short-medium-long projects and strategies are carried out under 5 headings: 1. Priority Areas to be Intervened, 2. Transportation and Circulation, 3. Priority Structures to be Intervened, 4. Improving the Quality of Village Residential Area / Space and Urban Service, and 5. Visitor Management. <

### **CONCLUSION and RECOMMENDATIONS**

When projects at different scales and priorities are evaluated as a whole, the Uzuncaburç archaeo-village project should be evaluated as a rural development model together with activities related to the protection and management of archaeological heritage. In this context, the strategy guide provides an important start for the management and long-term planning of the area. In addition, with the increasing number of visitors, education and awareness-raising activities on sustainable tourism need to be carried out in the area. The development of village pensions and women producer markets should be supported within the framework of sustainable tourism and rural development model.

### **Thanks and Information Note**

The paper provides basic information and documents regarding the "Uzuncaburç Archaeo-Village Conservation Strategy Guide - Road Map" prepared with the contract signed between Mersin Metropolitan Municipality and Mersin University.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KAHRAMANMARAŞ SÜTÇÜ İMAM ÜNİVERSİTESİ TIP FAKÜLTESİNİN ELEKTRİK ENERJİSİ TÜKETİMİ VE PİYASA TAKAS FİYATLARI İLE DEĞERLENDİRİLMESİ

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#### ÖZET

Piyasa durumuna bakıldığında işletmecilerin geleceğe yönelik doğru adım atmaları oldukça önemli hale gelmiştir. Bu sebepten enerji sektöründe piyasa koşullarına adapte olmaları, üretimi planlı ve verimli kullanmaları PTF (Piyasa Takas Fiyatı) takibi ile artış göstermektedir. Piyasa Takas Fiyatı oluşumunda temel etken tüketici ve üreticilerin etkinlikleriyle arz talep doğrultusunda fiyatların işlenmesidir. Mevcut durumda ulusal olarak tek bir fiyat tipi işlese de büyük ölçekli tesis sahipleri ekonomik ve verimlilikte kar için PTF takibi güvenilirlik açısından önem arz etmektedir. Bu çalışmada Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi'ne ait elektrik enerjisi tüketim, fatura verileri sunulmuş Piyasa Takas Fiyatındaki değişimler göz önüne alınmış ekonomik açıdan etkisi ve enerji kaynakları ile PTF arasındaki ilişki gösterilmiştir. Detaylı bir tüketim ve elektrik enerjisi birim maliyetler arasında analiz gerçekleştirilmiştir.

**Anahtar Kelimeler:** Elektrik Enerjisi, PTF, Tüketim





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EVALUATION ON ELECTRICITY ENERGY CONSUMPTION OF KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY MEDICAL FACULTY AND MARKET ELECTRICITY PRICES

#### ABSTRACT

Considering the market situation, it has become very important for operators to take the right steps for the future. For this reason, their adaptation to market conditions in the energy sector and their planned and efficient use of production increases with the monitoring of MEP (Market Electricity Price). The main factor in the formation of the Market Electricity Price is the processing of prices in line with supply and demand through the activities of consumers and producers. Although currently a single price type operates nationally, MEP monitoring is important for large-scale facility owners in terms of reliability and economic and efficiency profits. In this study, electrical energy consumption and billing data of Kahramanmaraş Sütçü İmam University Faculty of Medicine are presented and the economic impact and the relationship between energy resources and MEP are shown, taking into account the changes in the Market Electricity Price. A detailed analysis was carried out between consumption and unit costs of electrical energy.

**Keywords:** Electric Energy, MEP, Consumption



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Gelişmekte olan ülkelerde nüfus artışı, yaşam koşullarının değişmesi, teknoloji ve sanayinin ilerlemesi enerji ihtiyacında artışa sebep olmaktadır. Bu ihtiyaç ve ihtiyacın karşılanabilme durumu ülkelerin ekonomik ve sosyal olarak gelişmişlik seviyeleriyle doğru orantılı olarak artış göstermektedir. Bu sebepten dolayı enerji tüketimi ve bununla beraber enerji üretimi ülkelerde kalkınmaya sebep olan etkenlerdendir. Tabi bu durumda tüketici ve üreticilerin enerji planlaması, kapasitesi doğru aktive edebilmesi işletmenin verimli yönetim ve işleyişi bakımından önem arz etmektedir.

İşletmede tüketimi karşılayacak olan ve üretilen enerji talep edilen fiyat seviyelerine göre ayarlandığında ekonomik açıdan kazanç sağlanabilir. Bunun beraberinde elektrik fiyatının aylık veya dönemlik doğru tahmini rekabetçi piyasa koşullarında önemli oranda kar sağlamaktadır. Üretim, tüketim veya başka amaçlarla sektörde olup elektrik fiyatlarından büyük oranda etkilenen işletmeler ticari olarak daha verimli hale gelmek ve kar arttırmak için elektrik fiyatının minimum kayıpta olması taraftarıdır (Ertaylan vd.,2021). Bu da PTF'nin doğru takibi ile mümkündür.

Gün öncesi piyasası (GÖP), bir sonraki günde teslim edilecek olan arz talep doğrultusunda ilerleyen, aktif elektrik piyasası ve dengesizlik uzlaştırması şeklinde gerçekleştirilen, elektrik enerjisi alış ve satışı için Epiaş tarafından yürütülüp organize edilen piyasadır (Web1, 2023).

Piyasa katılımcılarına enerji alış ve satış işlemleri ikili anlaşmalarla sağlanmaktadır. GÖP enerji piyasası için referans fiyat belirleyerek gün öncesinde dengelenmiş bir sistem sağlamaktadır ve GÖP'te oluşan elektrik referans fiyatı (Piyasa Takas Fiyatı-PTF) olarak kabul edilmektedir (Şenocak ve Kahveci, 2021). Piyasada, bu ikili anlaşmalarla elektrik satışı yapan katılımcılar için elektrik fiyatlarının tahmin edilmesi, anlaşmaların ticari değerini belirlerken, piyasa işletmecileri içinse elektrik fiyatlarının doğru tahmini, enerji üretim planlaması ve maliyeti konusunda yatırım kazanç durumlarını belirlemektedir. Bu sebepten enerji sektöründe santral planı olan şirketler için bu rakamlar önem arz etmektedir (Adalı, 2015).

Güneş enerji santrali gibi büyük ölçekli enerji üretim tesislerinin yatırım maliyeti biraz yüksektir fakat bu tesislerde verimin yüksek olmasından dolayı talepler de artış göstermektedir (Dinçer ve Odabaş, 2022). Bu tesisler kurulumundan sonra üretim yönetim ve planlamasını yaparken kar oranını artırmak için PTF'nin yüksek olduğu zaman diliminde üretim elde etmeyi amaçlar (İnal, 2022).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bu çalışmada Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi gerçek tüketim değeri grafiği ve bu tüketim için fatura bedeli değişim grafiği incelenmiştir. Son 2 yıla ait PTF aritmetik ortalama grafiği değerlendirilip kar oranını yükseltmek için hangi zaman dilimleri tercih edilebilir analiz ve bilgiler sunulmuştur.

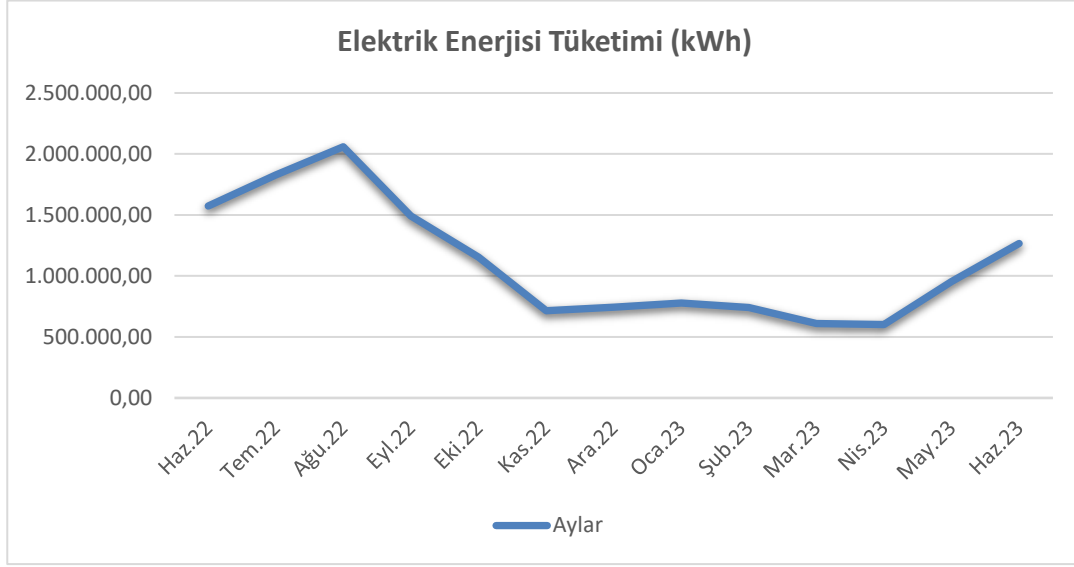
### MATERYAL ve YÖNTEM

Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi'nde medikal ekipmanların, bilgisayarların, sunucuların, aydınlatma, iklimlendirme gibi sistemlerin etki ettiği bir yıllık elektrik enerjisi tüketim verileri Tablo 1'de gösterilmiştir. Verilen tablo incelendiğinde elektrik enerjisi tüketim değerlerinin yaz ve kış aylarında değişkenlik gösterdiği görülmektedir. Elektrik enerjisi tüketimi en yüksek değeri 2.058.884,00 kWh ile Ağustos (2022) ayında, en düşük değeri ise 601.652,40 kWh ile Nisan (2023) ayında görmüştür.

Elektrik enerjisi tüketimi yaz aylarında yüksekken kış aylarında bu değer daha düşük olduğu anlaşılmaktadır. Ek olarak, Şekil 1'de tıp fakültesi için elektrik enerji tüketim değerlerinin aylara göre değişimleri grafiksel gösterimi verilmiştir.

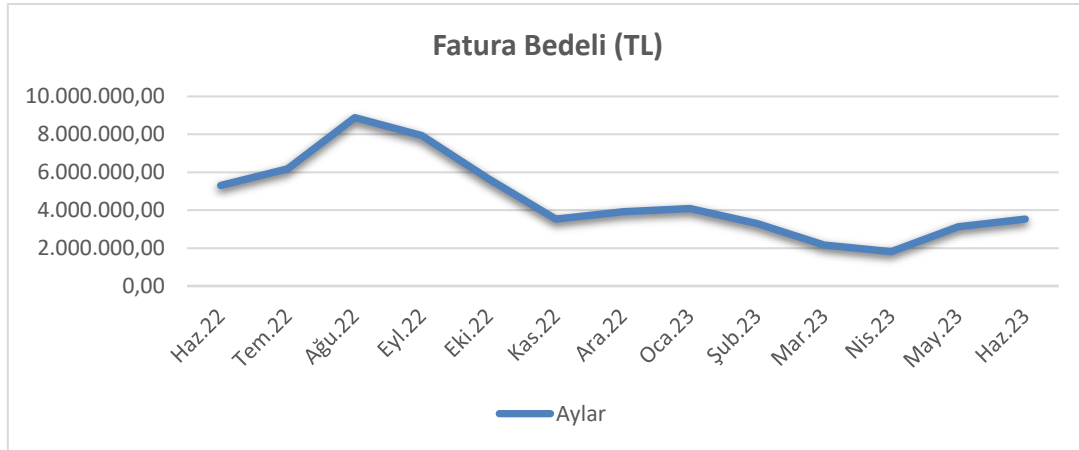
**Tablo 1.** Tıp Fakültesi için Elektrik Enerji Tüketim Değerlerinin Aylara Göre Dağılımı

Ay	Elektrik Enerjisi Tüketimi (kWh)
Haziran-2022	1.573.213,80
Temmuz-2022	1.828.845,10
Ağustos-2022	2.058.884,00
Eylül-2022	1.492.559,70
Ekim-2022	1.153.597,20
Kasım-2022	715.495,50
Aralık-2022	744.247,80
Ocak-2023	777.595,50
Şubat-2023	742.433,10
Mart-2023	609.856,50
Nisan-2023	601.652,40
Mayıs-2023	954.042,30
Haziran-2023	1.266.246,60
<b>Toplam</b>	<b>14.518.669,50</b>



**Şekil 1.** Tıp Fakültesi için Elektrik Enerji Tüketim Değerlerinin Aylara Göre Değişimleri Grafikselsel Gösterimi

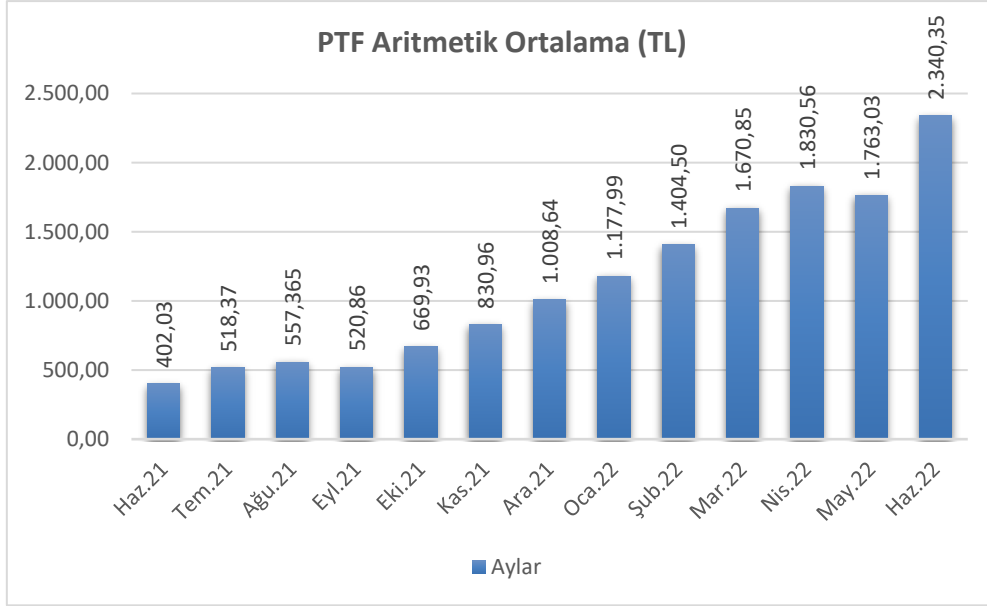
Aşağıda son bir yıllık elektrik enerjisi tüketimine bağlı olarak fatura bedeli değerleri incelenmiştir. Fatura bedeli en yüksek değeri 8.881.538,33 TL ile Ağustos (2022) ayında, en düşük değeri ise 1.811.368,47 ile Nisan (2023) ayında görmüştür.



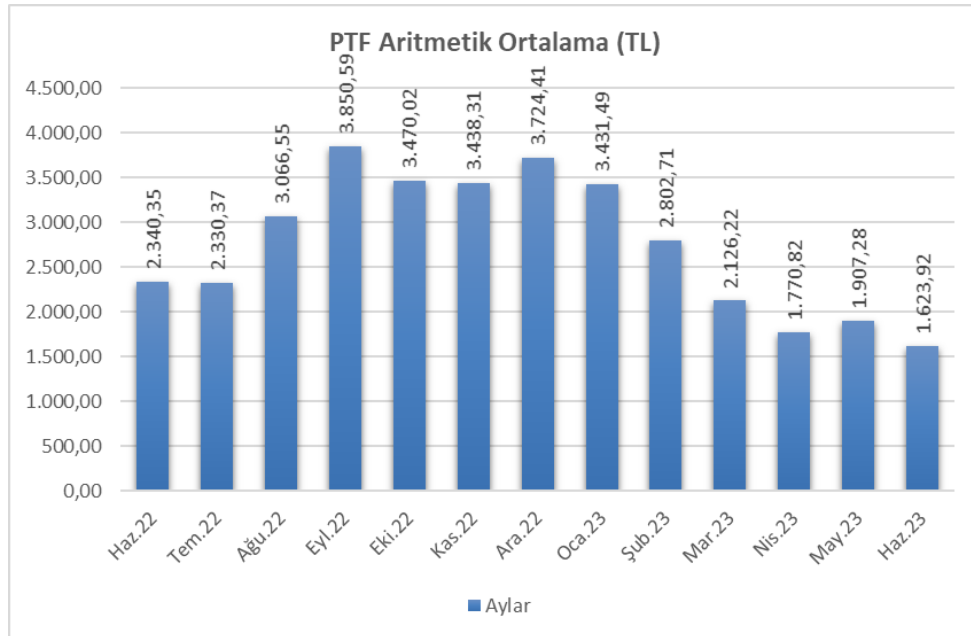
**Şekil 2.** Tıp Fakültesi için Fatura Bedeli Değerlerinin Aylara Göre Değişimleri Grafikselsel Gösterimi

Gün Öncesi Piyasası'nda arz talep doğrultusunda gerçekleşen alış ve satış teklif miktarlarının kesiştiği noktadan oluşan PTF, TL/MWh olarak enerji takas fiyatını belirlemektedir. Aşağıda şekil 3 ve 4'te PTF aritmetik ortalama grafiği verilmiştir. Şekil 3, Haziran 2021-Haziran 2022 arasında EPIAŞ bünyesinde elektrik fiyatlarının aya ait ortalaması alınarak oluşturulan PTF

grafığı incelendiğinde PTF fiyatlarının giderek artış gösterdiği görülmektedir. Haziran (2021) ayında en düşük değeri 402,03 TL ile görünürken en yüksek değeri 2.340,35 TL Haziran (2022) ayında görmüştür. Şekil 4'te Haziran 2022-Haziran 2023 PTF aritmetik ortalama grafığı incelendiğinde PTF en yüksek değeri 3.850,59 TL ile Eylül(2022) ayında en düşük değeri ise Haziran (2023) 1.623,917 TL ile görmüştür.



Şekil 3. Haziran 2021-2022 PTF Aritmetik Ortalama Değerlerinin Aylara Göre Değişimi (Web1, 2023)



Şekil 4. Haziran 2022-2023 PTF Aritmetik Ortalama Değerlerinin Aylara Göre Değişimi (Web1,2023)





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SONUÇ ve DEĞERLENDİRME

PTF aritmetik ortalama değeri ile enerji kaynakları tüketim ve üretim miktarı arasında doğrudan ilişki olduğu ve bunlardaki azalma ve artışların direkt olarak fiyata etki ettiği, değişen piyasa fiyatlarına bakıldığında artan PTF ile üretimin fazla olduğu dönemde gelir de artış gösterirken üretimin düşük olduğu dönemlerde gelirden azalma olacağı söylenebilir. İşletme sahibi piyasa katılımcılarının GÖP’de işlem yaparken PTF’yi takip edebilmeleri ve doğru tahminlerle adım atabilmeleri, işletme karlılıkları, kazanç ve üretim planlamaları açısından büyük bir avantajlar sağlamaktadır. Bu çalışmada Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi’ne ait elektrik enerjisi tüketim, fatura verileri sunularak Piyasa Takas Fiyatındaki değişimler göz önüne alınıp ekonomik açıdan etkisi ve enerji kaynakları ile PTF arasındaki ilişki gösterilmiştir. Detaylı bir tüketim ve elektrik enerjisi birim maliyetler arasında analiz gerçekleştirilmiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KAHRAMANMARAŞ SÜTÇÜ İMAM ÜNİVERSİTESİ TIP FAKÜLTESİ ELEKTRİK ENERJİSİ İHTİYACI İÇİN GÜNEŞ ENERJİ SANTRALİ TASARIMI VE SİMÜLASYONU

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#### ÖZET

İnsan hayatında elektrik enerjisine ihtiyaç her alanda vardır ve bu ihtiyaç artış göstererek devam etmektedir. Bununla birlikte elektrik enerjisi ihtiyacının getirdiği sorunlar da artış göstermektedir. Fosil yakıtların zararları, küresel ısınma, çevrenin korunması, insan yaşamı için tehdit oluşturabilecek sorunların azaltılmak istenmesi ve artan elektrik enerjisi tüketim ihtiyacı temiz, stabil ve ekonomik olan yenilenebilir enerji kaynaklarına yönelimi gerekli hale getirmiştir. Bu yenilenebilir enerji kaynaklarından en önemli olanlardan birisi de güneştir. Bu çalışmada Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi elektrik enerjisi tüketiminin güneş enerjisi ile sağlanabilmesi için bir tasarım ve analiz gerçekleştirilmiştir. Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi bir yıllık toplam elektrik enerjisi tüketim miktarı 14.518.669,50 kWh/yıl'dır. Bu tüketim için 7.997,33 kWp/6400 kWe bir güneş enerji santrali tasarımı yapılmış olup bu tesise ait performans oranı, kayıp, üretim ve enerjisi hakkında detaylı bir analiz gerçekleştirilmiştir.

**Anahtar Kelimeler:** Güneş Enerjisi, Fotovoltaik, Kahramanmaraş



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY FACULTY OF MEDICINE SOLAR POWER PLANT DESIGN AND SIMULATION FOR ELECTRICAL ENERGY NEEDS

#### ABSTRACT

There is a need for electrical energy in every area of human life, and this need continues to increase. However, the problems caused by the need for electrical energy are also increasing. The harms of fossil fuels, global warming, environmental protection, the desire to reduce problems that may pose a threat to human life, and the increasing need for electrical energy consumption have made it necessary to turn to clean, stable and economical renewable energy sources. One of the most important of these renewable energy sources is the sun. In this study, a design and analysis was carried out to provide electrical energy consumption of Kahramanmaraş Sütçü İmam University Faculty of Medicine with solar energy. The annual total electrical energy consumption of Kahramanmaraş Sütçü İmam University Faculty of Medicine is 14,518,669.50 kWh/year. For this consumption, a 7,997.33 kWp/6400 kWe solar power plant was designed and a detailed analysis was carried out on the performance rate, loss, production and energy of this facility.

**Keywords:** Solar Energy, Photovoltaic, Kahramanmaraş



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Gelişen teknoloji, yaşam standartlarının değişmesi, toplum ve ekonomik koşullardaki ilerlemeler, elektrik enerjisi üretim ve tüketimine olan ihtiyacı artırmıştır. Bununla birlikte fosil yakıt rezervlerindeki azalma, karbondioksit salınımına getirilen kısıtlamalar, çevrenin korunması, doğal dengeyi bozabilecek olumsuzlukların engellenmesi yenilenebilir enerji kaynaklarına kullanılmasını gerekli hale getirmiştir. Güneş enerjisinden elektrik enerjisi elde edilmesi yenilenebilir, stabil, temiz olması nedeniyle rağbet görmeye başlamıştır. Aynı zamanda taşınabilir, istenilen boyutlarda tasarlanıp kurulabilir. Elektrik enerjisi ihtiyacı kadar projelendirilebilir konumdadır.

Güneş enerjisinden elektrik enerjisi elde edilmesi fotovoltaik (PV) adı verilen güneş panelleri ile sağlanmaktadır. Fotovoltaik, yüzeyindeki yarı-iletken madde aracılığıyla güneş ışınlarını oluşturan fotonları yakalayıp fotonları absorbe ederek elektronların hareketi ile bir elektrik akımı oluşturur ve böylece elektrik enerjisine dönüştürür (Dai ve ark., 2023; Mu ve ark., 2023). Güneş enerjisinden elektrik enerjisi üretimi konusunda literatürde çok sayıda çalışma bulunmaktadır. Bu çalışmalardan bazılarında yer verilmiştir. Yazıcı 2021 yılında yaptığı çalışmada, İstanbul'da bir güneş enerjisi santral kurulumu ve bu santralin enerji üretimine dair güvenilirlik analizi yapmıştır. Tasarım bir simülasyon programında çalıştırılmış güneş enerjisine ait üretim bilgileri incelenmiştir ve bu sistemin bağlanacağı enerji şebekesine dair güvenilirlik analizi de aylık olarak yapılmış ve değerler incelenerek GES'in sisteme olan etkisi görülmüştür (Yazıcı, 2021). Boyekin 2020 yılında yaptığı çalışmada, elektrikli araç için şarj istasyonu ile bağlantılı çatı üzeri GES kurulumu ve üretim değerlerini analiz etmiştir. GES projesinin sahadan alınan gerçek verileri ve PVsyst ile PVSOL programlarında simülasyon tahmin sonuçları, üretim verileri ve maliyet açısından karşılaştırılmıştır, önerilerde bulunulmuştur (Boyekin, 2020). İşler 2020 yılında yaptığı çalışmada, şebeke bağlantılı depolamasız güneş enerji sistemlerini performans ve verim açısından incelemiştir. Kahramanmaraş ilinde bulunan güneş enerjili Telekomünikasyon sistemini gözlemleyip üretim ve enerji değerleri analiz edilmiştir (İşler, 2020). Kutluca 2020 yılında yaptığı çalışmada Kırklareli ili Vize ilçesinde 960 Wp kurulu güce sahip, şebekeden bağımsız GES verileri ile FV sistemlerin performans ve verimliliğini ele almıştır. Bu güneş enerji santralinin PVsyst ve PVSOL programları ile benzetimi yapılarak, mevcut değerlerle karşılaştırma yapılmıştır. Bunun neticesinde GES performans ve verimini etkileyen parametreler tespit edilmiştir (Kutluca, 2020). Çelebi 2019 yılında sanayi işletmeleri için çatı uygulamalı GES projelendirmesi üstüne





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

çalışmıştır. Bu çalışmada Adıyaman ilindeki Kahta Organize Sanayi bölgesinde faaliyet gösteren 177 kwp'lik bir güneş enerji santralinin PVsyst programıyla benzetimi yapıp analiz edilen teorik değerlerle ölçümü yapılan gerçek zamanlı değerler karşılaştırılmıştır (Çelebi, 2019).

Güneş enerji yatırımları bakım ve işletme gibi maliyetleri bakımından düşük olmasına karşın güneş panellerinin maliyeti biraz yüksektir fakat güneş enerji santrallerinde verimin yüksek olmasından dolayı güneş enerjisi yatırımına talep yüksektir. Bu sebepten yatırımın tasarım sürecinde güneş enerjisi sisteminin kurulacağı bölge, teknoloji, sistem gelir ve giderini göz önüne almakta fayda vardır (Dinçer ve Odabaş, 2022). Güneş enerjisinden elektrik enerjisi üreten bir PV sistem tasarlanırken üreticiye tüketim değerine karşılık elde edeceği üretim değeri ve bu tesisin geri dönüşüne dair bilgilendirmeler planlama aşamasında oldukça önem arz etmektedir. Fizibilitelemesi iyi yapılmış olan projeler kurulum zamanı sonrasında da elektrik enerjisi üretim performansı açısından daha iyi olur. Bu sebepten analiz ve tasarım için literatürde belirli simülasyon programları mevcuttur. Yaygın olarak kullanılan programlar; PVsyst, Homer, RETScreen, PVGIS, PVSOL Expert vb. şeklindedir. Bu yazılımlar güneş enerji santrali tasarımında finansal değerleri, sistemin çalışma durumunu, gölgelenme durumunu, verim hesaplamaları gibi birçok raporu görme imkanı da sunarken; kurulum aşamasında sistem verimliliğinin yüksek olması, kayıp ve sapmaların az olması gibi durumlarda bize sunduğu verilerle yol gösterici ve kolaylaştırıcıdır (Dinçer ve Odabaş, 2022).

PVsyst mimarlar, mühendisler ve araştırmacılar tarafından kullanılmak üzere tasarlanmıştır. Aynı zamanda çok yararlı bir eğitim aracıdır. Kullanılan prosedürleri ve modelleri açıklayan ayrıntılı bir bağlamsal Yardım menüsü içerir ve bir proje geliştirme kılavuzuyla birlikte kullanıcı dostu bir yaklaşım sunar. PVsyst, birçok farklı kaynaktan meteoroloji verilerinin yanı sıra kişisel verileri de içerebilmektedir (Web1, 2023). Bu çalışmada, Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi gerçek tüketim değerlerine ait bir yıllık veri grafiği sunulmuştur ve bu tüketimi karşılayacak GES tesisi simülasyon programında tasarlanmıştır. Bu çalışmada PVsyst demo programı kullanılmıştır. Santrale ait kazanç ve kayıp hakkında bilgiler sunulup sonuçlar analiz edilmiştir ve değerlendirilmiştir.

### **MATERYAL ve YÖNTEM**

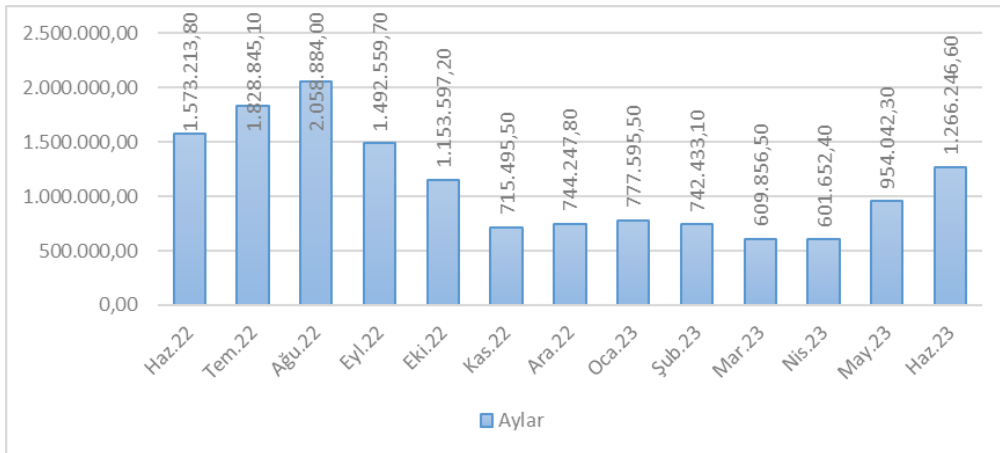
Güneş enerji santrali tasarımında kurulması planlanan tesis kadar, santralin yapılacağı lokasyon da oldukça önem arz etmektedir. Arazinin jeolojik yapısı, eğimi, güneş potansiyeli, toprak yapısı kurulacak tesisin verim ve maliyetini etkilemektedir.

Bu çalışmada Kahramanmaraş ili Onikişubat ilçesi Kahramanmaraş Sütçü İmam Üniversitesi sınırlarında güneş enerji santrali simülasyon tasarımı yapılmıştır. Bu alandaki lokasyon verilerine bakıldığında seçilen yerin enlemi  $37^{\circ}35'28''K$ , boylamı  $36^{\circ}49'28''D$ , yüksekliği 505 mt'dir. Şekil 1'de güneş enerji santralinin kurulduğu lokasyon gösterilmiştir.



Şekil 1. Tesisin kurulduğu lokasyon (Web 2,2023)

Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesinde medikal ekipmanların, bilgisayarların, sunucuların, aydınlatma, iklimlendirme gibi sistemlerin etki ettiği bir yıllık elektrik enerjisi tüketim verileri grafiği Şekil 2'de gösterilmiştir. Verilen grafik incelendiğinde elektrik enerjisi tüketim değerlerinin yaz ve kış aylarında değişkenlik gösterdiği görülmektedir. Elektrik enerjisi tüketimi en yüksek değeri 2.058.884,00 kWh ile Ağustos ayında, en düşük değeri ise 601.652,40 kWh ile Nisan ayında görmüştür. Elektrik enerjisi tüketimi yaz aylarında yüksekken kış aylarında bu değer daha düşük olduğu anlaşılmaktadır.

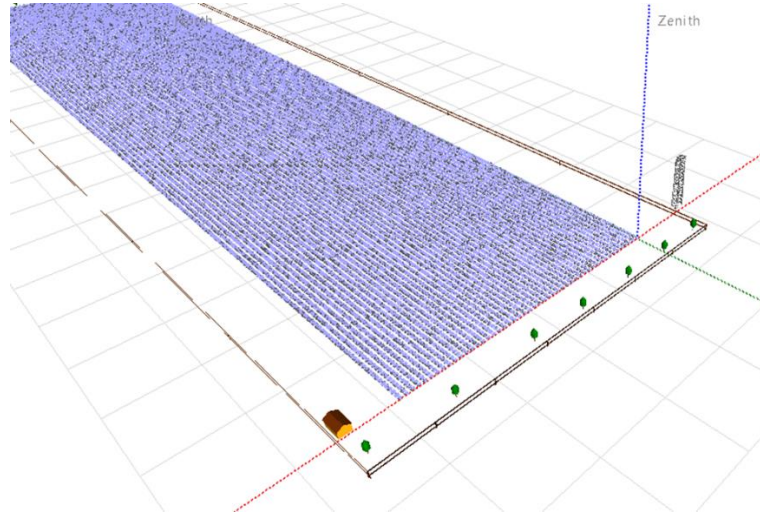


Şekil 2. Tıp Fakültesi Elektrik Enerjisi Tüketim Değerlerinin Aylara Göre Dağılımı (kWh)

Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi bir yıllık toplam elektrik enerjisi tüketim miktarı 14.518.669,50 kWh/yıl'dır. Bu çalışmada, Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi tüketim verilerini karşılayacak şebeke bağlantılı fotovoltaik sistemin benzetimi, analiz ve sonuçların sunumu için simülasyonda tasarım ve değerlendirme yapılmıştır.

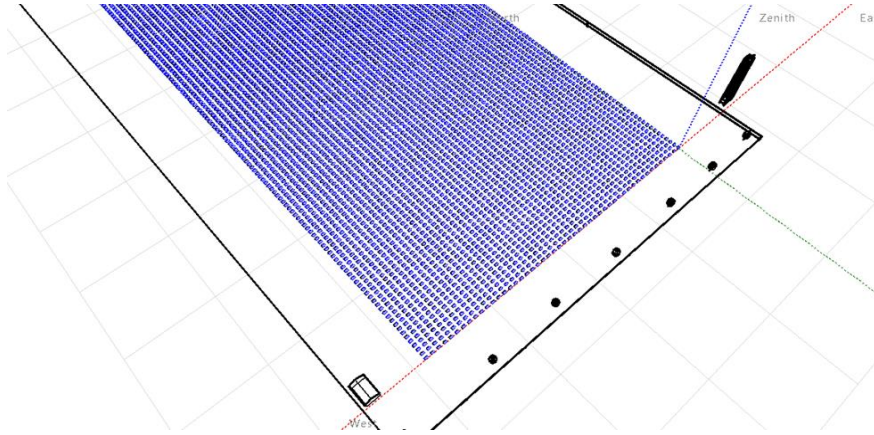
### **SANTRAL TASARIMI**

Tüketim değerlerine göre santralin tasarım ve planlaması gerçekleştirilmiştir. Belirlenen lokasyona göre projelendirme gerçekleştirilmiştir. Şekil 3'te verilen ekrandan panellerin açıları seçilmektedir. Hesaplama sonucunda kullanıcı açıyı girebilir veya program en iyi eğim açısını kendisi belirleyebilir. Bu ekran Şekil 4'te verilmiştir. Bu sayfa ayarları kullanılarak sistem için uygun yıllık, yaz ya da kış mevsim durumu belirlenir. Bu ayarda sistem kayıp sıfır olana kadar eğim açısı değiştirilir. Arazi tipi olarak tasarımı yapılan güneş enerji santralinin PVsyst simülasyon programında farklı açılardan görünümü aşağıda verilmiştir. Tasarlanan santralin program üzerindeki görünümü Şekil 3-6'de gösterilmiştir.

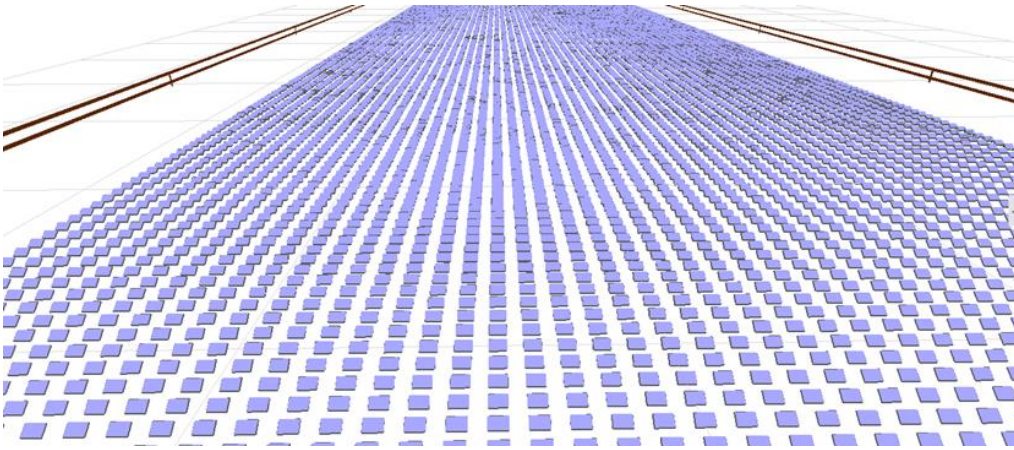


**Şekil 3.** Tasarlanan santralin program üzerindeki güneybatı yönünden görünümü

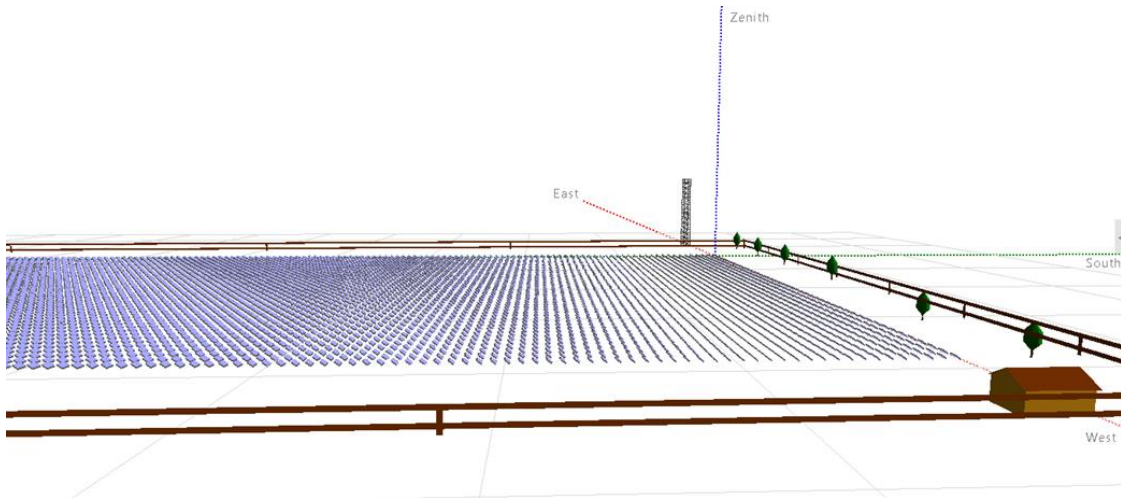




**Şekil 4.** Tasarlanan santralin program üzerindeki üstten görünümü



**Şekil 5.** Tasarlanan santralin program üzerindeki güney yönünden görünümü



**Şekil 6.** Tasarlanan santralin program üzerindeki batı yönünden görünümü



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### BULGULAR ve TARTIŞMA

Bu çalışmada PVsyst demo programı kullanılarak tasarımı yapılan güneş enerji santraline ait kayıp, gölgeleme durumu, performans gibi durumlar hakkında bilgi verilmiştir. Bu çalışma kapsamında Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi gerçek tüketim değerlerine bakılarak arazi tipi tesis tasarlanmıştır. Tasarlanan sisteme ait genel parametreler ve PV dizi karakteristikleri Şekil 7’de verilmiştir. Tasarım yerleşiminde panel olarak CW Enerji firmasına ait CWT545 - 108PM12 modülü 14674 adet kullanılmıştır. Program seçimlerini maksimize edebilmesi için uygun evirici Hopewind firmasına ait HPSP0800-CC olarak 8 adet kullanılmıştır. Şekil 8’de tesise ait parametreler detaylı olarak verilmektedir.

Project summary			
<b>Geographical Site</b> Kahramanmaraş Turkey	<b>Situation</b> Latitude Longitude Altitude Time zone	37.58 °N 36.93 °E 561 m UTC+3	<b>Project settings</b> Albedo 0.20
<b>Meteo data</b> Kahramanmaraş NASA-SSE satellite data 1983-2005 - Synthetic			

System summary			
<b>Grid-Connected System</b>	<b>Sheds on ground</b>		
<b>PV Field Orientation</b> Fixed plane Tilt/Azimuth 37 / 0 °	<b>Near Shadings</b> Linear shadings		<b>User's needs</b> Unlimited load (grid)
<b>System information</b>		<b>Inverters</b>	
<b>PV Array</b> Nb. of modules Pnom total	14674 units 7997 kWp	Nb. of units Pnom total Pnom ratio	8 units 6400 kWac 1.250

Şekil 7. Tasarlanan sistem için simülasyon parametre değerleri



General parameters			
<b>Grid-Connected System</b>		<b>Sheds on ground</b>	
<b>PV Field Orientation</b>		<b>Sheds configuration</b>	
Orientation		Nb. of sheds	14674 units
Fixed plane		<b>Sizes</b>	
Tilt/Azimuth	37 / 0 °	Sheds spacing	2.50 m
		Collector width	1.30 m
		Ground Cov. Ratio (GCR)	52.0 %
		<b>Shading limit angle</b>	
		Limit profile angle	28.2 °
<b>Horizon</b>		<b>Near Shadings</b>	
Average Height	17.7 °	Linear shadings	
		<b>User's needs</b>	
		Unlimited load (grid)	
		<b>Models used</b>	
		Transposition	Perez
		Diffuse	Perez, Meteorom
		Circumsolar	separate

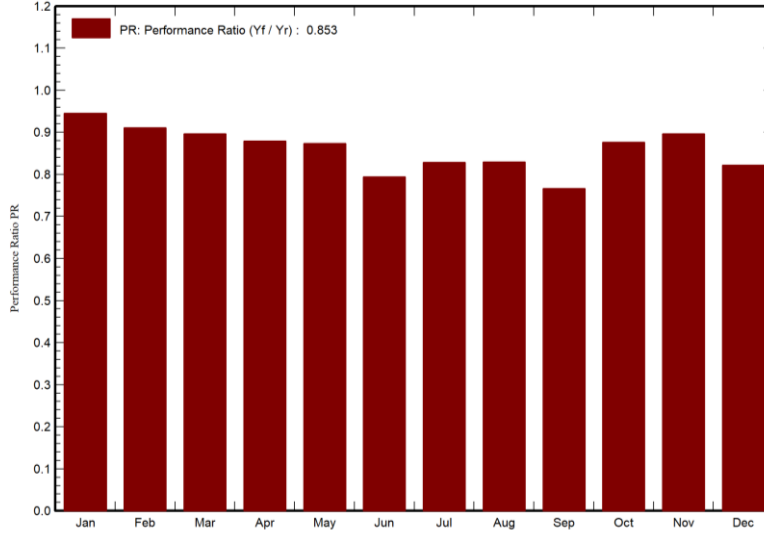
PV Array Characteristics			
<b>PV module</b>		<b>Inverter</b>	
Manufacturer	CW Enerji	Manufacturer	Hopewind
Model	CWT545 - 108PM12	Model	HPSP0800-CC
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	545 Wp	Unit Nom. Power	800 kWac
Number of PV modules	14674 units	Number of inverters	8 units
Nominal (STC)	7997 kWp	Total power	6400 kWac
Modules	638 Strings x 23 In series	Operating voltage	500-900 V
<b>At operating cond. (50°C)</b>		Max. power (=>25°C)	840 kWac
Pmpp	7294 kWp	Pnom ratio (DC:AC)	1.25
U mpp	651 V		
I mpp	11196 A		
<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	7997 kWp	Total power	6400 kWac
Total	14674 modules	Number of inverters	8 units
Module area	37571 m <sup>2</sup>	Pnom ratio	1.25
Cell area	34945 m <sup>2</sup>		

**Şekil 8.** Tasarlanan santral için elektriksel özellikler ve PV dizi karakteristik değerleri

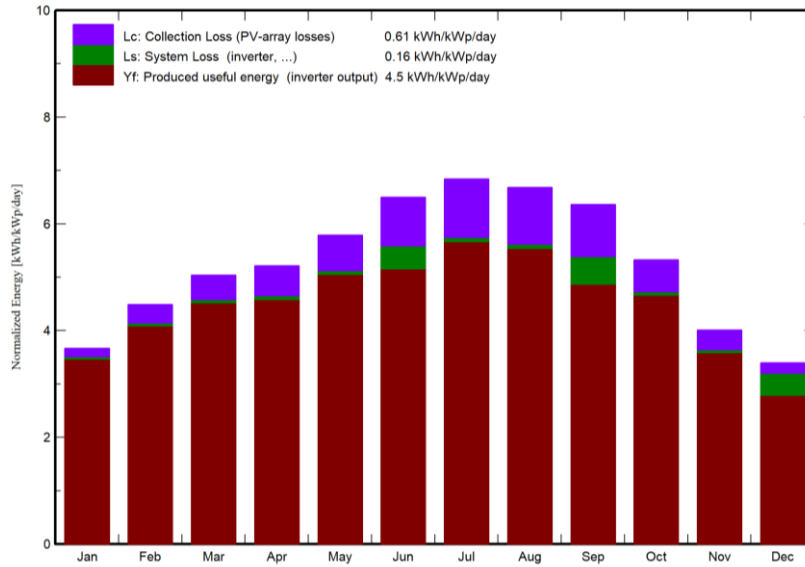
Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi için tasarlanan arazi tipi güneş enerji santralinde PV gücü 7.997,33 kWp, AC gücü 6400 kWe'dir. Sistemin tasarlanmasının ardından elde edilen sonuçlara göre PV santralin aylara göre performans oran dağılımları Şekil 9'da gösterilmektedir. Ayrıca Şekil 10'da normalize edilmiş sonuçlar da verilmiştir. Elde edilen sonuç grafikleri incelendiğinde en yüksek performans değerinin Ocak ve Kasım aylarında olduğu, en düşük performans oranının ise Haziran ve Eylül aylarında olduğu Şekil 9'da görülmektedir. Şekil 10'da normalleşmiş üretim grafiği incelendiğinde en fazla kullanılabilir enerjinin olduğu aylar Temmuz ve Ağustos ayları iken tahsilat kaybının en fazla olduğu dönem yine bu aylardadır. Sistem kayıp durumuna bakıldığında ise bu aylarda kaybın az olduğu söylenebilir. Kullanılabilir enerjinin en az olduğu Aralık ve Ocak aylarında ise tahsilat kaybı az olurken, sistem kaybı Aralık ayında yüksek Ocak ayında ise az olduğu söylenebilir.

Tablo 1'de Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi gerçek tüketim değerlerinin, simülasyon programının sunduğu üretilen enerjinin ve mahsuplaşma miktarının

bulunduğu tablo verilmiştir. Buradan toplam üretimin tüketimi karşılama oranını bulunacak olursa bu değerin  $13.436.031 \text{ kWh} / 14.518.669,5 \text{ kWh} = 0.925(\%93)$  olduğu söylenebilir.



Şekil 9. Tasarlanan santralin aylara göre performans oranı dağılımı



Şekil 10. Tasarlanan santralin aylara göre normalize edilmiş dağılımı



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 1.** Tasarlanan santral için tüketim, üretim ve mahsuplaşma değerleri ve aylara göre dağılımları

Aylar	Tüketim Miktarı (kWh)	Üretim Miktarı (kWh)	Mahsuplaşma Sonucu (kWh)
<b>Haziran</b>	1.573.213,80	1.274.740	-298.473,8
<b>Temmuz</b>	1.828.845,10	1.557.973	-270.872,1
<b>Ağustos</b>	2.058.884,00	1.526.749	-532.135
<b>Eylül</b>	1.492.559,70	1.244.152	-248.407,7
<b>Ekim</b>	1.153.597,20	1.123.790	-29.807,2
<b>Kasım</b>	715.495,50	843.154	+127.658,5
<b>Aralık</b>	744.247,80	763.678	+19.430,2
<b>Ocak</b>	777.595,50	840.325	+62.729,5
<b>Şubat</b>	742.433,10	898.851	+15.6417,9
<b>Mart</b>	609.856,50	1.091.135	+481.278,5
<b>Nisan</b>	601.652,40	1.062.268	+460.615,6
<b>Mayıs</b>	954.042,30	1.209.216	+255.173,7
<b>Toplam</b>	<b>14.518.669,5</b>	<b>13.436.031</b>	<b>%93</b>



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EKMEK VE KUKLA TİYATROSU KIRSALDA SÜRDÜRÜLEBİLİR ESTETİK

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#### ÖZET

Kukla, ilkel dönemlerden bu yana insanlığın yarattığı törensel eylemlerin figürlerinden biri olarak büyüsel etkisini korumuş ve günümüze kadar ulaşmayı başarabilmiş grotesk sanat formlarından biridir. Gösterinin amacı doğrultusunda şekillenen biçim, plastik ve teknik özelliklerin kuklanın kendi gelişim çizgisindeki yolculuğu, onun bir aktarım nesnesi olarak sanatçılar tarafından farklı yaklaşımlarla kullanılmasını sağlamıştır. 20.yüzyıla damgasını vuran avangard sanatçıların üretimleri sonraki kuşakları da etkilemiştir. Dünyadaki hızlı gelişmeler 1960larda Peter ve Elka Schumann'ın yaratıcı dünyasında da itici bir güç olmuştur. Bread and Puppet ( Ekmek ve Kukla Tiyatrosu ) adını verdikleri kolektif sanat deneyimlerinin ilk üretimlerini New York'ta çeşitli mahallelerde gerçekleştirmişlerdir. Ancak zamanla zorlaşan koşullar çerçevesinde 1975'te kendilerine doğanın – kırsalın içinde doğa - insan-ekoloji – sanat – üretim ve başkaldırı bağlamında yeni etkileşimlere ve sahnelemelere ev sahipliği yapacak olan Glover, Vermont'ta yeni bir yaşam alanı bulmuşlardır. Sirkel – törensel olarak tanımladıkları performanslarında kullandıkları kuklaların ve diğer her türlü gösteri nesnesinin ana malzemesi şehrin atıklardır. Böylece New York sokaklarında başlayan ve sonrasında doğanın ortasında devam eden sahnelemelerinin aynı zamanda estetik değerini de belirlemiştir. Bread and Puppet Tiyatrosu'nun dünya görüşüyle oldukça örtüşen bu durum, tüketimden çok üretime odaklanan, kolektif bir atölye çalışmasının sonucunda dramaturjisinden, koreografisine ya da müziğine kadar içinde herkesin bir rol alabileceği performansların ortaya çıkmasını sağlamıştır. Tüm gösterilerinin sonunda dağıtılan ve isimlerinin de bir parçası olan çavdar ekmeğinin ise doğa, insan, varoluş, sanat ve üretim ilişkisi içinde tiyatro için pek çok karşılığı bulunmaktadır. Sanat ve düşünce üretimlerinin devamlılığını sadece gösterilerinin bilet satışlarıyla ve yıllar içinde tiyatrolarına dair yayın, afiş vb. satışa sundukları materyallerin gelirleri ile sağlamaya çalışarak günümüze kadar ayakta kalmayı başaran eşsiz bir oluşum olarak Bread and Puppet, Vermont kırsalında doğayla pozitif etkileşim içinde elli yılı aşkın bir süredir yerel ve uluslararası seyircisini etkilemeye devam etmektedir.

**Anahtar kelimeler:** Bread and Puppet, Kukla, Performans, Doğa





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **BREAD AND PUPPET THEATRE SUSTAINABLE AESTHETICS IN RURAL AREAS**

#### **ABSTRACT**

The puppet, as one of the ritualistic figures created by humanity since primitive times, has retained its magical influence and has become one of the grotesque art forms that have successfully reached our present day. The form, plasticity, and technical characteristics shaped in line with the purpose of the performance have allowed the puppet to be used by artists in various approaches along its developmental trajectory as a medium of transmission. The productions of avant-garde artists who left their mark on the 20th century also influenced subsequent generations. The rapid developments in the world became a driving force in the creative world of Peter and Elka Schumann in the 1960s. They conducted the initial productions of their collective art experiment, named Bread and Puppet Theatre, in various neighborhoods of New York. However, as conditions became increasingly challenging, in 1975, they found a new living space in Glover, Vermont, which would host new interactions and performances within the context of nature, rural life, human ecology, art, production, and resistance. In their ritualistic performances, which they describe as "Circus," the main material used for puppets and all kinds of performance objects by Bread and Puppet Theatre is the waste of the city. This has not only shaped the aesthetic value of their performances, which began on the streets of New York and continued in the midst of nature but also aligned with the worldview of the theater. This alignment focuses on production rather than consumption, resulting in performances where everyone can play a role, from dramaturgy to choreography or music, as part of a collective workshop. The rye bread distributed at the end of all their shows, which is also a part of their name, holds multiple meanings within the context of nature, human existence, art, and production in the theater. Bread and Puppet, as a unique entity that has managed to sustain the continuity of their artistic and intellectual creations solely through ticket sales of their performances and the income generated from the sale of materials related to their theaters, such as publications and posters, has persevered to this day. For over fifty years, they have continued to engage both local and international audiences in a positive interaction with nature in the rural setting of Vermont.

**Keywords:** Bread and Puppet, Puppet, Performance, Nature



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1.GİRİŞ

Dramatik sanatların da kökeni olarak kabul edilen; insanlığın varlığına dair soruların karşılığını bulmak için yarattığı mitlerin canlandırılması ve bir arada yaşamak için koyduğu toplumsal değerlerin kutsanması yoluyla gerçekleştirdiği ritüellistik törenlerin bir parçası olarak maskeler ve kuklalar, duyguların ifadesinde birer “ aktarım nesnesi “ olarak önemli bir rol almışlardır. Bu özelliğiyle kukla; yüzyıllar boyu gezginlerin, gezici kumpanyaların, hatta bazı devlet adamlarının aracılığıyla coğrafyadan coğrafyaya taşınmış toplumsal gereksinim ve kültürel eğilimlere bağlı olarak biçimsel, estetik ve teknik bakımdan benzer ve farklı özellikler kazanarak günümüze kadar gelen bir sanat formu olmuştur.

Sanayi devrimi sonrasındaki gelişmeler, iki dünya savaşının yıkıcı etkileri ve tüm bunların yarattığı sosyo-politik dönüşümler geçmiş “ insanlık deneyimlerine bir başkaldırı olarak “ 20. yüzyıl sanatçısının düşünce ve üretim pratiğinde “ sanatı “ ciddi bir araştırma konusu haline getirmiştir. Avangard akımın sanatçıların plastik sanatlardaki sanatın kendi gerçekliği içindeki tanımını yapabilmek adına yarattığı heyecan, aynı zamanda 20. yüzyıl tiyatrosunu oyun – oyuncu – sahne - seyirci denkleminde güçlü bir değişime zorlamıştır. Amaç bir bakıma yaşam ile sanatı yakınlaştırmadır. Şok etkisi yaratma, gerçek yaşamla eşzamanlılık gözetimi ve bilinçli bir biçimde raslantıya yer verilmesi, temelde hep aynı amaca hizmet eden yöntemlerdir. Amaç, sanatın yaşamdan kopukluğunun giderilmesidir. (CANDAN, 1997, s. 89)

1900lerin başında Dadaist, Fütürist, Sürrealist ( özellikle Antonin Artaud’nun kitlesel ve ritüellistik tiyatro düşüncesi ) tiyatro, 1930lara gelindiğinde düşünce köklerini 1917 Ekim Devrimi’nden almış ve Almanya’nın politik çalkantılarında biçimlenmiş Erwin Piscator’un metne, oyuncuya, seyirciye olduğu kadar sahne tasarımına da yepyeni olanaklar sunan öncü politik tiyatrosu -film, projeksiyon, hoparlör, görüntüyü destekleyici olarak oyuna katılır. Sahne mekanizması geliştirilir, dönen yürüyen sahneler ve gelişmiş ışıklama donatımı kullanılır (ŞENER, 1982, s. 217)-, sonrasında “ gerçekçi-doğalcı “ eski yaklaşımlara karşı çıkarak; yabancılaştırma ve Gestus gibi kavramları sahneye kazandıran, böylelikle politik tiyatroyu bir adım öne taşıyan Bertold Brecht’in epik tiyatrosu gibi yirminci yüzyıla damgasını vuran avangard sanatçıların çalışmaları kendinden sonraki kuşakları da etkilemiştir.

### 2. Başlangıç

Amerika’da, ülke ve dünya ölçeğindeki siyasi gelişmelerin etkisiyle 1960’lı yıllarda bu öncü avangardların izini sürmek isteyen bir deneysel tiyatro ortamı doğmuştur. Toplumsal



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

dönüşümün bir göstergesi olarak, yepyeni bir dünya arayışı içinde doğaya dönüş ve komün yaşam eğilimleri oluşmuştur.

Bu bağlamda, Schumann'ların hikayesi Almanya'da başlayacaktır. Peter Schumann resim, heykel, müzik, dans gibi sanatın pek çok alanıyla ilgilenmektedir. Elka ise, henüz sanat tarihi bölümündeki eğitimine devam etmektedir. Karşılaşmalarından sonra aralarında uzun bir yol arkadaşlığı başlayacaktır. Peter Schumann'ın, Avrupa avangardına ilgisi vardır ama özellikle sanatsal duyarlılığı; Ortaçağ tutku oyunları ( Passion Plays / Easter Pageant ), kutsal kitap, masallar ve diğer halkbilim anlatı gelenekleri gibi (Puppet, 2023) daha geleneksel formlarla birleşmiştir. Ayrıca törensel gösterilerindeki anlatımları Brecht'in epik tiyatro anlayışına da yakın bulunabilir. Elka Schumann ise sosyal duyarlılığıyla büyükbabasından aldığı hayat felsefesinin izlerini taşıyan bir üretme potansiyeline sahiptir. Avrupa'daki aile hayatlarını Amerika'ya taşıma kararını verdiklerinde yanlarında tüm bu özelliklerinin yanı sıra Peter Schumann'ın annesinden öğrendiği ekşi mayalı ekmek tarifi de vardır.

1961 yılında New York sanat ortamının toplumsal ve politik meselelerle ilgili olduğu bir dönemde Peter Schumann'ın sanatında da etkili kişilerden biri olacak Richard O. Tyler sayesinde, Manhattan'da 19.yüzyılın sonlarından bu yana düşük gelirli göçmen nüfusu barındıran Lower East Side'da bir çatı katı dairesinde kiracı olurlar. Burada kolektif bir sanat oluşumu içinde haftalık performanslar ortaya koyarken çocuklar için ilk kukla gösterilerini yapmaya başlamışlardır. Bu sanatsal üretim kaygılarına mahallenin kaotik sorunları daima eşlik etmiştir.

New York'un en yoksul mahallelerinde açık havada ve büyük ölçekli sahnelemeler gerçekleştirirken, hep birlikte gündemdeki kentsel, siyasi ve sosyal meseleler ele alınmıştır. Böylece tiyatronun ikonik kuklaları doğmuştur: Uncle Fatso, The Dragon, Mother Earth and Uranos. (Puppet, 2023) 1963'te tiyatrolarına Bread and Puppet ismini vermelerini sağlayan ve gösterimlerinin sonunda seyircilerine ikram ettikleri çavdar ekmeği, kapitalizme karşı sembolik bir anlam taşır. Çünkü Schumann için tiyatro farklıdır. Tıpkı ekmek gibi bir zorunluluktur. Temel bir ihtiyaçtır. Schumann'ın kendi deyimiyle; vaaz veren bir tür dinsel ayin gibidir ve kendi kendine yeten bir ritüeldir.

Tiyatrolarının en önemli ideali; kolektif işbirliği ve insan emeğinin gücü sayesinde kapitalist bağımlılıklara karşı şehrin çöplerinden doğan bir özgürlük anlayışıyla, ekonomik yönden tam bağımsız olabilmektir. Bu aynı zamanda kumpanyanın gösterilerinde kullandığı kuklaların estetik kimliğini de belirlemiştir. Atık kağıtlar, burlap kumaşlar, ipler vb. buluntu malzemeler,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

papier maché tekniği ve eski çarşafın üzerini tempura tekniği ile boyamak suretiyle tasarımlarını gerçekleştirmişleridir. Ekmeğin ve kukla tiyatrosunun iç içe girdiği ve eş zamanlı üretilip paylaşıldığı bu yaklaşımın temelinde her ikisinin de ucuz ve basit malzemelerden yaratılıp samimi, etkili ve birleştirici bir rol üstlenmesi vardır.

Peter Schumann'ın kukla tasarımları grotesk görünüşleri, büyüklükleri ve basit teknik oynatım olanaklarıyla dönemin protest gösterilerinin önemli unsurları haline gelmiştir. Bunların arasında 1968 yılında Fransa'da festival oyunu olarak sahneledikleri Vietnam Savaşı'nı protesto eden "Fire" performansının etkisi önemlidir.

Örneğin, Amerika'da yeni bir tiyatro hayalindeki Richard Schechner sokakların sahneleştiği, kamuya açık alanlarda üretilen ve ritüelistik etki bırakan performansların peşinde, TDR dergisinin editörü olduktan kısa bir süre sonra 1968 yılında kaleme aldığı "Çevreci Tiyatro İçin 6 Vecize" (PUCHNER, 2012, s. 427) isimli yazısında Bread and Puppet Theatre'ı yeni tiyatro bağlamında değerlendirmiştir.

### 2. Kırsalda Yeni Bir Başlangıç

Schumann'lar, Lower East Side'ta suç oranının giderek artması sebebiyle çocuklarına daha güvenli bir ortam sağlamak isterler ve kendilerine yapılan bir teklif üzerine Vermont eyaletinde Plainfield kasabasına taşınırlar. Burada alternatif eğitim anlayışıyla dikkat çeken Goddard Koleji'nde sanatsal çalışmalarına devam ederler. Bread and Puppet ekibi yeni üyeleri ile kırsalda yepyeni bir hayata adım atmış olur. Sirkel – törensel gösterilerinin bir parçası olacak müzikal anlayış burada şekillenecektir. Aile okulun yakınındaki bir çiftliğe taşınır ve Elka Schumann bir sebze bahçesi kurarak çiftliğin ve tiyatronun idari – mali işleri ile ilgilenir.

1975 yılına gelindiğinde ise, aile ve tiyatro bu kez Vermont, Glover'a taşınma kararı alır. Elka'nın ailesine ait olan çiftlik böylelikle Bread and Puppet'a günümüze kadar gelen kimliğini kazandıracaktır. Bu mekan tiyatroya yaklaşık elli yıl boyunca doğanın içinde insan- ekoloji – sanatsal yaratım denkleminde yeni etkileşimlere, protest ve kült sahnelemelere ev sahipliği yapacaktır.

Tıpkı büyükbabasının 1930'lu yıllarda şehirden kırsala dönmesiyle yarattığı aktivist anlayışıyla, Elka Schumann da çiftlikle özel olarak ilgilenmiştir. Peter Schumann sanatsal üretimin daimi yaratıcısı ve tiyatronun bu bağlamdaki beyni ve lokomotifini ise, Elka hem tiyatronun, hem de çiftliğin mali ve idari işlerinde arka plandaki kahramanı olmuştur.

Glover, Vermont eyaletinin kuzeydoğusunda yer alan doğanın içinde ve geniş ormanların ortasında bir kasabadır. Özellikle Akçağaç bölge için sembolik bir ağaçtır ve Akçağaç Şurubu



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

üretimi önemli bir yer tutar. Elka Schumann çiftliğin mevcut potansiyelini ele alır: çayırılık araziyi yerel çiftçilere kiralar, yine yerel ormancılarla iş birliği yapar, elma suyu ve Akçaağaç şurubu üretimi yapılır. Küçük çaplı hayvancılıkla uğraşır; çocuklarının yardımıyla yaklaşık on yıl boyunca 20 kadar koyun sürüsünü besler, yün elde eder. Bu yünlerin çoğunu kızlarıyla birlikte eğirmiş ve etlerinden de faydalanmıştır.(Schumann, 2023)

İlk kez Plainfield'ta varolan Yerel Diriliş Sirki ( Domestic Resurrection Circus ), Glover'da 1975 yılı yazında yeniden hayat bularak, 1998 yılında sonlanana kadar kumpanyanın en önemli gösterilerinden biri olmuştur. Açık alan oyunları büyümlü, coşkulu bir etkiyle festival havasında gün boyu sürmektedir. Peter Schumann'ın dramaturjik yaklaşımında “ sahneler “ daima doğanın bir parçasıdır. Açık hava ve manzaraya dair ne varsa “ törensel gösteri “ onun içinde varlık kazanır. Kuklalar ise, sessiz duruşları, basitlikleri ve kendi tarihsel anlamlarıyla Bread and Puppet gösterilerinin güçlü figürleridir. Ayrıca onlar zaten başlangıcından beri anarşist bir sanatın temsilcileridir.

Zaman içindeki ihtiyaçları doğrultusunda kumpanya elindekini dönüştürerek ya da kullanarak Glover'daki çiftliği daha fonksiyonel hale getirmiştir: Asırlık süt ahırını Bread and Puppet'ın gelmiş geçmiş gösterilerinin kukllarına ve diğer materyallerine ev sahipliği yapacak şekilde müzeye dönüştürülür. Bu mekan aynı zamanda 1984 yılında kurulan; gösterilerde kullanılmak üzere tasarlanan aksesuarların üzerlerine yapılacak baskı işlerinin yanı sıra, Peter Schumann'a ait çok sayıda afiş vb. tasarımın ve kumpanyaya ait kitapların basıldığı bir matbaa olan Bread and Puppet Press'e ev sahipliği yapmaktadır.

Arazideki dik yamaç seyircilerin gösterileri rahatlıkla izleyebildiği doğal bir amfi tiyatro olarak değerlendirilecektir. Ayrıca “Papier Maché Katedrali“ adını verdikleri tamamen çevredeki yaşlı ağaçları seçerek inşa ettikleri direkli, ahşap yapı oyunlarına hizmet etmektedir. Quebec tarzı fırında ise çavdar ekmeği pişirilmektedir. Yine 1975 yılında çam ağaçlarının arasında bir orman köyü planlanmış ve renkli kulübelerden oluşan bu mekan bir süre sonra dünyaya veda etmiş özel kişilerin anısının yaşatıldığı bir etkinlik alanına dönüşmüştür.

### 3. SONUÇ

Bread and Puppet Theatre, kendi kendine yeten bir tiyatro olma idealini gerçeğe dönüştürerek, sanat ve düşünce üretiminin devamlılığını sadece gösterilerinin bilet satışlarıyla ve yıllar içinde tiyatrolarına dair yayın, afiş vb. satışa sundukları materyallerin geliriyle sağlamaktadır.





**Resim 1**

17.İstanbul Bienali kapsamında yaptıkları gösterinin üretimden kanatlar, Eylül 2022

(Yazarın kendi arşivi )



**Resim 2**

Topluluğun 17.İstanbul Bienali kapsamında “Toplumun Kötülükleri” başlıklı gösterisinden, Eylül 2022

(Yazarın kendi arşivi )

Vermont kırsalında elli yılı aşkın bir süredir varlık gösteren tiyatronun usta – çırak ilişkisine dayanan yaşam felsefesi kuşaktan kuşağa aktarılmıştır. Çiftlikteki kolektif yaşantının kurallarının zorlayıcılığına rağmen; Peter Schumann’ın güçlü sanatsal kimliği ve Elka Schumann’ın 2021’deki ölümüne kadar ailesine ve kumpanyaya sağladığı güçlü desteği; yerel halkın, uluslararası izleyicinin ve performansçıların gönüllü ve aktif katılımını sürekli hale getirmiştir.

Bread and Puppet Theatre tiyatronun eşsiz bir oluşumu olarak; yaşamdan bağlarını hiçbir şekilde koparmamayı ve özgür bir sanat için zorluklara katlanarak ayakta kalabilmeyi ilke edinmiştir. Bu anlamda yeni kuşaklar için ilham kaynağı olmaya devam edecektir:

*“...Bir gösteriden alabileceğimiz en iyi şey bulutlar ya da değişen ışıktır. Gerisi bu fırsatlarla karşılaştırıldığında neredeyse önemsizdir. İzleyicinin bu unsurları algılamasını sağlayabilseydik mükemmel olurdu, başka bir şey yapmamıza gerek kalmazdı...” (Deandrea, 2023)*



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ROUTER GREEN NETWORK ELEMENTS ON THE STREETS OF THE CITY

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#### ABSTRACT

Public spaces are urban areas where more than one person comes together within the urban fabric to provide cultural interaction and communication as well as socialisation, which are in constant use, where users feel safe and comfortable, and which are suitable for economic and social life. These areas are open spaces. They are where the human-environment relationship is most intensely experienced in urban life. They are areas that are protected from environmental conditions and where, unlike indoor spaces, people are not restricted in how they move. At this point, it includes various and different areas of use. They are: squares, lanes, streets, yards, parks, playing fields, sports and entertainment areas. City streets are public spaces that are most familiar to people in urban life. These areas are socially open and important elements that connect everyone from one point to another and largely shape and define a city. They transport both pedestrians and vehicles from one place to another. They are also areas where people can engage in activities alone or with their friends. They are places where neighbourly relations are established and protected, and where commercial and social relations are conducted. It provides information about the quality of life and the viability of a city. It plays an important role in shaping cities with its green network elements within three-dimensional structures. This is because green network elements offer many important benefits to their users, such as improved air quality, carbon sequestration, oxygen production, absorption of airborne pollutants, reduction of the urban heat island effect, reduction of noise pollution, improvement of mental and physical health through contact with nature. At the same time, it allows its users to be active in urban life by directing their movement and transport through its shape, form and texture. This study investigated the shape, form and texture of green network elements used in urban street design.

**Keywords:** Public spaces, Streets, Green Network Elements

## INTRODUCTION

Public spaces are social and cultural areas within the urban fabric that are easily accessible to all users, designed for the benefit of society and as shared living spaces. These are areas where many people gather, communicate, provide cultural interaction, socialise and where users feel safe, comfortable and belong (Karayılmazlar & Çelikyay, 2018). In addition, public spaces with mobility and access; these are areas for public use where sports, cultural and social activities, activities such as waiting, gathering, dispersing and shopping take place, and where they have commercial functions (Çelikyay, 2017). They are open spaces where the relationship between people and the environment is strongly felt in urban life. It protects itself from environmental conditions. Unlike indoor spaces, it does not restrict the movement of its users. The focus is on continuous use in public spaces, and this use is open to everyone in society. At this point, it includes different and diverse areas of use. Squares, avenues, alleys, streets, courtyards, parks, playgrounds, sports and entertainment areas, such as the areas shown as examples in Figure 1; these are various and different usage areas of public spaces (Karayılmazlar & Çelikyay, 2018; Saylan & Erdönmez Dinçer, 2017).



**Figure 36.** Examples of Various and Different Uses of Public Space (Url-1; Url-2, 2023)

The quality of the city in which we live can be revealed not only by the dwellings, but also by their relationship with the environment. Streets are one of the areas that play a pioneering role in revealing this quality (Ayaz & Yamaçlı, 2019). Streets are one of the public spaces that establish relationships between city users with their heterogeneous structure, connect private and public areas, and provide rich experiences to their users. Streets are the most basic connecting elements of our public life space (Özcan et al., 2003). They are spaces shared by all



city dwellers. They are areas where social and political events take place, where society shows its power and expresses itself (Köse, 1998). At the same time, in terms of creating liveable spaces, streets (Figure 2.) are considered interaction spaces because they are within walking distance of people leaving their homes and provide connections to the surrounding areas. They are located in the open areas of cities and form the main skeleton of the city (Şahin Körmeçli & Elitaş, 2023).



**Figure 37.** Green Network Elements on the Streets (Url-3; Url-4,2023)

In the city, where people live their daily lives; it is in constant interaction with the streets and their surroundings where many functions such as homes, workplaces, educational areas are located. At this point, while many elements such as buildings and trees on the streets physically define the streets, the people who live in the houses on the street, the pedestrians who pass through the street, the users who establish a functional relationship with the environment and its needs also define the street as vital (Özcan et al., 2003). From a vital perspective, streets are areas that determine the movement of pedestrians, especially within the city. The elements used in street design contribute significantly to this. In particular, green network elements play an important role. This is because green network elements offer many important benefits to their users, such as improved air quality, carbon sequestration, oxygen production, absorption of airborne pollutants, reduction of the urban heat island effect, reduction of noise pollution, and improvement of mental and physical health by providing people with contact with nature (Li et al., 2015). Green network elements allow urban users to engage in recreational activities.

At the same time, green networks, through their form and structure, enable users to be active in urban life by directing their movement and transport. They guide and facilitate vehicular and pedestrian traffic by directing the movement of citizens. They facilitate urban circulation. At



this point, a literature review was conducted to examine the form, shape and texture of green network elements used in urban street design. Examples of urban street designs from around the world were discussed and examined.

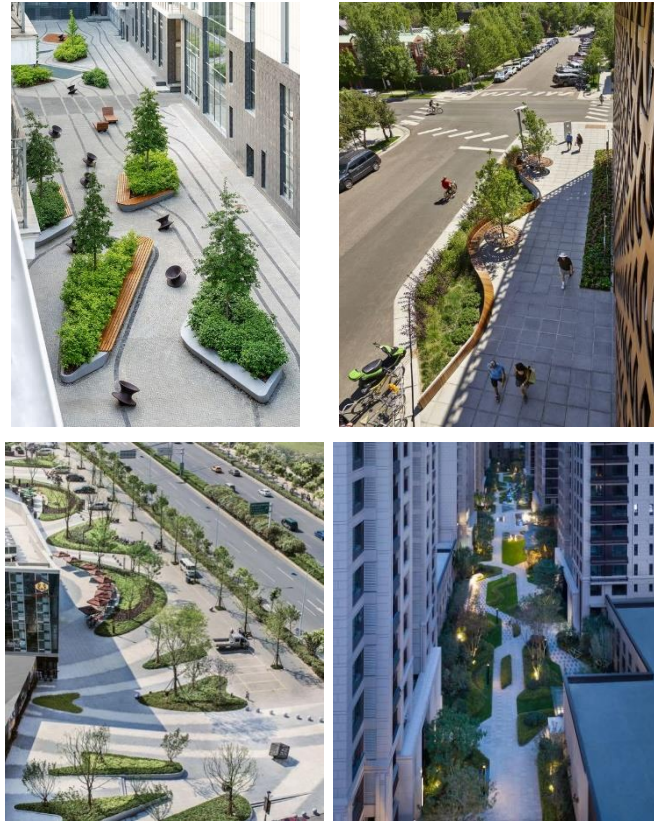
## **2. Green Network Elements on City Streets**

The form and texture used in the green network elements of city streets express various meanings to the city and its users. Figure 3. and Figure 4. are shown as examples of angled forms and circular shape-form approaches in the lines used in the designs and the soft and hard textures. The effects of the form and texture of the green network elements of the example city streets shown in these figures are evaluated as follows.



**Figure 38.** Urban Street Examples Designed with Angular Shape-Form (Url-5; Url-6; Url-7, 2023)

Figure 3 shows the applied designs created by using angled linear shapes in the design lines of urban streets. These designs emphasise clarity and sharpness in the green network elements. The lines, together with the shape form, impose restrictions on the movement of users. Users who cannot move outside their boundaries can perform the actions they want to in accordance with the defined movements. Activities and amenities are designed along these lines. The textures of the green mesh elements have been designed to reduce the clarity and precision of the form. At the same time it emphasises the users and directs them to action. Users of urban streets designed in this way carry out their activities while being aware of their movements and boundaries. In general, these forms have a formal structure because they are symmetrical and have equal angles. They therefore direct users along a line.



**Figure 39.** Urban Street Examples Designed with Circular Shape-Form (Url-8; Url-9; Url-10;Url-11, 2023)

Figure 4 shows the applied designs created using circular shapes on city streets. In these examples, the green grid elements consist of circles or segments of circles. Circular form is the theme; softness and naturalness are felt in the shape of the design lines. Spaces consisting of intersections of circles with different centres and green network elements provide opportunities for different activities. At the same time, circular green network elements create richness and multi-functionality in terms of effectiveness. There are also boundaries and clear lines.

Urban streets designed in this way have a passive, peaceful and relaxing character. Green textures combined with circular forms are used more intensively on city streets. This reduces the structural dominance of the city. It makes users' movements and activities more comfortable.

### **3.CONCLUSION**

As a result, streets are one of the public spaces where people's life activity takes place the most. Whatever people do during the day, they include the streets in their movements. Because streets contain functions that allow people to carry out their movements.



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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Street users limit their movements according to the way the streets are designed within the urban fabric. It also directs their activities. At this point, green network elements are one of the most prominent design elements. With its form and texture, it limits its users, emphasizes them and makes them feel comfortable and safe. It allows the city to gain the benefits of green network elements within urban structures. This makes the city more usable and livable.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A NEW APPROACH TO DETERMINING PROTECTED AREA MANAGEMENT EFFECTIVENESS: IUCN GREEN LIST CRITERIA

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#### ABSTRACT

National parks and similar protected areas; Although declared primarily to protect plants, animals and landscapes, it is a complex form of land management that allows for a variety of positive activities of people. Although there has been a significant increase in the number of protected areas around the world, the problems in the management of these areas have continued to increase. Many relevant organizations, especially The International Union for Conservation of Nature (IUCN), have developed and implemented many methods and approaches for the effective management of these areas, especially in the last half century. Green List criteria is an approach consisting of components, criteria and indicators for good governance, recently implemented by IUCN for effective protected area management. The IUCN Green List Standard defines a set of seventeen criteria categorized under four components along with 50 indicators for successful conservation in protected and conserved areas. This program aims to promote, increase and support effective, equitable and successful protected areas in all partner countries. The program certifies and supports protected and conserved areas that effectively and equitably achieve conservation goals. Protected areas seeking to achieve 'Green List' status must ensure that the IUCN Green List Standard has been successfully implemented; It should show Application, Candidacy and Green List Stages and then maintain it. The IUCN Green List, on the other hand, contributes directly to all Aichi Targets of the UN Convention on Biodiversity, most directly Aichi Target 11, as well as Climate Change Mitigation and Adaptation. To date, 61 protected areas have met the IUCN Green List Standard. Approximately 1/7 of this Green List is World heritage sites. In Turkey, studies have previously been carried out to determine the management effectiveness of national parks and similar protected areas by applying various methods. TODAY, re-conducting similar studies according to Green List standards will reveal new and usable data.

**Keywords:** Green List, IUCN, Protected areas, Conserved areas.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Although human beings generally tend to dominate nature and use it completely, efforts to develop various conservation methods and systems to protect natural and cultural assets continue to increase. The most advanced of these efforts are undoubtedly the protected area systems that are accepted at national and international levels. National Parks and similar protected areas and their specific management methods aim to protect natural and cultural resources while providing scientific, economic, social and cultural benefits to the society (Kurdođlu et al. 2004).

Despite all these benefits, it is frequently stated that there are serious problems in the fulfillment of basic management functions such as planning, organization, execution and control in most protected areas, and it is seen that management systems in which performance can be evaluated cannot be established.

Although the declaration of protected areas with various names and structures in the world dates back to ancient times, nature protected areas were given a systematic management style with the Yellowstone National Park, which was declared in the United States in 1872. Today, the number of national parks in the world has reached 7 thousand. IUCN, together with the United Nations World Conservation Monitoring Centre, maintains a global database of Conservation Areas and protected areas. The October 2023 database, available through Protected Planet (WDPA), lists 287,359 official protected areas, covering more than 15% of the world's land surface and 7.4% of the world's oceans. These protected areas are spread across 244 countries and territories. So far, 61 protected areas with a total area of 733,351 km<sup>2</sup> have been included in the Green List. This figure is only an official record; There are many more protected areas, such as indigenous peoples' lands and specially protected wilderness areas. (URL 1, 4). Such Community Conserved Areas (CCAs) are quite common in Turkey and are called with names such as sacred forest, cursed forest, grove, village grove, shelter.

The concept of national park, which started to be mentioned in our country in the late 1940s, could only be put into practice in 1958 with the Yozgat amlığı National Park, which was declared by the Forest Law No. 6831. Currently, there are a total of 48 national parks in our country. Approximately 8.5% of the country's surface area is reserved as protected area with various statuses.

National parks and similar protected areas; Although declared primarily to protect plants, animals and nature, it is a complex form of land management that allows for a variety of positive



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

activities of people. Although there has been a significant increase in the number of protected areas around the world, problems in the management of these areas have continued to increase. Many relevant organizations, especially the International Union for Conservation of Nature (IUCN), have developed and implemented many methods and approaches for the effective management of these areas, especially in the last half century (Kurdoğlu et al. 2006).

Although there has been a significant increase in the number of protected areas around the world, problems in the management of these areas have continued to increase. Many relevant organizations, especially the International Union for Conservation of Nature (IUCN), have developed and implemented many methods and approaches for the effective management of these areas, especially in the last half century. There are many approaches developed around the world to monitor the management effectiveness of protected areas (Table 1) (Hocking et al. 2004; Dudley et al. 2004; URL 2).

Table 1. Methods developed for protected area management effectiveness

<ul style="list-style-type: none"> <li>▪ AEMAPPS</li> <li>▪ Advanced METT</li> <li>▪ Africa Rainforest Study</li> <li>▪ Annual Report</li> <li>▪ Asean MEE</li> <li>▪ BREMi Framework</li> <li>▪ Belize MEE</li> <li>▪ Bhutan METT+</li> <li>▪ Birdlife IBA</li> <li>▪ CCPAMETT</li> <li>▪ CI Tracking Tool</li> </ul>	<ul style="list-style-type: none"> <li>▪ Catalonia MEE</li> <li>▪ Combination of Methods (PAME and METT)</li> <li>▪ Common Standards Monitoring</li> <li>▪ EUROPARC Quality Criteria and Standards for National Parks</li> <li>▪ Ecological Evaluation Score Cards</li> <li>▪ Ecological Integrity Monitoring</li> <li>▪ Ecuador MEE</li> <li>▪ <b>Enhancing Our Heritage</b></li> <li>▪ European Diploma</li> <li>▪ European SCS</li> </ul>	<ul style="list-style-type: none"> <li>▪ First Cycle of MEE Tiger Reserve</li> <li>▪ French National Parks</li> <li>▪ GOBI Survey</li> <li>▪ Galapagos MEE</li> <li>▪ How is your MPA doing?</li> <li>▪ IEG</li> <li>▪ IMET</li> <li>▪ <b>IUCN Green List</b></li> <li>▪ Korea SOP</li> <li>▪ MEE of National Parks and Wildlife Sanctuaries</li> <li>▪ MEMS</li> </ul> <p style="text-align: right;"><a href="http://www.protectedplanet.net">www.protectedplanet.net</a></p>
<ul style="list-style-type: none"> <li>▪ <b>METT</b></li> <li>▪ METT-4</li> <li>▪ METT-RAPPAM</li> <li>▪ METT-SA</li> <li>▪ MPA MEE</li> <li>▪ Malta MEE</li> <li>▪ Management Effectiveness Assessment Tool (MEAT) developed and adapted from CTI CFF.</li> <li>▪ Marine Tracking Tool</li> <li>▪ Modified Threat Reduction Assessment (MTRA)</li> <li>▪ NSW SOP</li> </ul>	<ul style="list-style-type: none"> <li>▪ NTMEE</li> <li>▪ National Inventory</li> <li>▪ National PAME Assessment</li> <li>▪ Natura 2000 National Monitoring</li> <li>▪ PA Consolidation Index</li> <li>▪ PAME Headline Indicators</li> <li>▪ PAMETT</li> <li>▪ PANPARKS</li> <li>▪ PIP Site Consolidation</li> <li>▪ PROARCA/CAPAS</li> <li>▪ Parks Canada</li> <li>▪ Parks profiles</li> <li>▪ Qld Rapid Assessment</li> </ul>	
<ul style="list-style-type: none"> <li>▪ <b>RAPPAM</b></li> <li>▪ SAMGe</li> <li>▪ SAPM</li> <li>▪ SGBD/SMART</li> <li>▪ SINAC</li> <li>▪ SMART</li> <li>▪ Saint Lucia Management Effectiveness Tool (SLUMET)</li> <li>▪ Second Cycle of MEE Tiger Reserve</li> <li>▪ Stockholm BR Survey</li> </ul>	<ul style="list-style-type: none"> <li>▪ Tasmanian WHA</li> <li>▪ Third Cycle of MEE Tiger Reserve</li> <li>▪ USA SOP</li> <li>▪ Valdiviana</li> <li>▪ Venezuela Vision</li> <li>▪ Victorian SOP</li> <li>▪ WH Outlook Report</li> <li>▪ WWF MPA World Bank Scorecard</li> <li>▪ WWF/CATIE</li> <li>▪ West Indian Ocean MPA</li> <li>▪ Wetland tracking tool</li> <li>▪ i-effectiveness</li> </ul>	



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### Green List Development Process

Finally, recognizing gaps in management in protected areas, the IUCN and the World Commission on Protected Areas (WCPA) developed a standard to guide managers and as the basis for a certification program that considers both management and outcomes. The IUCN Green List is based on IUCN's many years of work developing and promoting systems for assessing the effectiveness of management of protected areas. This initial work to develop a standard for protected area management took place at the IUCN World Parks Congress in Durban in 2003 (Hockings et al., 2004) and various options, including certification, were discussed (Dudley et al., 2004).

WCPA and IUCN's Global Protected Areas Program convened a global consultation process to develop and test a new IUCN Green List Standard and associated certification process for protected areas. A pilot phase was conducted with results presented at the 2014 IUCN World Parks Congress in Sydney. Pilot studies were conducted in eight countries (Australia, China, Colombia, France, Italy, Kenya, Republic of Korea and Spain) and 25 conservation and protected areas received a provisional 'Green List' certification for their success. The revised Standards were discussed further at the IUCN World Conservation Congress 2016 and approved by the IUCN Council in 2017. The current version (Version 1.1) will be reviewed at the IUCN World Conservation Congress in 2024 to ensure that the standard is relevant to current issues in conservation and protected area management (URL 4).

#### Aim of the Green List

Although many methods and approaches have been developed and implemented for the effective management of National Parks and similar protected areas in our country and around the world, the need in this regard will undoubtedly come to the fore again. Green List criteria are the latest approach implemented by the IUCN for effective protected area management.

The aim of the Green List program is to increase the number of protected and conserved areas that deliver successful conservation outcomes through good governance, sound design, effective and equitable management. The aim is to use the Standard in all regions and countries of the world, on land and at sea (URL4).

It is envisaged to achieve this main goal through several sub-basic goals.

- Strengthen the conservation outcomes of the IUCN Green List Standard and and develop an appropriate benchmark for effective management.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

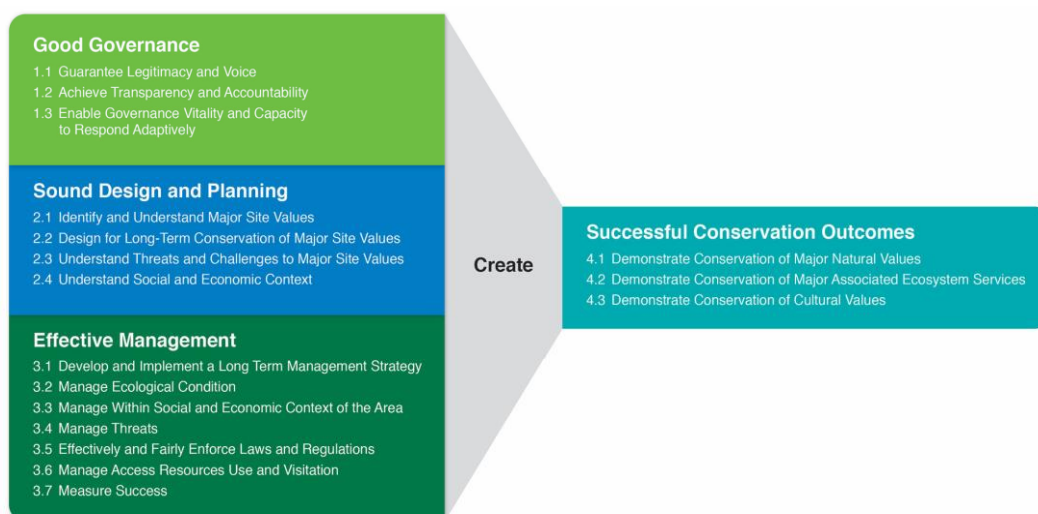
- Position the Green List Program as a tool to improve the conservation capacity of conservation and conservation areas
- To promote cooperation and investment in the implementation of effective and equitable conservation management in conservation and conservation areas adhering to the IUCN Green List Standard.

While the number of Protected and Conserved areas has increased in the world over the last half century, the lack of a globally accepted standard for good governance and management of protected areas has been an obstacle to assessing management success. This deficiency was intended to be completed with the IUCN Green List.

The IUCN Green List is a global certification program that aims to achieve and promote effective, equitable and successful protected and conserved areas by highlighting best practice and providing a reference point for progress towards effective and equitable management. The IUCN Green List is a global campaign for the successful conservation of nature. At its core is the Green List Sustainability Standard, which provides a global reference on how to tackle the environmental challenges of the 21st century. The IUCN Green List provides locally relevant expert guidance to help achieve equitable and effective conservation outcomes in protected areas. It can help ensure that wildlife and ecosystems can survive, thrive and add value to communities everywhere (URL 1).

### Green List Components

The Green List Standard includes 17 criteria and 50 indicators under 4 components (Hockings et al.,2019).



**Figure 1.** Green List Components and Criteria





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Together, these support the Successful Conservation Outcomes component, which proves that a site's goals and objectives have been successfully achieved. Each component has a set of criteria, and each criterion has a set of general indicators to measure success. For example, Good Governance indicators are shown in Figure 2.

Component	Criterion	Generic Indicator No.	Generic Indicator
<b>1: GOOD GOVERNANCE</b>	1.1 GUARANTEE LEGITIMACY AND VOICE: There are clearly defined, legitimate, equitable, and functional governance arrangements, in which the interests of civil society, rights-holders and stakeholders, are fairly represented and addressed, including those relating to the establishment or designation of the site.	GLS-V1.1-1.1.1	The site's governance structure is clearly defined and documented and in accordance with relevant national or regional government, jurisdiction or recognised authority specifications
		GLS-V1.1-1.1.2	The site's local governance structures and mechanisms provide civil society, stakeholders and rights-holders with appropriate opportunities to participate in management planning, processes and actions
		GLS-V1.1-1.1.3	The site's local governance structures and mechanisms recognise the legitimate rights of Indigenous Peoples and local communities
		GLS-V1.1-1.1.4	Rights-holders and stakeholders are effectively involved in decision-making and the adaptive management of the site.
		GLS-V1.1-1.1.5	Governance arrangements help advance gender equity in relation to management of the site.

**Figure 2.** Criteria and Indicators for Good Governance (Hockings et al.,2019)

### Why is there a need for a “Green List”?

The future of life on Earth depends on efforts to nurture and protect nature. The effects of population growth, industrialization, production and consumption patterns on land and at sea are pushing the boundaries of the world. We are rapidly threatening our existence with the loss of ecosystems, wild species and natural processes. We are degrading terrestrial and marine ecosystems beyond recovery, and we are only just beginning to see the true impacts of the climate crisis.

In its most comprehensive finding to date, this edition shows an average 69% decline in the relative abundance of monitored wildlife populations worldwide between 1970 and 2018. Latin America showed the largest regional decline in mean population abundance (94%), while freshwater species populations have seen the largest global decline overall (83%) One million plants and animals are threatened with extinction (WWF,2022).

But it seems possible to hope for change and dream of a greener future. A conserved or protected area that achieves the IUCN Green List Standard is certified and recognized as achieving sustained outcomes for people and nature in a fair and effective manner. Any site can participate and progress towards verified success and then maintain or further improve the



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Standard. In summary, any conserved or protected area that has achieved “Green List” status refers to the following (URL 4):

- Respect for the local community through fair and meaningful participation of rights holders and stakeholders.
- Have a solid design and plan that defines the needs to secure the important values of the area.
- Existence of effective management to monitor the status of these important values.
- Successful conservation results for nature and people
- Clear contribution to climate change responses, health and well-being and other challenges

### **CONCLUSION and EVALUATION**

Despite all these benefits, it is known that there are serious problems in fulfilling basic management functions such as planning, organization, execution and control in most protected areas in the world, and especially management systems that can evaluate performance cannot be established. Undoubtedly, the negativity of the political environment should not be overlooked.

The pressures created by the rapidly increasing population and the resulting diversity of demands on natural resources and cultural values, which are often considered as an integral whole, have revealed environmental problems with unplanned and unhealthy growth. This situation has pushed human beings to seek management that will ensure that resources can meet the needs of future generations without being destroyed (Kurdoğlu, 2007). One of the most interesting results in a study conducted on 10 protected areas in the Eastern Black Sea using RAPPAM, one of the most used methods to determine management effectiveness, was that the "management evaluation" title received the lowest score. Indeed, it is a known fact that protected area managements do not evaluate themselves and do not have them evaluated, and this situation was once again confirmed by the scores of the participants (Kurdoğlu 2011).

In another preliminary study similar to this study, it was seen that the political environment was quite negative in terms of nature conservation. Typical negative indicators of this are; It can be considered that the level of communication between units related to natural resources is low, national policies do not support widespread environmental education at all levels, and laws and regulations regarding protected areas are not implemented effectively at all levels (Kurdoğlu et al., 2006).

On the other hand, conserved and protected areas have a critical role in mitigating climate change, adapting to climate change, and reducing the risk of disasters caused by natural hazards



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

and serious climate events. The IUCN Green List Standard contributes to the development of fair governance and effective management of protected areas, including embedding elements of climate change mitigation, adaptation and disaster risk reduction through all four components of the standard. The IUCN Green List, on the other hand, contributes to all Aichi Targets of the UN Convention on Biodiversity, most directly Aichi Target 11 (URL 1).

As a result of the dissemination of similar practices, our country's protected area system and management structure will be determined in detail. Revealing management effectiveness and deficiencies as a result of participatory studies will undoubtedly enable problems and solutions to be evaluated with common sense.

The study shows that the various methodologies used to assess the effectiveness of protected area management paint a fairly similar picture of management strengths and weaknesses around the world. Of course, effective protected area management is an important tool in combating current and future threats to biodiversity (Kurdođlu & Avcıođlu 2011).

It can be seen that, as in the beginning, the creation and implementation of nature conservation policies are open to debate today, due to the differentiation in the values given to natural resources. Nature conservation is a cultural reflection. If traditional teaching prioritizes respect and protection for nature over a certain period of time, it means that a culture of conservation has been formed in that society. If our view of nature is not nature-first but, in the most optimistic sense, only human-centered, it will be inevitable for the situation to get worse (Kurdođlu, 2007).

Yet to address the growing challenges to nature and achieve a positive baseline for meeting the Sustainable Development Goals, more is needed than percentages and hectares or acres on a map. We need protected spaces to offer hope, renewal and health. They can be relied upon for clean air, fresh water and rainfall, pollination, and spiritual shelter to people, urban and rural communities around the world (URL 4)



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### ECO-MUSEUM APPROACH FOR SUSTAINABLE RURAL TOURISM DEVELOPMENT

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#### ABSTRACT

The primary objective of rural tourism is to benefit local economies by promoting handicrafts, local cultures, and agricultural activities. In addition, rural tourism aims to preserve and enhance endangered cultural heritage through the benefits of tourism activities translated into community projects. The concept of ecomuseum points the integration of nature and culture and highlights the leading role of local community. Some basic keywords in the ecomuseum concept are landscape, heritage, community, memory, participation, ecology, and identity. Ecomuseums generate centres for the protection of natural resources and further the conservation and development of natural heritage and local's cultural identities. Therefore, each ecomuseum has different characteristics than the other. This study examines culture-based rural tourism successful management practices and applies these practices to underdeveloped regions. The study uses principles and practices consistent with "eco-museum" ideals that depart from traditional approaches to heritage management and tourism use. The aim is to highlight the synergy between promotion, protection and preservation of heritage and enhancing the economic, social and cultural well-being of local communities. The theoretical basis of the study focuses on the principles of the tourism valuation method applied to heritage complexes, sustainability indicators of tourism development.

**Keywords:** ecomuseum, rural tourism, rural heritage, sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

The concept of ecomuseum points the integration of nature and culture and highlights the leading role of local community. Some basic keywords in the ecomuseum concept are *territory, heritage, population, memory, participation, ecology, and identity* (Laishun and Gjestrum, 1999). One of the eminent researchers, Georges Henri-Riviere (1985), summarizes the definition of ecomuseum as;

- Ecomuseums is a tool designed and organized by the relevant institutions by local community. It should be managed together for their common interests.
- Ecomuseums are such a mirror that reflects the relationships between the local community and visitors to their environment.
- Ecomuseums demonstrate the nature of the relationship between people and nature.
- Ecomuseums enable reflection over long periods of history, from the prehistoric times to date.
- Ecomuseums offer privileged spaces for those who wish to stay for a while or for those just visiting.
- Ecomuseums are laboratories that provides experts with information on cultural heritage, locals, and environment in the area, and cooperates with scientific research institutions.
- Ecomuseums generate centers for the protection of natural resources and further the conservation and development of natural heritage and local's cultural identities.
- Ecomuseums may encourages the locals to take control of their own future in line with the advancement of conservation efforts and research, such as a school.
- Each ecomuseum has different characteristics than the other.

René Rivard (1988) have provided a very simple way to illustrate differences between traditional museum and the ecomuseum;

**Traditional museum** = building + heritage + collections + expert staff + public visitors

**Ecomuseum** = territory + heritage + memory + community/population

The ecomuseum concept has the potential to bridge past and future landscapes (Tress and Tress, 2001; Naveh, 2001), old and new generations, encouraging the local community to reflect about its own identity, the main aspects of local culture and the strategic elements for the future development of the area.

Ecomuseums can be categorized into the three types (Doğan, 2015, Maggi and Zatti, 1999):



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

- Ecomuseums based on cultural heritage,
- Ecomuseums based on natural values, flora-fauna etc. unique natural heritage,
- Living ecomuseums
  - *They are eco-museums that live with local people in a region, whose cultural heritage, traditions, and natural environment are of unique value. In these ecomuseums, the traditions, culture, rituals, architecture of the local people; the natural environment in which they live, their relationship with nature, their production methods, agricultural products, etc. are important. Such ecomuseums mediate through tourism to reveal, protect, document, introduce and transfer to young and future generations the unique values of that region, which are unique and distinguishable from others.*

The conceptual foundation for ecomuseums had its pillars in the French, British, and South American examples. However, Italy is currently the "driving force" behind the ecomuseum movement." In the 'Strategic Manifesto of the Italian Ecomuseums' (Dal Santo et. al., 2017) they describe the concept ecomuseum as planning identities.

*«Ecomuseums are participating processes to recognize, manage and protect the local heritage in order to improve social, environmental and economic development; they are **planning identities** through which reconnect techniques, cultures, productions, aspirations of a homogeneous landscape relate to its cultural heritage and its specificity; they are also creative and inclusive paths, based on the active participation of people and the cooperation of organizations and associations. »*

So, the innovative contribution of ecomuseums is a collection of good practices of local development ranging from involving the community to create social innovation, to research on local heritage, also through subjective tools such as community maps, to landscape management, restoration of architectural heritage, the characterization of traditional festivals and to the promotion of solidarity tourism.

### **2. Ecomuseum and Tourism**

When the concepts of ecomuseum and tourism are evaluated together, it is noticeable that their common point is sustainability. For this reason, sustainable tourism can be expressed as the title that best overlaps the concept and definition of ecomuseum.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Sustainable tourism is an approach that supports the long-term protection of natural, cultural and social resources and their positive development. It is an approach in which people maintain life in cultural, ecological and biological integrity by protecting the environment without degrading it, and all resources are managed in such a way that they can meet all their needs by transferring them to future generations in a way that meets the economic and social needs of the people and tourists in the visited region.

The connection between cultural and natural heritage is consistent with the tourism. Cultural offerings in regions of natural appeal, with impressive landscapes, important historical and geological aspects and sightseeing opportunities have the potential to attract more visitors, engage local communities, and motivate the protection and conservation of the local heritage. In this sense, the ecomuseum can be seen as a sustainable development and as an attractive prospect for investment in responsible tourism.

### 3. Ecomuseum Examples in Turkey

Although there is no certainty, today, there are over 600 ecomuseums around the world (Elmalı Şen et.al., 2020). About 200 of the ecomuseums in Europe are in Italy, more than 70 in Spain and over 60 in France (Göz and Güneröz, 2023). There is no specific study on ecomuseums in museum legislation in Turkey. While developing ecomuseum models in Turkey, foreign ecomuseum examples and studies on the subject were taken into consideration and examples were prepared by the private sector and local administrations (Göz and Güneröz, 2023). Open Air Museums, Ethnography Museums, and some ecotourism projects located in rural areas are considered as ecomuseum in general. However, there are only two ecomuseum in Turkey named as ecomuseum: Hüsamettindere Ecomuseum and Boğatepe Zavot Ecomuseum.

#### *Hüsamettindere Ecomuseum*

Hüsamettindere Ecomuseum, located in Mudurnu, Bolu, Turkey's first ecomuseum. It is an ecomuseum that was established in 2009 by a group of businesspeople who bought the homes in the village. 30 Turkish-style homes have been faithfully restored to their former glory. The village has been designated as having both tangible and intangible cultural heritage, including customary ways of life, livelihoods, ceremonies, and cuisine cultures (Elmalı Şen et.al., 2020). This ecomuseum has raised the awareness of local people about the cultural and natural landscape. The museum's approach to valorizing rural heritage is tourism-oriented (Göz and Güneröz, 2023).



**Figure 1.** Hüsamettindere Ecomuseum signage and the village views

### *Boğatepe-Zavot Ecomuseum*

In 2010, locals launched the Boğatepe cheese museum initiative, which focuses on regional specialty cheeses from the village. All its operations fell under the purview of the Boğatepe-Zavot Ecomuseum when it first opened in 2012. These activities included not only the settlement but also the surrounding area and were not limited to the manufacturing of cheese (Doğan,2015). In addition to the Cheese Museum, 70% of the region is covered by an ecomuseum (Göz and Güneröz, 2023).



**Figure 2.** Boğatepe-Zavot Ecomuseum signage and the village views

## 4. CONCLUSION

An integrated approach to rural tourism is affirmed in its close connections not only to natural resources but also human, social, and cultural characteristics of places and tourist destinations. This perspective introduces the dimension of responsibility alongside that of sustainability, which, as is well known, implies the involvement of the local communities themselves as well as their respective government institutions.

Responsible tourism is in fact based on strategies and policies based on sustainability that should stimulate appropriate and oriented behavior, not only towards respect for environmental resources, but also towards increasing local empowerment and awareness of the possible ethical function of rural tourism. The capability of ecomuseums to be a model of development of responsible and sustainable tourism focused on rural areas. In this sense, a framework ecomuseum approach for sustainable rural tourism can be useful tool to establish ecomuseums.





## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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To describe criteria for ecomuseum establishment, three main category is necessary to identified: natural heritage, cultural heritage and socio-economic and tourism features of the area. Under the natural heritage geodiversity, educational value, natural landscape, land use can be criteria for decision process. For cultural heritage, unique customs, events, festivals, and traditional architecture is important items and socio-economic factors and tourism features includes accessibility, distance from the main recreational and historical attractions, and other tourism facilities.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CARTOGRAPHIC PRESENTATION OF LANDSCAPE PLANS: A COMPARATIVE ANALYSIS OF MAPPING TECHNIQUES FOR UPPER SCALES

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#### ABSTRACT

In this study, the mapping terminology/language and cartographic symbology expressing the protection and development categories of the land guided by landscape plans were examined. For this purpose, officially in force landscape plans in different countries and at upper (regional and sub-regional) scales were analysed. As a result, a mapping language and technique were proposed for landscape plans at regarding scales, taking into account the similarities and differences in the maps analysed. Landscape plans provide an indispensable landscape base for urban and regional planning types at higher scales. Accordingly, the mapping language should facilitate integration with different types of plans. Hence, landscape plans, city plans, and urban designs should be crafted using analogous techniques. The landscape plans mapping language should be of a character that can be easily integrated into spatial planning techniques and standards in practice. City plans and urban designs guided by landscape plans play a critical role in creating more livable and sustainable urban areas.

**Keywords:** Landscape plan, mapping, cartography, technique, symbology



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

The purpose of that paper is to examine the mapping terminology and cartographic symbology expressing the protection and development categories of the land guided by landscape plans, and accordingly to propose mapping language and technique for landscape plans. Within this framework, the regional and sub-regional landscape plans examined in this study are the legal documents. Accordingly, mapping terminology and symbology are the parts of the legal documents of national spatial legislation that create common standards. The existence of a national planning system is undoubtedly an important impetus for the establishment of legal documents on common standardised mapping techniques and symbology. Moreover, since the existence of legislation will in practice necessitate the preparation of landscape plans, it provides an opportunity for the development of experience in mapping terminology and techniques, as well as planning knowledge and skills, and thus the development of effective solutions over the year. On the other hand, the scope of landscape planning and landscape design services. There should be a common practice for the general framework and scope of the landscape (knowledge) base that forms the basis for spatial land use and conservation decisions. This study is about the language and technique for mapping this basic common information in landscape plans.

### 2. MATERIALS and METHODS

The materials utilized in this study consist of landscape plans from diverse countries, encompassing upper spatial scales of 1/25,000 and/or 1/10,000. The research methodology encompasses the following steps:

Step 1: Analyzing map legends of landscape plans related to (a) Landscape structure, function, and change, which are the mechanisms shaping a landscape, (b) Landscape (protection) value in accordance with the European Landscape Convention, and (c) Landscape potential for human-oriented uses (sector-specific landscape use potential).

Step 2: Propose a mapping language and technique.

These step are developed considering the meaning landscape (Fig. 1) and general framework of any landscape plans suggested by Şahin et al (2014a). There are many countries with well-established landscape planning systems (Table 2). Landscape plans from many of these countries were analysed during the study. However, the examples of Germany and the Netherlands, which have been successfully implementing landscape planning for many years, are included in this paper.

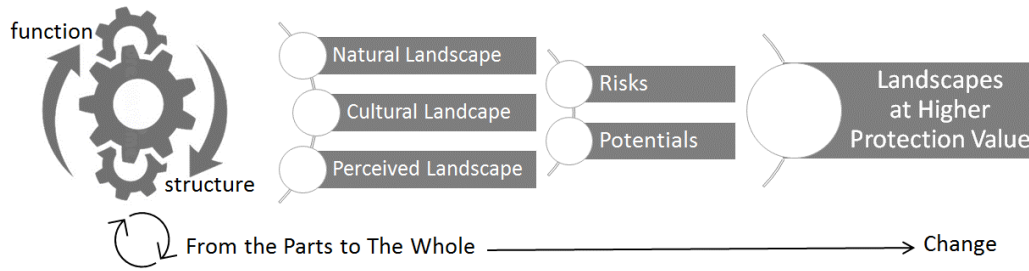


Figure 1. The meaning of landscape (Şahin, 2023)

Table 2. Landscape planning systems in various countries (De Montis, 2014).

Coutry	Government	History	Ratifica tion	Laws	Policies and tools
Catalonia (Spain)	• Ministry of Agriculture, Food and Environment	• Law on national parks (1916)	Yes, 2007	• Law Landscape Protection, Management and Planning (2005)	• Landscape directives
	• Government of Catalonia	• Law on defence, conservation, and enhancement of historical and artistic heritage (1977) • Law on the protection of nature (1989)			• Landscape catalogues  • Landscape maps • Landscape Observatory
France	• Ministry of Ecology, Sustainable Development, and Energy	• Law on Natural Monuments (1906)	Yes, 2005	• Law on Landscape (1993)	• Atlas of the landscapes
	• National Council of Landscape	• Law on historic monuments (1913)			• Photographic observation of the landscape
	• Regional Directions of Environment	• Law on the hydraulic energy use (1919) • Law on the preservation of natural monuments and artistic, historic and scientific landscapes (1930)			
Italy	• Ministry for Cultural Heritage and activities	• Law 1089/1939	Yes, 2006	• Decree 42/2004	• Regional Landscape Plans
	• Regional administrations	• Law 1497/1939 • Constitution (1948) • Law 431/1985 • Law on national parks 394/1991			





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Switzerland	<ul style="list-style-type: none"> <li>• Federal Department of Environment, Transport, Energy and Communication (DETEC)</li> </ul>	<ul style="list-style-type: none"> <li>• Federal Law for the intense supervision of woods (1902)</li> </ul>	Yes, 2013	<ul style="list-style-type: none"> <li>• Law on Nature and Landscape Protection (1966).</li> </ul>	<ul style="list-style-type: none"> <li>• Federal Inventory of landscapes and natural monuments (1977)</li> </ul>
	<ul style="list-style-type: none"> <li>• Cantons</li> </ul>	<ul style="list-style-type: none"> <li>• Law for the exploitation of hydro-electric power (1916)</li> <li>• Constitution (revised in 2000)</li> </ul>		<ul style="list-style-type: none"> <li>• Ordinance on Nature and Landscape Protection (1991)</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory of constructed sites worthy of protection (ISOS)</li> <li>• Conception Paysage Suisse (CPS, 1997)</li> <li>• Landscape Project 2020 (2003)</li> </ul>
The Netherlands	<ul style="list-style-type: none"> <li>• Ministry of Infrastructure and the Environment (MIE)</li> </ul>	<ul style="list-style-type: none"> <li>• Residence law (1901)</li> </ul>	Yes, 2005	<ul style="list-style-type: none"> <li>• Law for nature and landscape protection (1998)</li> </ul>	<ul style="list-style-type: none"> <li>• Landscape Memorandum (1992)</li> </ul>
	<ul style="list-style-type: none"> <li>• Ministry of Economic Affairs, Agriculture and Innovation (MEAAI)</li> </ul>	<ul style="list-style-type: none"> <li>• Law for natural beauty (1928)</li> <li>• Constitution (1806)</li> </ul>		<ul style="list-style-type: none"> <li>• Law for land management (2007)</li> </ul>	<ul style="list-style-type: none"> <li>• Landscaps Manifestc(2005)</li> <li>• Meetnet Landschap</li> <li>• Landscape development plans</li> </ul>
UK	<ul style="list-style-type: none"> <li>• Department for Environment, Food and Rural Affairs (Defra)</li> </ul>	<ul style="list-style-type: none"> <li>• Protection of the Countryside (1850)</li> </ul>	Yes, 2006	No specific law	<ul style="list-style-type: none"> <li>• Landscape Character Assessment, LCA</li> </ul>
	<ul style="list-style-type: none"> <li>• Natural England</li> </ul>	<ul style="list-style-type: none"> <li>• National Parks and Access to the Countryside Act, 1949</li> <li>• Countryside Act (1968)</li> <li>• Landscape evaluation (1970)</li> <li>• Landscape assessment (1980)</li> <li>• Environment Act (1995)</li> <li>• Natural Environment and Rural Communities Act (2006).</li> </ul>			<ul style="list-style-type: none"> <li>• The State of Countryside 2020</li> <li>• Countryside Character Network</li> </ul>



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

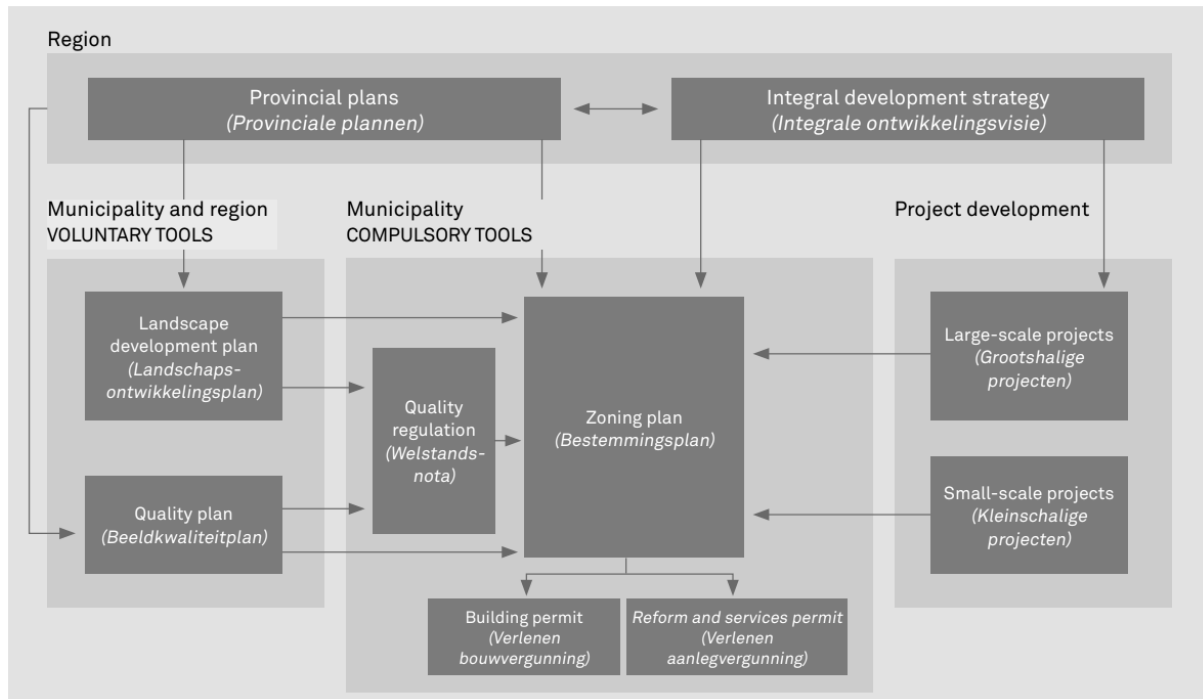
### **3. FINDINGS and DISCUSSION**

#### **3.1 Landscape Planning System in The Netherlands and Germany**

##### **The Netherlands**

In the Netherlands, fundamental principles related to landscape quality are seamlessly integrated into national, regional and municipal spatial strategies and planning, as shown in Fig. 2. Due to its unique spatial context, the country uses highly advanced methods to address land use challenges, rooted in the belief that almost any modification of the terrain is possible. Within this framework, Dutch landscape management and planning emphasises the development and innovative design of new landscapes rather than the preservation of existing ones.

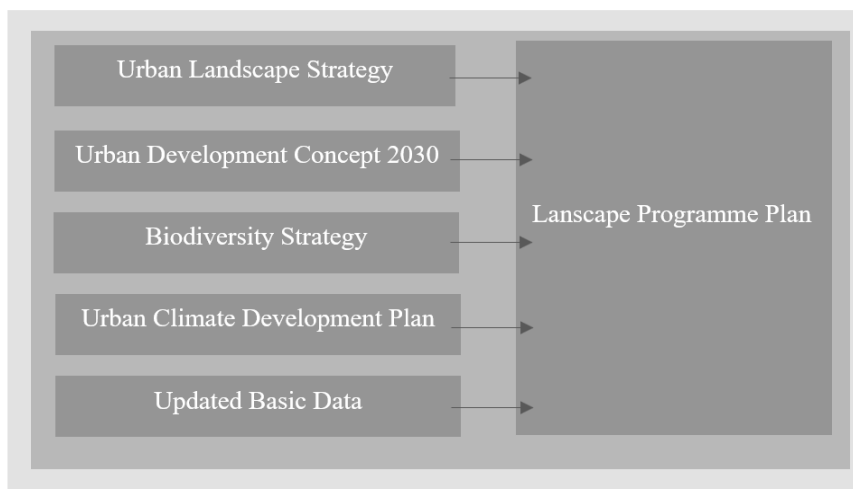
New projects are approved under the condition that they enhance the quality of the landscape or, at the very least, do not degrade it, in accordance with the "Strategy for the Development of a Quality Landscape." This approach is applied to zoning plans, regional plans, local frameworks, and regulatory plans that govern the aesthetic standards of constructed elements, as well as the Landscape Development Plan. The approval of construction permits, renovations and services is subject to strict compliance with the guidelines set out in the "Quality Regulation", both during the planning and execution phases. This regulation can be further enriched and shaped by an additional framework known as "Landscape Quality Plans". These plans, which are defined by specific quality objectives, define how construction elements should fit seamlessly into their surroundings, thereby influencing the granting of permits (Sala et al., 2014).



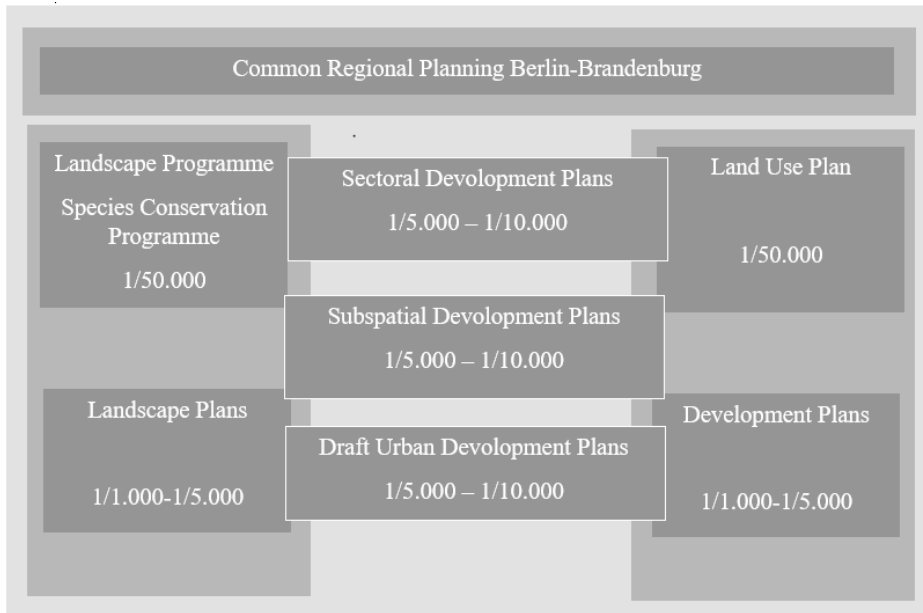
**Figure 2.** Relationship between landscape planning and territorial and urban planning (Sala, 2015)

### Germany

The Landscape Programme (LaPro) (Fig.3), including the Species Conservation Programme, is a tool for day-to-day work in planning and administration. It defines how the landscape is to be developed and protected (Senate Department for Mobility, Transport, Climate Protection and Environment, 2023). Fig. 4 shows the relationship between landscape planning and regional planning in Berlin.



**Figure 3.** Landscape Programme Plan (LaPro) (Senate Department for Mobility, Transport, Climate Protection and Environment, 2023).



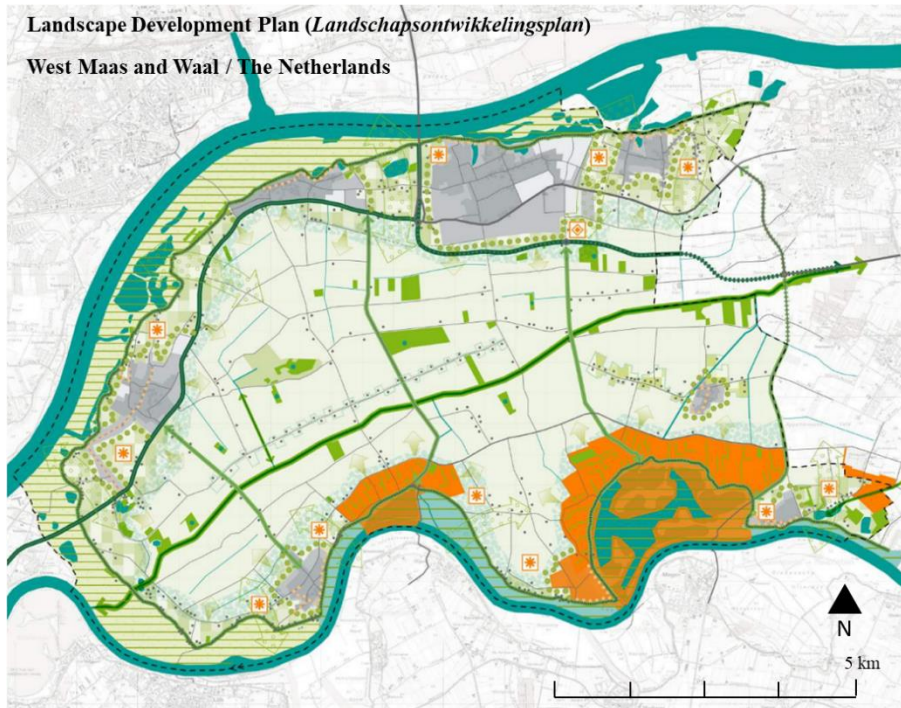
**Figure 4.** Relationship between landscape planning (category for species protection) and regional planning in Berlin (BFN, 2010; Senate Department for Mobility, Transport, Climate Protection and Environment, 2023).

### 3.2. Examples of landscape plans and their legends

#### The Netherlands West Maas and Waal Landscape Development Vision

West Maas and Waal landscape development basic vision (Fig. 5) for the project area which is a rural landscape, deals with the principles, measures and rules for maintaining and strengthening the characteristic landscape structures. For each type of landscape it indicates how farms should be integrated. In addition, specific rules and measures have been developed for a number of tasks in the rural area. Specific rules and measures have been developed for the following approaches: Landscape enhancement and farmyard integration; search zones for landscape enhancement and core edges; water storage; strengthening natural values; improving recreational access. The landscape development vision defines the desired direction of development for various landscape types. The aim is to reinforce landscape differences between different landscape types.

The landscape development plan formulates concrete measures, rules and principles based on the vision plan. Basic drawings and reference images support the proposed measures. It also indicates which plant types and elements are characteristic of the various approaches. Landscape plan forms a practical and handy assessment framework for both the municipality and those taking the initiative in the area of nature and landscape development. (Anonymous, 2023a).



**Figure 5.** Landscape Development Plan, West Maas and Waal, The Netherlands (Anonymous, 2011a)

Legend

- |  |  |  |   |
|--|--|--|---|
|  | historic core  |  | policy under development by province and state  |
|  | core   |  | search zones landscape reinforcement  |
|  | industrial estates   |  | strengthen landscape structures edge of embankment/bowl   |
|  | farm / living outside  |  | strengthening north-south landscape structures  |
|  | existing infrastructure (grey) and watercourses (blue)   |  | preserve and strengthen landscape elements in the area (avenue planting and duck decoys (a structure used to catch wildfowl, consisting of a central pond and radiating water-filled arms)) |
|  | nature development / EHS (floodplain)  |  | nature development (De Meren)   |
|  | interweaving of water recreation and nature development (floodplain)   |  | search area for embankment/bowl edge water storage  |
|  | preserve and strengthen small-scale riparian embankment through functional mixing, enhance landscape and preserve cultural-historical values |  | preserve and enhance views towards the basin  |
|  | preserve and enhance special landscape unit (river dune near Alforst)  |  | natural transition between landscape and core   |
|  | development space in the area for extensive agricultural activity (possibilities for VAB policy)   |  | small-scale overnight and daytime recreation (outskirts of village centres)   |
|  | preserve special landscape unit (Papesteeg-Liesbroekstraat-Hoogbroekstraat)  |  | sharing zone; green buffer between cores  |
|  | policy under development by province and state   |  | recreational development with attention to landscape integration (vision and assessment framework Gouden Ham/De Schans and zoning plan De Tuinen van Appeltern)                             |
|  | development of ecological corridor   |  |   |

**Figure 5 (cont)** Landscape Development Plan, West Maas and Waal/The Netherlands (Anonymous, 2023a)





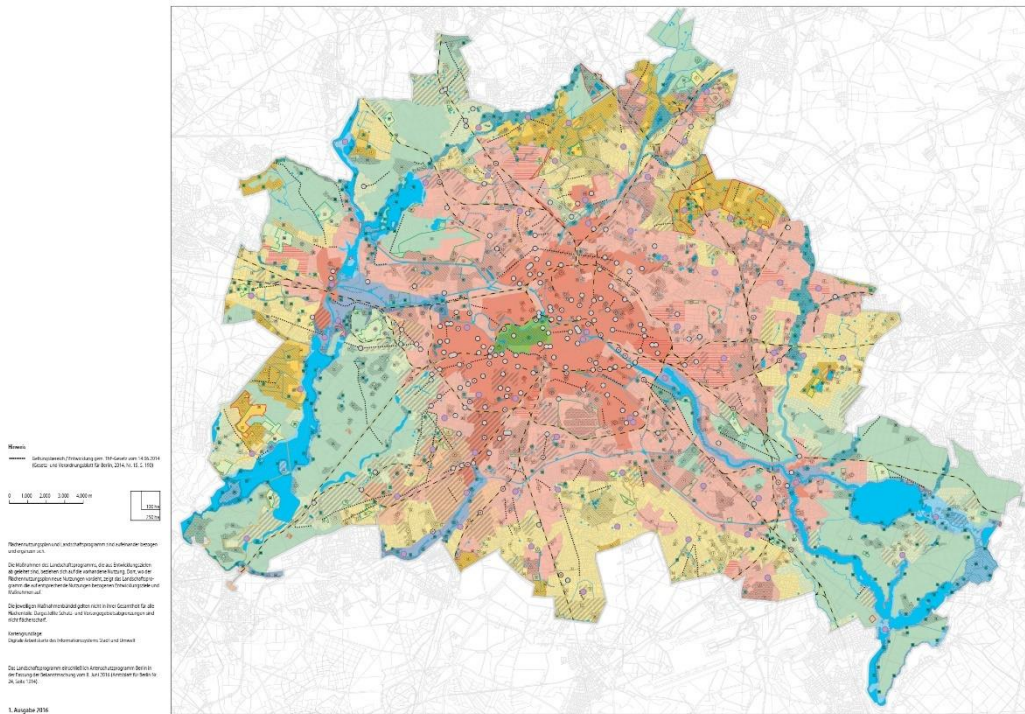
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **Germany Berlin Landscape Programme**

Germany has a well-established tradition of landscape planning that traces its roots back to the 18th century. In contrast to other nations, Germany's landscape planning efforts began early and have taken on diverse forms across different federal states, as highlighted by von Haaren & Vollheyde (2019). In 1960, with the detailed environmental policy, landscape planning started to be included in national development policies as an environmental political instrument to protect the functional character of nature (Buchwald 1995; Kılınç, 2018). Landscape planning is crucial now more than ever, as there is currently no other comprehensive environmental planning in Germany that addresses the complete spectrum of landscape functions (or ecosystem services) necessary to be protected for the public by governmental institutions (von Haaren et al., 2014, von Haaren & Vollheyde, 2019).

1/100.000 scale Berlin Landscape Program Plan (Fig. 6) includes development targets under the headings of inner city region, green center, urban transition area, lowlands, orchards, parks, forest, cultural landscape, woodland, river and lake landscape, river valleys. It also includes the landscape structure under the headings of general structural elements, protection and development of urban and settlement structures, protection of cultural and natural landscape structures and development, key measures.



## LANDSCAPE

### Development Targets and Measures

### Development Areas

#### Urban Areas

##### Inner City Region

- \* Preservation and development of green street areas; restoration of streets, promenades, city squares and front gardens
- \* Increasing the perceptibility of waterways; creating promenade areas along waterways
- \* Planting for emphasise special urban situations; planting of courtyards, walls and roofs
- \* Emphasise elements that characterise the landscape in the design of open spaces (e.g. slope edge, historical elements, native plants)
- \* Yüksek kaliteli açık alanların yaratılması durumunda bina yoğunlaştırma

##### Green Center

- \* Conservation and enhancement of an area characterised by vegetation; highlighting different design qualities, considering local history.
- \* Improving the perceptibility of the river Spree.

##### Urban Transition Area with Combined Usage

- \* To improve the urban structure; preservation and enhancement of characteristic townscape areas as well as distinctive landscapes and green structures
- \* Consideration of typical local design elements and special settlement and open spaces (such as parks, gardens, squares, structured settlements of the 1920s and 1930s).
- \* Square creation with the development of structures and leading tree species in large apartment complexes
- \* The preservation of the Volkspark garden and the cemetery ring as an element of the urban structure and to be supported by new parks.
- \* Improve the proportion of green space in commercial and infrastructure areas (greening roofs and walls, creating privacy screens at the edges of sensitive uses).
- \* Restoration of landscape degradation
- \* Preservation and enhancement of characteristic landscape elements; creation of open spaces, greened streets and urban squares characteristics of the local landscape in case of settlement expansion.

##### Lowlands

- \* Consideration of natural relations
- \* Protection of open areas in lowland and hillside regions with typical vegetation
- \* Creation of open green areas along the waterways
- \* Preservation and improvement of the appearance of waterways

##### Settlement Areas

###### Orchards

- \* Maintenance and restoration of cultural landscape elements such as hedges, hedgerows, ditches, small water bodies and fresh meadows.
- \* Protection and development of village areas with typical design features such as meadows, gardens, courtyards and village cemeteries
- \* Restoration of historical streets
- \* Maintenance and improvement of characteristic street trees and refuges
- \* High preservation of landscape-specific open spaces; development of characteristic green structures
- \* Protection and promotion of fruit tree populations, use of traditional ornamental plants in gardens
- \* Preservation of a high proportion of green space in the transition area

###### Parks

- \* Protect and support the population of large-crowned park trees in gardens, parks and streets.
- \* Maintenance and restoration of squares, front gardens, streets and typical settlement elements.

###### Forests

- \* Protection and development of special settlement contexts and characteristic design elements (villa areas, 1920s and 1930s settlement areas)
- \* Protecting and supporting the forest tree population in gardens and open areas of the settlement
- \* Maintenance and development of typical structural elements for the area, such as forest parks, forest cemeteries, forest meadows and rough grasslands.
- \* Preserving a high proportion of greenery in the transition area to forests

## Landscape

### Cultural Landscape

- \* Maintenance and restoration of typical landscape elements such as field edges, hedges, poultry houses, ditches, small water bodies, unpaved field roads and streets.
- \* Restoration of landscape degradation; conservation and restoration village-field connections and typical design elements of village areas such as meadows, old trees, gardens and pastures
- \* Consideration of cultural landscape character and typical structural elements in the development of local recreation areas and parks.
- \* Integration of small-scale agricultural uses in local recreation landscapes; various land management; grassland use in lowland areas.

### Woodland

- \* Development of multi-layered forest stands; protection of old and near-natural forest stands
- \* Maintenance and improvement of landscape elements;
- \* Hute forests, rough grassland, heathland, forest meadows, fields, water bodies and wetlands
- \* Reducing pressure on sensitive forest areas (restriction of private motorised traffic)

### River, Lake Landscape

- \* Protection and enhancement of reed beds, riparian meadows and riparian forests
- \* Restoration of natural vegetation in riparian areas
- \* Improving the accessibility and design of river quality
- \* Maintaining and developing visual relations

### River Valleys

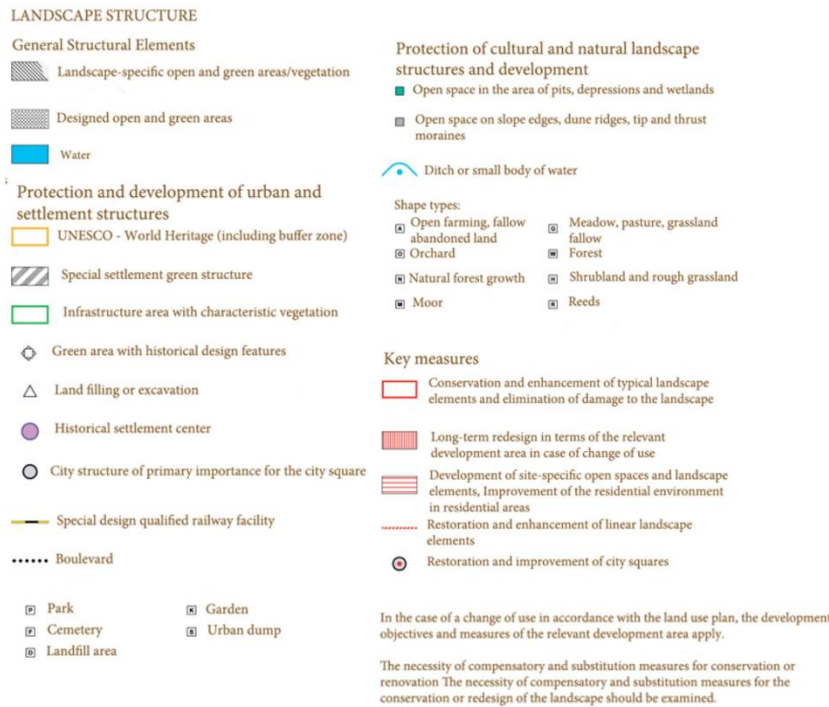
- \* Restoring natural relationships through the removal of obstructions and uses that degrade the landscape.
- \* Protecting and promoting typical and rich meadow landscapes
- \* Protection of waterways
- \* Creation of footpaths, open and green areas along the waterways

**Figure 6.** Landscape Programme Plan, Berlin/Germany (Senate Department for Mobility, Transport, Climate Protection and Environment, 2023).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus



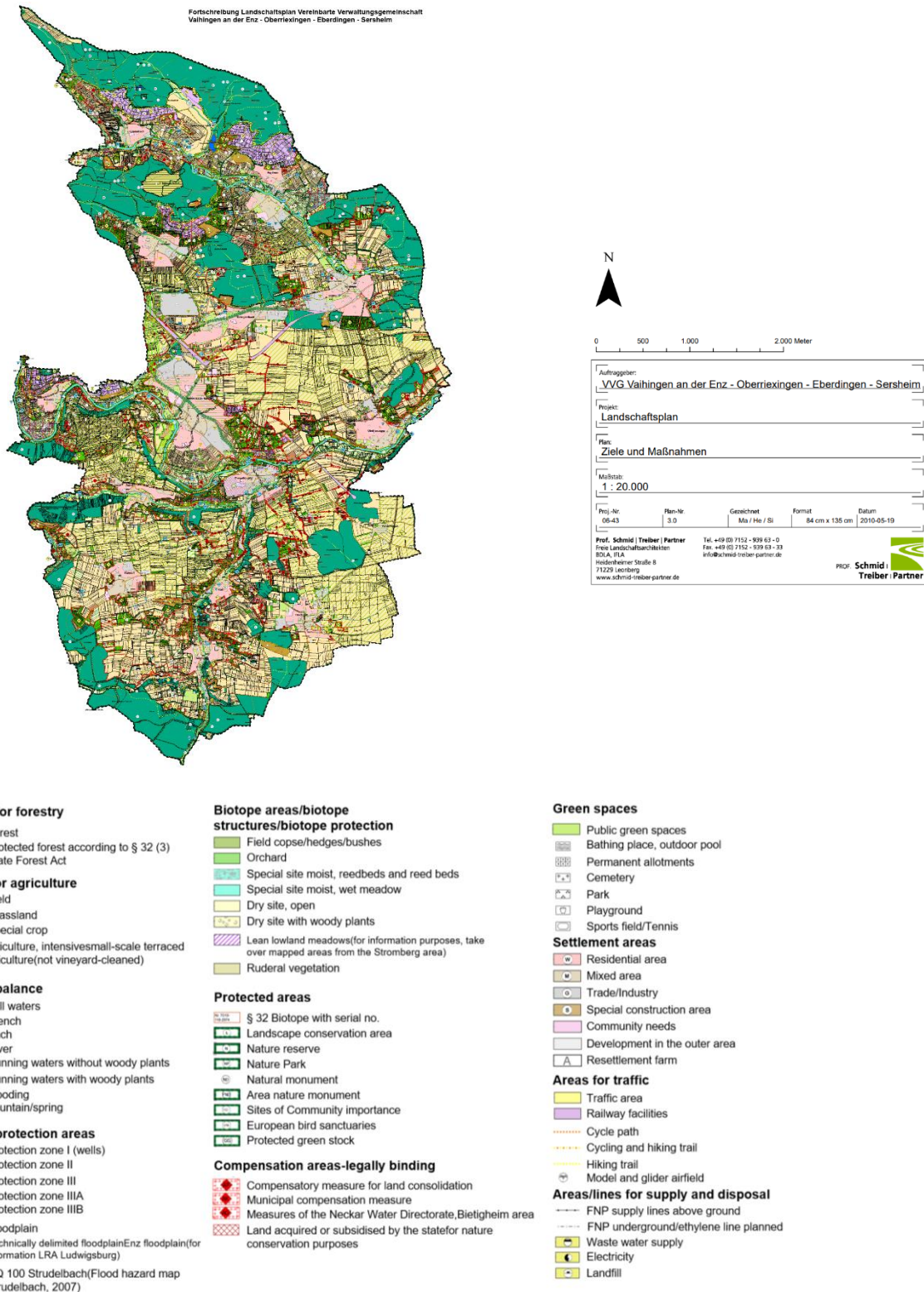
**Figure 6 (cont).** Landscape Programme Plan, Berlin/Germany (Senate Department for Mobility, Transport, Climate Protection and Environment, 2023).

### Germany

#### Vaihingen an der Enz - Oberriexingen - Eberdingen - Sersheim Landscape Plan

At the level of preparatory urban land use planning, the landscape plan (Fig. 7) is an interdepartmental, cross-sectional, ecological contribution to land use planning. Its aim is to organise and guide the various land use requirements, such as settlement, transport, agricultural use and recreation, in such a way that the efficiency of the natural balance is maintained and the landscape is only used within the limits of its natural carrying capacity. In addition, the mandate of the landscape plan includes the specialised planning for nature conservation and the specialised planning for open space-related recreation at the municipal level.





**Figure 7.** Landscape Plan, Vaihingen an der Enz - Oberriexingen - Eberdingen - Sersheim Germany (Anonymous, 2023b)



# IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

## Goals and measures

### Measures in the settlement area

- Village border design
- Design of the entrance to the village
- Design and development of a central green axis in the settlement area
- Reorganisation or redesign of public green spaces
- Safeguarding settlement areas with a high degree of greenery that shape the identity of the area: Consideration of the special requirements for open space quality at the subsequent planning levels
- Special consideration of settlement climatic concerns
- Safeguarding existing green areas / keeping separation green areas open

### Notes for the green order

- Planned settlement areas
- Residential area
  - Mixed area
  - Industrial estate
  - Special area
  - Green space

### Assessment of the impact relevance of planned building areas

- Building land without ecological risk - compensation not required (e.g. re-use of brownfield sites)
- Low ecological risk - compensation possible with effort. Conflicts are to be expected from a landscape planning point of view, but the impact on nature and the landscape can be compensated for overall by green space measures in the green space plan.
- Medium ecological risk. Significant conflicts are to be expected from a landscape planning perspective. The intervention can be compensated with effort. High requirements for the green space plan
- High ecological risk - compensation only possible with considerable effort. Significant conflicts are to be expected from a landscape planning perspective - strong technical concerns. An abandonment of the site is recommended. Very high requirements for the green space plan
- Very high ecological risk - compensation not possible. Land renunciation necessary

### Measures in the open landscape

- Biotope enrichment of intensively used agricultural landscapes (biotope network planning)
  - Structural enrichment taking into account the requirements for species protection (field breeders) with serial no. of the landscape plan
  - Structural enrichment with woody habitats, field margins, etc. with serial no. of the landscape plan
  - Long-term enrichment of the vineyard landscape with grass herb strips, dry stone walls, etc.
  - Recultivation of excavations / fillings taking into account the requirements of the landscape and nature conservation
  - Maintenance of habitats with serial no. of the landscape plan (areas for measures for the protection, maintenance and development of nature, soil and landscape)
- F = Wetland  
T = Dry site  
M = Lean lowland meadows  
G = Wooded habitat complex  
A = Quarry area  
W = Dry stone wall/vineyard walls  
P = Park  
R = Ruderal area

- Landscape-shaping garden house areas - no intensification of use, if possible, reduction of use intensity

### Proposals for deletion, redefinition or redesignation of natural monuments

- delete
- redefine
- reclassify

- Adaptation of agricultural use to the local conditions (low filter and buffer capacity of the soil)
- Approved area not yet filled

### Measures on transport routes

- Design of pathways through the planting of copses (single copses, rows of trees, alleys) or the creation of field margins.
- Design of viewpoints
- Memorandum transfer of train paths that have not yet been plan-approved
- Reference to a possible future route

### Measures at water bodies

- Protection and preservation of a stretch of watercourse (Preservation / maintenance of riparian woods and pollarded willows)
- Development of a section of watercourse (securing a riparian strip, planting measure)
- Ecological design of a watercourse section (Restoration of a watercourse / opening of a culvert)
- Conservation and development of permanent grassland of extensive use
- Implement watercourse development concept
- Draw up a watercourse development plan
- Implement watercourse development plan
- Section of measures on the Enz and Metter
- Section of measures on lateral tributaries

### Measures on or in forest areas

- Designing forest edges to promote the biotope network

### Measures to promote cultural experience

- Design of the viewpoint to the Celtic grave
- Celtic nature trail / Designing the surroundings
- Preserve geological window

### Impact regulation according to § 19 BNatSchG and § 1a BauGB

- "Search areas" for compensation measures in the landscape plan with no. (areas for measures to protect, maintain and develop nature, soil and landscape) nature, soil and landscape)

**Figure 7 (cont).** Landscape Plan, Vaihingen an der Enz - Oberriexingen - Eberdingen - Sersheim Germany (Anonymous, 2023b)



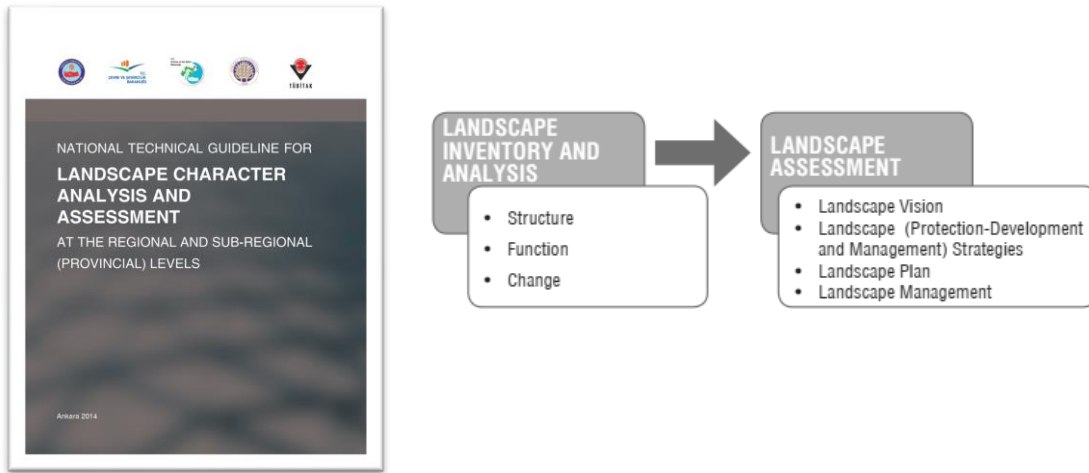


## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RESULTS and DISCUSSIONS

Although there are differences in the mapping language and technique of the landscape plans examined in this study, they all involve the analysis and evaluation of spatial and temporal features related to the structure and function of the landscape. Whether in rural or urban areas, it is noteworthy that the plans are nature-based. Another important point is that landscape plans consist of many sub-categorised plans. For example, the Berlin Landscape Programme-LaPro (landscape planning level) consists of four thematic plans: (1) ecology and environmental protection, (2) biotope and species protection, (3) visual landscape protection, and (4) recreation and open space use (Anonymous, 2023). As a result of the review of various landscape plans, it was found that the National Technical Guideline for Landscape Character Analysis and Assessment at the Regional and Sub-Regional (Provincial) Levels (Fig. 8) provided a sufficient basis for the development of the proposed mapping language and technique. The Guide addresses the landscape planning process within the scope shown in Fig. 8. Mapping terminology and techniques should be prepared for all stages of the process shown in the figure. The context of Landscape Conservation and Development Strategies developed with the Guideline provide the framework that will carry forward the mapping language and technique of the landscape plans analysed. This strategic plan provides a more secure and transparent scientific basis for spatial decisions and the integrated evaluation of all analyses in the maps examined. In addition, the strategic plan stage also provides an opportunity to evaluate the temporal change in the structural and functional characteristics of the landscape in an innovative way.



**Figure 8.** National Technical Guideline for Landscape Character Analysis and Assessment at the Regional and Sub-Regional (Provincial) Levels (left), general framework of landscape planning process (right) (Şahin et al, 2014)

Table 2 shows the categories of Landscape Conservation and Enhancement Strategies defined in the Technical Guidelines. In addition to the terminology for these categories, the guidelines also specify standard colour washes for the categories during mapping. Table 2 also shows the strategic terms and the scope of the National Landscape Strategies. Following five main categories should be used in defining general landscape strategies:

1. Landscape Protection Area
2. Restricted Landscape Use Area
3. Controlled Landscape Use Area
4. Potential Landscape Development Area
5. Landscape Statuses.



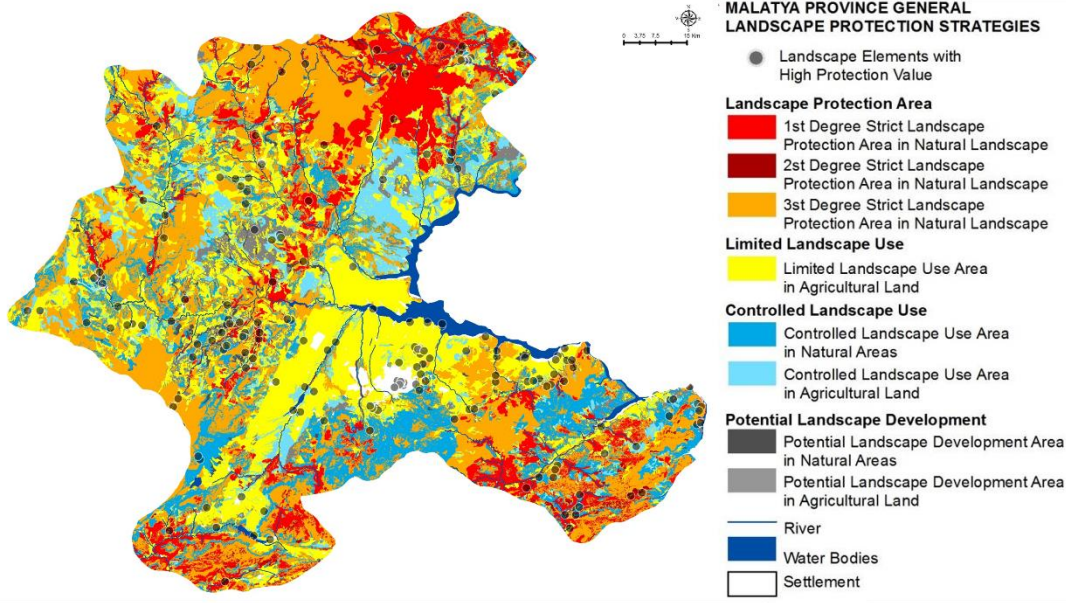
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 2. Landscape Protection Strategies (Şahin et al, 2014)**

NATIONAL TECHNICAL GUIDELINE FOR LANDSCAPE CHARACTER ANALYSIS AND ASSESSMENT AT THE REGIONAL AND SUB-REGIONAL (PROVINCIAL) LEVELS		REGULATION ON PROCEDURES AND PRINCIPLES REGARDING THE DETECTION, REGISTRY AND APPROVAL OF PROTECTED AREAS (It is a regulation focused on natural landscapes, it does not include areas of high conservation value in cultural landscapes.)	IUCN PROTECTED AREA CATEGORIES SYSTEM
LANDSCAPE PROTECTION AND RESTRICTED (SUSTAINABLE) PROTECTION AND USE AREAS	<i>Natural and semi-natural landscapes</i> <b>Landscape Protection Areas</b>	1st Degree: Strict Landscape Protection Area 2nd Degree: Strict Landscape Protection Area 3rd Degree: Partial Landscape Protection Area	<b>Sensitive areas to be protected definitely</b>  <b>Qualified nature protection areas</b>  <b>Ia Strict Nature Reserve</b> <b>Ib Wilderness Area</b> <b>II National Park</b> <b>III Natural Monument or Feature</b> <b>IV Habitat/Species Management Area</b> <b>V Protected Landscape/Seascape</b>
	<i>Cultural landscapes (agricultural areas, residential and industrial areas)</i> <b>Restricted Landscape Use Area</b>		
	Natural and semi-natural landscapes <b>Controlled Landscape Protection Area</b>	<b>The distinctive components of sustainable protection and controlled use area</b>	
CONTROLLED LANDSCAPE PROTECTION AND USE AREA	<i>Cultural landscapes (agricultural areas, residential and industrial areas)</i> <b>Controlled Landscape Use Area</b>		<b>VI Protected area with sustainable use of natural resources</b>
POTENTIAL LANDSCAPE DEVELOPMENT AREAS	Natural and semi-natural landscapes <b>Potential Landscape Development Area</b>		
	<i>Cultural landscapes (agricultural areas, residential and industrial areas)</i> <b>Potential Landscape Development Area</b>		

Using the terminology indicated in Table 2 strategic landscape plan for Malatya province in Turkey can be seen in Figure 8. This plan was integrated into Malatya Urban Development Plan (Şahin et al, 2016).



**Figure 8.** shows the landscape strategic plan prepared for Malatya province in Turkey. (Şahin et al, 2014, Şahin et al, 2016)

The main national guidelines, landscape atlases and others (Şahin, 2008; Uzun, 2010; Şahin et al., 2014a; Şahin et al 2014b; Uzun, 2015) that can be used to create landscape planning language and cartographic symbologies for different spatial scales are shown in Figure 9.



**Figure 9.** Some guidelines and studies on landscape planning in Türkiye



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **4. CONCLUSION and RECOMMENDATIONS**

Landscape plans provide an indispensable landscape base for urban and regional planning types at higher scales. At a lower level in the spatial planning hierarchy, a fragmentary urban design action area is defined. Landscape plans within the scope of this lower scale encourage a landscape-centred approach in land use and protection decisions, and facilitate seamless transitions between scales. Therefore, landscape plans, city plans and urban designs should be prepared with similar techniques. Since landscape plans will provide the base information for all upper and lower scale spatial plans, the planning language should facilitate integration with different types of plans. Especially in undeveloped and developing countries, long-standing and use-oriented city and regional plans are rapidly evolving into urban transformation actions, almost as if rejecting their own performance. One of the most important reasons for this urban transformation is that urban development is not based on landscape. In fact, it is easy to observe that landscape planning is not even included in practice in such countries. Therefore, landscape plans are needed to ensure that urban development or transformation does not cross the threshold of urban replacement or abandoning phase. For this purpose, the mapping language of landscape plans should be designed in a way that seamlessly integrates into practical spatial planning techniques and standards. City plans and urban designs guided by landscape plans play a critical role in creating more livable and sustainable urban areas.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### THE DEPICTION OF NATURE IN LITERATURE: THE CASE OF EMILY BRONTE'S WUTHERING HEIGHTS

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#### ABSTRACT

Inspiration from nature has been a wellspring for artists across various disciplines, including novelists, musicians, and painters. Throughout history, art has often drawn its vitality from the natural world, which was the earliest subject of the earliest artists. Literature is no exception to this phenomenon. When readers first encounter the cover of Emily Brontë's novel, "Wuthering Heights," they receive a strong indication of the atmosphere they will encounter within its pages. Howling winds in the English countryside and the rugged, uncivilized individuals who seem to be molded by the landscape set the stage for the novel's moorland setting. The development of characters in "Wuthering Heights" is intricately tied to the environment in which they were raised, with the narrative brimming with descriptions of the harsh weather and dark skies surrounding the rural English houses. The novel is suffused with the raw power and purity of nature, contrasted against civilization, which Emily Brontë depicts as a potential threat to the natural world. This study delves into the portrayal of nature in "Wuthering Heights" and its role in character development, as well as the contrast between nature and civilization.

**Keywords:** Nature, Literature, Wuthering Heights, Civilization, Nature

## 1. INTRODUCTION

Critics have likened the setting of Emily Brontë's masterpiece, "Wuthering Heights," to the Yorkshire landscape. The Yorkshire Dales National Park (2023) describes this landscape as wild and windswept, tranquil with valleys adorned with hay meadows, dry stone walls, barns, spectacular waterfalls, and ancient woodlands. It is a landscape created collaboratively by nature and people, offering immense beauty and character, making it one of the most picturesque places in the country. (see Figure 1)



Figure 1: Yorkshire Landscape - dales

Brontë appreciated the Pennine region, like the geologist Adam Sedgwick, and found it to be a source of inspiration and a landscape to be understood and enjoyed. (See Figure 2) In her novel, she vividly depicted the geological wonders of the Yorkshire Dales. Her work beautifully captures the rugged terrain and the wild, haunting aspects of the region, surpassing the Picturesque interpretation of the Yorkshire landscapes. Adam Sedgwick (1840) once proposed that imagining the earth's surface stripped of its covering and seeing the "muscular integuments, sinews, and bones of our mother Earth" would allow us to understand the geological forces shaping the landscape. (cited in Heywood, 1993)



Figure 2. Yorkshire landscape - a beck

Emily Brontë's fictional landscape was a reflection of the limestone landscape in the Yorkshire Dales. This manuscript explores how Brontë portrayed the moorland as a source of renewal for a society marred by corruption and slavery. Her understanding of both the landscape and society was influenced by the principles of the Picturesque doctrine. (See Figure 3)



Figure 3. Yorkshire landscape - moors

### **1.1. The Victorian Novel**

The Victorian era marked significant shifts in social dynamics, including the rise of women readers and circulating libraries, which catered to the educated middle class. Novels from this period, like "Wuthering Heights," were often published serially and featured omniscient narrators serving as moral guides. These narratives delved into the psychology of their characters and followed the Bildungsroman style. (Birch, 2009)

Victorian values, characterized by conformity, respectability, faith in progress, and acknowledgment of social injustices, were central to the era's literature. While writers like William Thackeray and Charles Dickens critiqued society, focusing on the upper classes and moral decay, women writers such as Charlotte and Emily Brontë crafted novels centered on romantic love, drawing from the Gothic tradition. Elisabeth Gaskell explored the lives of working-class individuals and unmarried women.

### **1.2. Emily Brontë and the Brontë Sisters**

The Brontë sisters, including Emily, defied societal norms by becoming writers in a male-dominated field, symbolizing the progress in women's education during the 19th century. Their upbringing in an upper-class family provided them with an exceptional education, distinguishing them from women of lower social classes who had limited access to education. Their literary works, including "Wuthering Heights," contributed to the advancement of women's education and independence. (Birch, 2009)





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Emily Brontë, born in 1818, grew up in a household with literary ambitions, with both her parents engaged in writing. Tragically, her mother, Maria Branwell, passed away when Emily was a child, and her aunt, Elizabeth Branwell, joined the family to assist her father, Patrick Brontë, in raising the children. Emily Brontë's writing is marked by mystery and a deep connection to nature, exemplified in the powerful descriptions of the love between Catherine and her dark stepbrother, Heathcliff. (Greenblatt, 2018)

### 1.3. Wuthering Heights: Plot and Characters

Emily Brontë's "Wuthering Heights" revolves around the passionate and destructive love between Heathcliff and Catherine Earnshaw. Set in the wild and desolate moors of Yorkshire, the novel explores themes of revenge, social class, and the supernatural. The narrative is presented through the perspective of Mr. Lockwood, a newcomer to the area who becomes entangled in the dark and tumultuous history of the Earnshaw and Linton families. The novel unveils the tragic consequences of unchecked passion and obsession.

The novel employs a unique storytelling technique, featuring a second- and third-hand manner of narration, including entries in Lockwood's diary and the testimonies of other characters. There is no unbiased narrator in the story, and Lockwood's reliability as a conveyer of facts is questioned due to his vain and shallow nature. In contrast, Nelly Dean, another character, is considered more knowledgeable and trustworthy, although she occasionally glosses over details.

Key characters in "Wuthering Heights" include Heathcliff, Catherine Earnshaw, Hindley Earnshaw, Hareton Earnshaw, Isabella Linton, and Linton Heathcliff.

Heathcliff - A bitter man tormented by the loss of his love, Catherine, and the abuse he endured from his stepbrother, Hindley. He aims to ruin Edgar Linton.

Catherine Earnshaw - She falls in love with Heathcliff but marries Edgar Linton for financial and social advantages, ultimately dying after giving birth to Catherine Linton.

Hindley Earnshaw - The son and heir to the Earnshaw inheritance, he abuses Heathcliff and seeks to degrade him for winning the love of Mr. Earnshaw.

Hareton Earnshaw - Hindley's son, cared for by Heathcliff, he becomes like Heathcliff but falls in love with and marries Catherine Linton.

Isabella Linton - Edgar's naive sister and Heathcliff's wife who runs off to London after a violent incident with Heathcliff.

Linton Heathcliff - Born in London and given to his uncle, he later marries Little Cathy under Heathcliff's influence.

## **2. DISCUSSION**

### **2.1 The Conflict Between Nature and Culture**

In "Wuthering Heights," Brontë continually contrasts nature and culture. Nature is embodied by the Earnshaw family, particularly Catherine and Heathcliff, who are driven by their passions rather than societal ideals. Their dwelling, Wuthering Heights, (see Figure 4) symbolizes the untamed, much like the characters themselves. In contrast, Thrushcross Grange (see Figure 5) and the Linton family represent culture, refinement, convention, and cultivation.



Figure 4. Depiction of Wuthering Heights



Figure 5. Depiction of Thrushcross Grange

The clash between these two opposing forces is exemplified when Catherine is bitten by the Lintons' dog and brought to Thrushcross Grange in Chapter VI. This event sets both sides on a collision course that defines much of the novel's plot. Initially, Wuthering Heights is in turmoil, dominated by Hindley's cruelty, while Thrushcross Grange appears peaceful. However,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Wuthering Heights' influence soon proves overwhelming, drawing the Linton family into Catherine, Hindley, and Heathcliff's tumultuous drama.

Brontë's narrative deliberately prevents readers from straying too far from the wilder characters, often portraying the more civilized characters as weak and silly. This nuanced characterization keeps the novel from a simplistic privileging of culture over nature or vice versa. In the end, the novel is a complex exploration of the interplay between culture and nature, defying easy categorization.

### 2.2. The Portrayal of Setting as Substance

It is easy to perceive the setting as substance, with Catherine and Heathcliff often seen as representative of natural forces, where "nature" is central to their bond. However, the critical language used betrays the elusive nature of "nature." Catherine's character is marked by an 'unrestrained' disposition, which has been evident since her early years. Having experienced the loss of both parents during her early childhood, Catherine has grown accustomed to a life of being 'independent and untamed,' a quality that persists throughout the novel. She expressed her longing for the freedom of her youth, stating, "I wish I were out in the open—I wish I were a girl again, partially feral, tough, and unburdened" (Karanezi, 2019). Catherine does not conform to the rules of discipline or comply with orders. This pattern is evident even while her father, Mr. Earnshaw, is alive, as he allows her to do as she pleases due to her 'wild temperament.' She also defies her brother Hindley during their childhood, consistently resisting his attempts to control or dictate her actions.

### 3. CONCLUSION

Emily Brontë's "Wuthering Heights" beautifully portrays nature as a potent, unadulterated force, while civilization is depicted as a potential threat to this wild essence. The interplay between nature and civilization is a central theme in the novel, where Brontë skillfully uses social dynamics to illustrate the tensions between the two. This study has examined the portrayal of nature in "Wuthering Heights," its role in character development, and the striking contrast it creates between nature and civilization. Brontë's work serves as a testament to the enduring connection between literature and the raw power of nature.

The closing remarks of this manuscript echo a sense of how nature, in the grand course of time, enforces its own laws, mends past wrongs, and buries the tragedy of human egoism in peace. Nature's timeless magnificence and beauty outlast all the trials of life. (Fotheringham as cited in Watson, 1949, p. 254).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **COMMUNITY DEVELOPMENT ASSOCIATION: A PANACEA FOR RURAL DEVELOPMENT IN OGUN STATE**

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#### **ABSTRACT**

The inadequacies of infrastructural facilities in the rural areas of Nigeria have resulted in the formation of Community Development Associations (CDAs) so as to help in the development of their respective communities. The contribution of the CDAs, such as the different types of projects for the provision of infrastructural facilities in the rural areas of Yewa Local Government Area of Ogun State, and the level of participation were examined in this paper. A cross-sectional survey research design was adopted for the study. A structured questionnaire was used to gather data from six purposefully selected CDA executives. The study revealed that all the sampled CDAs had executed health facility provision, electricity supply, and road rehabilitation in their communities. All selected Community Development Associations (CDAs) exclusively depended on member dues for the purpose of infrastructure development, thereby exemplifying the necessity for CDA members to independently contribute towards providing certain fundamental community services. The research suggests that community development organisations (CDAs) should establish strong collaborations with community development professionals inside their respective communities. This partnership would facilitate the effective transmission of complaints and demands expressed by rural individuals to local and state government entities. The ultimate goal is to enhance the likelihood of success for rural development activities. **Keywords:** community development; rural development; local participation; community development associations; rural infrastructure.

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Rural-to-urban migration, primarily driven by underdeveloped rural regions, stands as a significant challenge confronting Nigeria and other growing nations. Consequently, Nigeria experiences an elevated incidence of criminal activities, an inadequate provision of housing, and a pervasive issue of urban congestion. Despite the implementation of GSM services by President Obasanjo in 2002, which have subsequently been extended to semi-urban regions, rural areas continue to exhibit elevated levels of poverty, unemployment, illiteracy, and a dearth of fundamental infrastructure such as housing, electricity, and communication (Afolayan, 2008).

The act of investing in one's local community is a longstanding tradition in American culture. Before the entrance of colonial authorities, communities had already established themselves and were collaborating to mobilise their resources in order to enhance infrastructure and the quality of daily life. The construction of homesteads, farms, and roads was facilitated via communal efforts, as was the establishment of temples, marketplaces, and civic structures such as the "Obas" palace (Akinsorotan & Olujide, 2006).

Various state governments have made efforts to promote rural development through a diverse array of initiatives, including Vision 2010, Mission to Rebuild, Mission to Rebuild Continues, Electrification for All, and others. The provision of social services in rural areas typically necessitates the establishment of a novel system. A significant proportion of the state's populace continues to experience a dearth of fundamental necessities, including access to potable water, decent healthcare services, sufficient educational prospects, and uninterrupted availability of electricity (Ayeni & Audu, 2009).

There seems to have been a deterioration in the functioning of the formal institutions in Nigeria that were formerly entrusted with the well-being of rural communities, hence elevating the significance of Community Development Associations (CDAs). This phenomenon may be attributed to the increased scrutiny placed on governmental entities. In instances where Community Development Associations (CDAs) are present, there is a notable emphasis placed on prioritising the enhancement of both social and economic circumstances. In the realm of education, numerous Community Development Associations (CDAs) construct and afterwards contribute classrooms to both primary and secondary educational institutions (Adejumobi, 1987; Akinsosrotan & Olujide, 2006). The implementation of these programmes is integral to the achievement of a government's objectives in enhancing rural areas.



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The government's attempts to mitigate the challenges associated with rural development are insufficient. This phenomenon may arise from a confluence of elements, encompassing the prevailing disinterest among the general public in political affairs as well as the lack of genuineness or integrity exhibited by political figures who proffer hollow assurances throughout electoral campaigns. The notion that several tiers of government have a collective responsibility to contribute to the advancement of rural areas has been widely acknowledged for a considerable period of time. The Community Development Association (CDA) initiatives aimed at enhancing rural regions in Nigeria, particularly in the state of Ogun, are perceived as a prospective solution to the prevailing rural development challenges in the country.

The significance of CDAs in fostering rural community development is a subject of interest in this study. The primary objective is to identify the project participation by the CDAs, determine the types of projects engaged by the CDAs, and identify the sources of assistance for the project.

### **Literature Review**

#### **Community Development Association**

According to Tamuno (1999), the Community Progress Association (CDA) is an organisation that promotes the principles of democracy and development. These vehicles serve as the means by which transformative ideas, aspirations, and goals can be expressed, organised, and put into action. In an alternative perspective, the utilisation of Community Development Associations (CDAs) in the context of development pertains to a social action procedure wherein community members mobilise themselves for purposeful action, thereby formulating both collective and individual strategies to address their requirements and overcome their obstacles.

Community development organisations provide a platform for citizens to articulate their issues, goals, and needs. The main objective of this initiative is to facilitate community members in comprehending their social obligations, strategizing ways to fulfil those needs, and implementing measures within the constraints of their financial circumstances. Consequently, the primary aim is to develop and sustain a collective entity that embraces and nurtures a common interest trajectory while working together to accomplish mutual goals (Iheanye, 2001). The strategies are implemented by effectively exploiting the existing local resources and, if needed, complementing them with foreign funds (Amadike, 1989). However, the orientation of the CDAs towards mutual aid necessitates significant involvement from each member. The primary aim of Community Development Association (CDA) initiatives is to engage residents



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

in a collaborative endeavour that necessitates the application of democratic principles and practices.

The presumption exists that individuals possess the right to participate in decisions that have a direct impact on their lives. According to Ugal (1992), those who actively engage in the planning and execution of a rural project tend to exhibit higher levels of commitment due to their increased sense of ownership and involvement in the project's outcome. It is often assumed that all projects conducted by the CDA are successful due to the members' inclination to dissociate themselves from failure.

### **National development**

The process of development involves enhancing the size, complexity, or physical strength of an entity. Laah, Adefila, and Yusuf (2014) provide a comprehensive list of alternative conceptualizations of development. The aforementioned concepts encompass capacity building, dialectical transformation, enhanced welfare and human development, modernization, and the elimination of dependence. According to the World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF) in their joint report in 2016, development can be defined as an ongoing process that aims to enhance the overall welfare of the entire population and each individual by promoting their active, unrestricted, and significant involvement in development initiatives, as well as ensuring the fair allocation of benefits derived from these efforts. This term encompasses the multifaceted aspects of development, including economic, social, cultural, and political components.

According to the definition of development provided by Mangat, Zain, and Jamaluddin in 2018, development refers to the utilisation of productive resources within a society with the aim of enhancing the living situations of individuals who are experiencing poverty. Expanding one's economic, political, psychological, social, and cultural connections represents a multifaceted approach to personal development. The primary objective of development is to enhance the quality of life within a specific societal context, commonly within the confines of a nation-state (Adelesi, 2014).

Enhanced food production and quality, improved human capital, upgraded housing facilities, enhanced transportation and communication infrastructure, enhanced educational systems and knowledge dissemination, increased financial resources, and heightened economic prosperity collectively constitute the concept of "national development" as defined by Ugboh (2007).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

According to Abiona and Bello (2013), the advancement of a nation's financial and spiritual well-being while respecting the intrinsic value of its citizens is crucial for its overall development and success.

The achievement of national development requires the gathering of resources to facilitate the holistic enhancement of the economic, social, political, and technological welfare of the population. Chukwuemeka, Ugwuanyi, and Amobi (2013) posit that national growth can be seen as a form of development that encompasses the entire state. This phenomenon serves as empirical support for the diminishing levels of inequality and the existence of a thriving urban underclass. Ensuring the safety and protection of all individuals and their assets residing inside the territorial boundaries of a nation is of paramount importance for the advancement and development of said nation. Adenipekun (2013) asserts that the formation of a nation-state is contingent upon the eradication of inter-ethnic resentment and enmity in both intergroup and interpersonal interactions. Within the framework of this research, national development refers to the continuous progression of a nation's economic, social, political, demographic, scientific, ecological, and technical underpinnings without any imminent threats.

### **Rural development**

Rural development, or community development, encompasses a wide range of factors, such as agriculture, health, education, infrastructure provision, social life, political and economic issues, and integration into the national economy, among others. There exists a prevalent misperception within the realm of politicians and administrators that rural development and agriculture are incompatible. There is a need for a comprehensive approach to rural development in order to alter this image. According to WHO/UNICEF (2016), rural development encompasses a range of challenges, including agriculture, housing, education, employment, and health. Due to the presence of both horizontal and vertical links, encompassing both operational and spatial aspects, these components are seen as an integrated and unified system.

The comprehensive notion acknowledges the intricate and interconnected nature of the diverse factors that impact the quality of life in rural regions. The complexity of this process arises from the interplay of various contextual factors, including economic, social, political, cultural, and technological aspects (Robinson, 1992). To enhance the well-being of individuals residing in rural areas, it is imperative for local governmental entities to integrate the aforementioned



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

elements into their policies and strategies. Rural development endeavours to enhance the resilience of individuals in rural communities by means of reorganising and mobilising these communities holistically, thereby equipping them to effectively navigate the trials and transformations inherent in their everyday existence (Adesida and Okunlola, 2015).

According to Hussain, Khattak, and Khan (2008) and Emeh, Ikechukwu, Eke, Eluwa, Izubundu, and Ukah (2012), rural community development is perceived as a grassroots effort. The aforementioned initiative serves as a mechanism through which individuals residing in a particular region can enhance the capacity of their economic, demographic, and societal structures to withstand and adapt to significant transformations. The tangible advantages of community development, such as the establishment of infrastructure and the generation of employment opportunities, are shaped by various factors, including changes in attitudes, effective utilisation of talents, enhancement of networks, reframing of problems, and resourceful exploitation of available resources. Community development plays a significant role in facilitating the general operation and advancement of a community.

Rural community development encompasses the enhancement of various dimensions of a community, including its physical, financial, human, social, and environmental capitals. Through active engagement in their local community, individuals have the opportunity to cultivate social capital, which may then be leveraged to reassess prevailing viewpoints and broaden both their professional and personal networks. The augmentation of individuals' "human capital" occurs through the acquisition of additional skills and knowledge. As individuals amass money and foster the creation of novel avenues for economic growth, they simultaneously engender fresh prospects for economic opportunity. Furthermore, individuals have the potential to enhance the state of their surroundings.

### **Agencies Involved in Rural Community Development**

The term "development" refers to the process of managing and overseeing the operations and activities of the community. The term "local" refers to something that is specific to a certain area or region. The local government, being in close proximity to the citizens, serves as an effective mechanism for fostering self-help activism, facilitating self-help mobilisation, and facilitating essential local public engagement in the process of local decision-making. According to Edward Scouma, it is within rural communities that one may observe the stark manifestation of unequal distribution of resources, a significant deficiency in purchasing power,





## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

and pervasive poverty, which are readily apparent and undeniable. This phenomenon can be attributed to the fact that rural areas exhibit conspicuous manifestations of unequal resource distribution, limited purchasing power, and pervasive poverty. The Nigerian local government places a high priority on the preservation of the quality of life in rural communities.

According to Adenipekun (2013), the mitigation of the increasing prevalence of rural poverty can be achieved by the activation of a sense of local collaboration by local governments, thereby encouraging the active involvement of community members in all initiatives that have an impact on their lives. In a legal context, the term "legally independent from the government" refers to a state or entity that operates autonomously and is not subject to direct control or influence by governmental authorities. The Nigerian federal government has implemented a policy mandating the establishment of local development organisations in all 97,000 rural villages across the country.

Therefore, these organisations will serve as crucial catalysts for community transformation. Prior to assuming accountability for their personal growth, it is imperative for these heterogeneous individuals and collectives to acknowledge their capacity to effect alterations in their environment and conditions. It is imperative that individuals possess a comprehensive understanding of political matters in order to effectively assume this position. The directorate of social mobilisation is actively engaged in mobilising the general public with the aim of facilitating a transformative era of rural development that is centred around the needs and well-being of individuals while also promoting integration and authenticity.

Town unions, community development associations, social clubs, corporate movements, professional bodies (such as the National Union of Road Transport Workers), bar associations, medical associations, and fraternities like the Rotary Clubs are examples of structured and organised voluntary associations found in both rural and urban regions. The organisation has a widespread membership base of individuals around the nation who espouse their shared principles and beliefs. These clubs occasionally engage in community improvement initiatives alongside their primary focus on servicing their members. The ethnic and cultural disparities among these groups may potentially contribute to the exceptional aptitude of certain individuals in the role of community organisers.

**Informal Group Structure:** Informal or inadequately organised pressure groups have a comparable impact on local communities. These organisations encompass the village elders



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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council, student union, umuada, and other similar entities. These organisations discovered that Nigeria's influential regional and local leaders have the potential for mobilisation.

The considerable influence exerted by ancient rulers over the populace is widely acknowledged. The majority of Nigerians continue to hold traditional leaders in high regard and place their trust in them, recognising their crucial role in the mobilisation of resources. The Yorubas and Binis residing in the northern region of south-western Nigeria hold this belief. The Emirs exercise authority over the lives and actions of their subjects. This phenomenon exhibits a lesser degree of validity within the South East region, particularly among the Ibos, Ibibios, and Ijaws, who adhere to egalitarian and republican principles, displaying comparatively lower levels of loyalty and susceptibility to violence. In contemporary culture, affluent individuals frequently strive for conventional positions of authority.

Given that these customary leaders generally govern several communities or villages, the perspectives and standing of the triumphant candidate may not be universally acknowledged beyond their own village, even subsequent to a fatal confrontation. In the event of a confrontation between traditional leadership figures and grassroots entities such as local unions and social organisations, which are representative of and accountable to the populace, there is a potential for adverse consequences arising from widespread mobilisation efforts, particularly in the eastern region. The utilisation of popular mobilising agents for self-help projects in rural development should be approached with prudence by Eastern Nigerian states, in contrast to their Western and Northern counterparts.

### **Theoretical Framework**

The study employed the Locality Development Theory as a conceptual framework. The necessity of providing a theoretical justification for the involvement of the community in rural development, as well as examining the specific challenges associated with the role of Community Development Associations (CDAs) in planning and developing rural infrastructure, has impacted the choice of theoretical framework. (Rothman, 1977; Rothman et al., 2001). The theory posits that optimal community development occurs when a diverse array of individuals at the community level engage in the process of establishing objectives and undertaking subsequent activities, such as resource mobilisation, to attain those objectives. According to Agbese (1996) and Yakubu & Aderonmu (2010), community development is most effectively achieved when it is carried out at the local level with the participation of



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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diverse individuals. The premise underlying this concept is that the involvement of local stakeholders in problem-solving and cooperation is essential for the effectiveness of community-level initiatives. Indeed, it is verifiable that a collective of individuals has the potential to achieve a greater level of productivity compared to a person working in isolation. The responsibility for preserving their own interests should lie with the participants rather than the organiser, and this approach underscores the significance of leaders promoting community engagement.

According to Nwaru (1997) and Dizon (2012), it has been seen that communities experience several positive outcomes, such as enhanced cohesiveness, pride, confidence, and problem-solving capabilities, as a consequence of certain factors. The concept revolves around enhancing the capacity of local institutions to efficiently address unanticipated demands. According to Boateng (1998), it is contended that neighbourhoods have the potential to independently address and resolve a majority, if not all, of their own challenges, as well as determine their own trajectory for future development. In order to adequately tackle the obstacles associated with infrastructure development, it is imperative for communities to get assistance from both the local population and the relevant institutions. Additionally, the acquisition of information, intelligence, and expertise in political and economic matters is crucial for successful The objective of locality development is to engage individuals in productive endeavours for the betterment of their community, with the aim of attaining economic stability, enhancing social and/or political circumstances, safeguarding against potential risks, enhancing infrastructure, and conserving its historical, cultural, and environmental attributes (Davids et al., 2005). The primary objectives of the technique are to strengthen the collective, motivate individuals to generate innovative approaches for collaborative endeavours, and cultivate an understanding of the value of cooperation among its members.

### **Methodology**

Primary and secondary data of quantitative and qualitative types were used for this study. Primary and secondary data were collected in order to examine and understand the nature of the contributions of CDAs to infrastructural development in the rural communities of Itolu CDAs in Yewa South Local Government. The research design used in collecting primary data was the survey method. The survey method was chosen because of the validity of the findings it guarantees and because it is versatile enough to provide access to a variety of data. It is also



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

relatively accurate and representative (Abumere, 2002). For the primary data collection, a structured questionnaire was the main instrument used. The questionnaire was chosen because of its ability to yield adequate data to support generalization.

Available data from the department of community development in the Yewa South Local Government Area indicated that 45 CDAs were registered in Yewa South Local Government. However, the study will concentrate on the CDAs registered under the Itolu community. The registered CDAs under the Itolu community are 12: Mega, Orelope I, Orelope II, Itolu-Ile, Ifesowapo, Ifelagba, Progress, Mercy, Ajewole, Adun-Ife, Orisunmibare, and Itolu Central.

To minimise the cost of research and to be able to carry out an in-depth study of these associations in their respective communities, six (6) most active community development associations in the Itolu community were purposefully selected for study. They include Mega, Orelope I, Progress, Mercy, Adun-Ife, and Itolu Central CDAs.

The most active CDAs were identified with the assistance of the Head of the Community Development Department of the local government. There are 13 executives in each CDA, making a total of 78 for all six communities. However, a structured questionnaire was administered to 50 executive members of these associations who were purposefully selected.

To obtain representative data, 50 executives were selected out of 78 executive members. The selection is as shown in Table 1. The 5-point Likert scale, that is, from strongly agree = 5 points to strongly disagree = 1 point, was used in analysing the data obtained from the residents, while tables were used to synthesise the data obtained from the CDAs' leaders.

**Table 1:** Selection of Respondents from each CDAs

CDAs	Total Number of Executives	Selected Respondents
Mega	13	8
Orelope I	13	7
Progress	13	7
Mercy	13	7
Adun-Ife	13	7
Itolu-Central	13	7
<b>Total</b>	<b>78</b>	<b>50</b>

**Source:** Field Survey, 2023



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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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### **RESULTS and DISCUSSIONS**

The data gathered were analysed using frequencies and percentages. The frequency of the study was obtained by assigning weights to the 5-point Likert scale, that is, from strongly agreeing (5 points) to strongly disagreeing (1 point).

The findings of the study revealed that, out of the 50 respondents, 11 fell within the age range of 20–30, 9 were between 31 and 40, 15 were between 41 and 50, 10 were between 51 and 60, and 5 were over 61 years old. For the gender of the respondents, the study indicated that there were 32 males and 18 females that were examined. The educational level of the respondents showed that 7 had primary education, 26 had secondary education, 13 had tertiary education, and 4 had informal education. The occupations of the respondents showed that 10 are farmers, 10 are craftsmen, 5 are traders, 5 are apprentices, 15 are civil servants, and 5 are retirees. This is clearly represented in Table 2.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 2: Respondents Demographic Characteristics**

	Frequency	Percentage
<b>Age</b>		
20 – 30 years	11	22.0
31 – 40 years	9	18.0
41 – 50 years	15	30.0
51 – 60 years	10	20.0
>61 years	5	10.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Sex</b>		
Female	18	36.0
Male	32	64.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Education</b>		
Primary	7	14.0
Secondary	26	52.0
Tertiary	13	26.0
Informal	4	8.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Occupation</b>		
Farming	10	20.0
Craftsmanship	10	20.0
Trading	5	10.0
Apprentice	5	10.0
Civil servants	15	30.0
Retirees	5	10.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Source:** Field Survey, 2023

The findings of the study also reviewed that the projects in which CDA members can participate are many. Some of the projects include, among others, health facilities, road construction, electricity supply, school rehabilitation, market stall construction, drainage construction, and



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

water supply. The outcome of the data revealed that 11 respondents, which represents 22.0 percent of the sample size, participated in health care facility projects, 9 (20.0 percent) participated in road construction projects, 10 (20.0%) participated in electricity supply projects, 5 (10.0%) participated in school rehabilitation, 6 (12.0%) participated in market tower construction, 4 (8.0%) in drainage construction projects, and 5 (10%) in water supply projects. One common observation in the outcome of the study is that at least roughly one-tenth of CDA members participated in some of the listed projects. Participation is one of the prerequisites for sustainability in CDA programmes, as shown in Table 3.

**Table 3- Project Participation by CDAs**

Projects	Frequency	Percentage
Health facilities	11	22.0
Road Construction	9	18.0
Electricity Supply	10	20.0
School Rehabilitation	5	10.0
Market Stalls Construction	6	12.0
Drainage Construction	4	8.0
Water Supply	5	10.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Source:** Field Survey, 2023

After the identification of the projects engaged by the CDAs members, the study examined the different forms of participation. From the findings of the study, 2 (4.0%) of the CDAs participated by contributing material resources, while 7 (14.0%) participated by contributing money, and 26 (52.0%) by money, time, material, and labour. Only 13 (26.0%) participated in the implementation coordination, and 2 (4.0%) did not participate in any form of activity.

This result showed that almost all of the 6 CDAs (96.0%) were involved in at least one type of project participation or another activity. This involvement is likely to lead to commitment, which should eventually lead to the successful implementation of their objectives. This is shown in Table 4.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 4 - Types of Participation by CDAs**

	<b>Frequency</b>	<b>Percentage</b>
Material resources contribution	2	4.0
Money contribution	7	14.0
Money, Time, Materials and Labour Participation	26	52.0
Implementation coordination	13	26.0
No Contribution	2	4.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Source:** Field Survey, 2023

The study required the CDAs executives to indicate the sources of assistance for projects in their community. The findings revealed that no respondent indicated a loan as financial assistance from the government in the selected CDAs. However, 1 (2.0%) indicated gifts as a form of assistance from the government, while 18 (36.0%) indicated grants as assistance, and 31 (62.0%) indicated no assistance from the government at all.

The results of the study indicate that CDAs heavily depend on their own proactive efforts and publicly accessible resources in order to successfully carry out their projects. Furthermore, it can be postulated that there is a lack of adequate support from various tiers of government for the local development initiatives undertaken by Community Development Associations (CDAs). The government's inability to address these challenges may be attributed to enduring social, political, and economic difficulties, as well as the lack of substantive appeals made by the CDAs to the government. Furthermore, this phenomenon has facilitated the rural population in acknowledging their capacity to fulfil their own fundamental needs. Table 5 provides a visual representation of this information.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Table 5- Government Assistance to CDAs**

Assistance	Frequency	Percentage
Loan	-	-
Gifts	1	2.0
Grants	18	36.0
None	31	62.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

**Source:** Field Survey, 2023

### **DISCUSSION of FINDINGS**

The study required the CDAs executives to indicate the sources of assistance for projects in their community. The findings revealed that no respondent indicated a loan as financial assistance from the government in the selected CDAs. However, 1 (2.0%) indicated gifts as a form of assistance from the government, while 18 (36.0%) indicated grants as assistance, and 31 (62.0%) indicated no assistance from the government at all.

The results of the study indicate that CDAs heavily depend on their own proactive efforts and publicly accessible resources in order to successfully carry out their projects. Furthermore, it can be postulated that there is a lack of adequate support from various tiers of government for the local development initiatives undertaken by Community Development Associations (CDAs). The government's inability to address these challenges may be attributed to enduring social, political, and economic difficulties, as well as the lack of substantive appeals made by the CDAs to the government. Furthermore, this phenomenon has facilitated the rural population in acknowledging their capacity to fulfil their own fundamental needs. Table 5 provides a visual representation of this information.

### **CONCLUSION and RECOMMENDATIONS**

The study concluded that the CDAs had executed health facility provision, electricity supply, and road rehabilitation in their communities. The majority of the electricity projects were facilitated by the donation of electric transformers by some philanthropists to the communities on the condition that the communities shoulder the responsibility of the installation of the transformers. All the community development associations sourced their finance for



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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infrastructural development from compulsory levies paid by members only. Other means of projects' funding include financial assistance from members of the diaspora and philanthropists, as well as voluntary donations by community members. The study further showed that CDA members rely solely on their own efforts to provide some basic amenities for the community.

Based on the aforementioned findings, the study proposes that Community Development Associations (CDAs) engage in close collaboration with community development workers inside their respective communities. This collaborative effort aims to effectively channel community concerns and demands to both local and state governmental bodies. The two tiers of government, specifically the local government, which is purportedly grounded in the community, ought to recognise these Community Development Associations (CDAs), streamline their operations, and ensure sufficient oversight, coordination, motivation, monitoring, and evaluation of their initiatives through the appropriate government personnel. Non-governmental organisations (NGOs), such as population development associations (CDAs), have demonstrated significant advantages in rural areas by effectively supplementing government initiatives, benefiting both the government and the local population.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **ANALYSIS OF OUTSOURCING SERVICES AS A TOOL FOR ORGANIZATIONAL SUSTAINABILITY**

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#### **ABSTRACT**

The advent of globalization put outsourcing to grow into one of the far and wide incorporated commercial stratagems for conveying exceptional services to clients in the business area. Conversely, in spite of the amassed inclination in outsourcing engagements and still exist the derisory literature groundwork on how outsourcing undertakings upset organization routine in manufacturing sector. To bung up the lacuna this work craved to analyze the logistics outsourcing services as a tool for organizational sustainability in manufacturing sector in Nigerian firms. The paper sought to determine whether cost affects organizational performance, to assess whether quality of the goods manufactured influence organizational sustainability, to find out whether technology adaption has effects on organization performance and finally to establish whether risks has great effects on organization performance at Nigerian firms Limited. The researcher used descriptive research design method to conduct the study. The paper considered a population of 42 members of staff particularly the three major departments includes Production, Transport and Agriculture, Engineering for the interview. The investigator used census survey method to pick the sample size owing to the fact the population was small. The Primary source of data was applied by the use of questionnaires. The quantitative data was analyzed by means of Uni-variable, Bi-variable and Multi-variable analysis using statistical package for social sciences (SPSS) version 21 software. The findings appraised that: Cost, quality, technology adaption and organization performance exist between them a significant strong positive relationship. Also the study established an insignificant positive weak relationship that exists between risks and organization performance. Hence, the study recommended that manufacturing companies should do a thorough finding on the service provider in term of their tenacity, capability and resources if they can handle the core activity of the company before contracting out such services, Organization should engross the third party on the benchmark or quality of standards expected of them.

**Keywords:** Logistics, Outsourcing, Organization, Sustainability





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Cost reduction and effectiveness has caused most of the organization to be specialized in the limited number crucial areas. This will pave the way for the organization to move towards the outsourcing activity. Traditionally, outsourcing has performed mainly for the peripheral activities such as cleaning, catering and security. But now it is mainly focused on more crucial activities of the business such as design, manufacture, marketing, distribution and information systems. Manufacturing industry was the leading business activity in Nigeria during the early 80's both in terms of size and employment. The industry was employing over 200,000 family households and about 30% of the labor force in the national manufacturing sector. Later the sub-sector started declining in the mid-1980s until the 1990s. Efforts to boost growth in manufacturing industry have been undertaken with outsourcing being one of the strategies. Nigeria's share of manufacturing exports to the global market is estimated to be about 10.75 percent in 2019 and it was 6.3944% in 2021 that is favorable compared with its immediate neighbors Uganda, Tanzania and Nigeria, according to World Bank collection development indicators on August 2023 (Nigeria Institute for Public Policy Research and Analysis, 2013). Nigeria manufacturing output for 2021 was \$64.41B, a 17.65 percent increase from 2020 which was then at \$54.73B, a 6.03% increase from 2019 which was \$51.63B, a 26.89 % compared it was in 2018 which is \$40.69B, a 23.89% increase from 2017(World Bank)

Agricultural manufacturing organizations are constantly in search of new solutions and strategies to develop and improve organization performance. One of the strategies which they have adopted is outsourcing for competitive advantage. Even though many studies have been done in relation to outsourcing, very few have focused on effects of outsourcing in manufacturing sector. Despite the rapid growing trend in outsourcing there are limited published sources of literature related to outsourcing in Nigeria. Meclah *et al.*, (2010) mentioned that there are limited studies on outsourcing. Based on these facts, the present study will be carried out to fill this gap by finding out the effects of outsourcing on organization performance in a manufacturing sector with KK Nigeria Limited as a reference industry with intent to determine whether cost affects organizational performance of KK Nigeria Limited, to assess whether quality affects organizational performance at KK Nigeria Limited. To find out whether technology adaption affects organization performance KK Nigeria Limited and to establish whether risks affects organization performance at KK Nigeria limited



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **RELATED WORKS AND THEORIES**

Iborida, Emmanuel et al (2021) Worked on the Pros and Cons of outsourcing logistic Functions among Manufacturing Firms in Southwest, Nigeria and found out that there is a significant influence of outsourcing on a reduction in operational and project management cost. Also, it leads to competitive advantages, the flexibility of operation, and sufficient time for process planning

Muralitharan shanmugan et al (2019) researched on Manufacturing outsourcing to achieve organizational performance through manufacturing integrity capabilities but concluded that supply chain management played a significant role for successful outsourcing activity that meet the organization objective mainly on cost reduction and improvement of core function for business sustainability and growth. Another study comparative study of logistics outsourcing and in-house services on customer satisfaction among Nigerian manufacturing companies done by Omona-a Hamilton Horsfall et al (2018)

#### **Resource Based View (RBV) Theory**

RBV theory puts more emphasis on the firm's internal resource rather than external opportunities and threats created by industry conditions. The theory maintains that in order to generate sustainable competitive advantage a resource must provide economic value and must be presently scarce, difficult to imitate, non-substitutable and not readily obtainable from markets. The theory also relies on two key points; first that resource are determinants of firm performance and second that resources must be rare, valuable, difficult to imitate and non-substitutable by other rare resources. When the latter occurs a competitive advantage has been created.

#### **Contractual Theory**

For an outsourcing strategy to be implemented, it requires a legally bound contract which sets the institutional framework in which each party's rights, duties, and responsibilities are clearly defined. The goals, policies, practices, and strategies on which the arrangement is based are also specified in the contract. The purpose of the outsourcing contract is to facilitate proper exchange of services between the two parties, prevent misunderstanding, prohibit moral hazards in a cooperative relationship, and protect each party's proprietary knowledge. Properly written contracts prevents risks arising from non-performance and misunderstanding, and also reduces uncertainty likely to be faced by firm decision making process.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### METHODOLOGY

The researcher used descriptive research design method in carrying out his study. This research work used of both primary and secondary source of data. The primary data was collected through questionnaire, and personal interview. Two set of questionnaire and interview guide was employed in the course of this study. The questionnaire was designed in line with the objectives of the study and to elicit information on the logistics outsourcing services as tool for organizational sustainability from management and secondary data was achieved through the use of text books, thesis journals and internet materials, as well as publications related to logistics and distribution methods which was used mainly for literature review of Company, distributors. The study targeted a population of 42 management staff from three major departments of KK, namely: Production, Transport and Agriculture, and Engineering. Data was analyzed through descriptive statistics and inferential analysis by use of statistical package for social sciences (SPSS) version 21 software. Both Correlation and Multiple Regression analysis was used to test the relationship between the independent variables and the dependent variables.

Regression model: the equation was expressed as follows:

$$Y = \alpha + \beta_1 (X_1) + \beta_2 (X_2) + \beta_3 (X_3) + \beta_4 (X_4) + e$$

Y – Organization Performance

$\alpha$ - Constant (coefficient of intercept)

X1 – Cost Reduction

X2 – Quality Improvement

X3 – Technology Adoption

X4 – Risk Reduction

e – Error term

$\beta_1, \beta_2, \beta_3, \beta_4$  – Regression coefficient for four variables.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### RESULT and DISCUSSION

		Cost	Quality	Technology adaptation	Risks	Organizational performance
Cost	Pearson Correlation Sig. (2-tailed)	1	-0.253** 0.48	.532** .001	.509** .002	.701** .006
Quality	Pearson Correlation Sig. (2-tailed)		1	.530** 0.46	.079 .647	.525** .010
Technology adaptation	Pearson Correlation Sig. (2-tailed)			1	0.494** .035	.670** .012
Risks	Pearson Correlation Sig. (2-tailed)				1	.140**
Organizational performance	Pearson Correlation Sig. (2-tailed)					1

**N=36**

From the above table, it is shown that there was a significant weak negative relationship between cost reduction and quality improvement ( $r = -0.253$ ,  $p = 0.048$ ). The more the quality is improved the less the cost is reduced on the products and services and vice versa. Technology adaption and cost reduction have a significant positive moderate relationship as explained by the Pearson correlation coefficient of 0.532 and a p value of 0.001. This can be interpreted to mean that the more the company adapts to new technologies in production and delivery of its goods and services the more the cost is reduced. There was also a moderate positive but significant relationship between risk reduction and cost reduction ( $r = 0.509$ ,  $p = 0.002$ ). The



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

implication of this is that the more the risk reduced the more the cost is reduced. Cost reduction and organization performance have a significant strong positive relationship as implied by ( $r=0.701$ ,  $p=0.006$ ). The more the cost is reduced the more the organization performs.

Quality and technology adaption have a significant moderate positive relationship since the Pearson correlation coefficient is 0.530 and p value is 0.046. This implies that more adaption to technology leads to more improvement in quality. There is an insignificant positive weak relationship between quality improvement and risk reduction ( $r=0.079$ ,  $p=0.647$ ), an indication that risk does not necessarily mean an increased quality improvement. Quality and organization performance have a significant moderate positive relationship as shown by correlation coefficient of 0.525 and a p value of 0.010. The interpretation of this relationship is that an increase in quality moderately increases the organization performance.

Technology adaption and risk were found to have a significant positive relationship ( $r=0.494$ ,  $p=0.035$ ). This is interpreted to mean that the more the technology is adapted the more the risk is reduced. There was a significant positive relationship between technology adaption and organization performance ( $r=0.670$ ,  $p=0.012$ ). More adaption to technology implies an increased organization performance. Finally, the results shows that there is an insignificant positive weak relationship between risk and organization performance as the correlation coefficient was found to be 0.140 and p-value was 0.414. This is interpreted to mean that an increased risk does not necessarily imply an increased organization performance.

### **Regression Analysis results**

Regression is the determination of a statistical relationship between two or more variables (Kothari, 2004). This study utilized multiple linear regression analysis to examine the relationship of the predictor variables with the dependent variable. Adjusted R<sup>2</sup> which is known as the coefficient of determination was used to explain how organization performance varied with cost, Quality, technology adaption and risk. The model summary table shows that 60.5% of change in organizational performance can be explained by four predictors namely cost, Quality, technology adaption and risk an implication that the remaining 39.5% of the variation in Organizational performance could be accounted for by other factors not considered in this study.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.806a	.650	.605		.465

a. Predictors: (Constant), Cost, Quality, Technology adaption&Risks

Analysis of variance (ANOVA) was done to establish the fitness of the model used. The ANOVA table shows that the F-ratio ( $F=9.301$ ,  $p=.000$ ) was statistically significant. This means that the model used was appropriate and the relationship of the variables shown could not have occurred by chance.

Model	Sum of squares	Df	Mean square	F	Sig
Regression	21.759	4	5.440	9.301	.000 <sup>b</sup>
Residual	18.130	31	.585		
Total	39.889	35			

a. Dependent variable = organizational sustainability

b. Predictors: (Constant), Cost, Quality, Technology adaption&Risks

### Regression coefficients

Model	Unstandardized coefficients		standardized coefficients	t	Sig
	B	Std error	Beta		
<b>Constant</b>	1.828	.701		2.609	.014
<b>Cost</b>	.118	.148	.142	.797	.007
<b>1 Quality</b>		.153	.277	1.474	.036
<b>Technology</b>	.225	.176	.149	.763	.042
<b>Risks</b>	.134	.148	.242	1.423	.165
	.211				

c. Dependent variable = organizational sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The above table gives the results for the regression coefficient for the multiple linear equation.  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$  which by supplying the coefficients becomes:  $Y = 1.828 + 0.118 X_1 + 0.225 X_2 + 0.134 X_3 + 0.211 X_4$

Giving to the regression equation proven, holding all independent factors a constant then organization performance will be 1.828 units. From the regression equation holding all other independent variables a constant, a unit increase in cost will lead to a 0.118 improvement in organization performance; a unit change in quality will lead to a 0.225 increase in organization performance; a unit increase in technology adaption will lead to a 0.134 increase in organization performance and a unit increase in risks will lead to a 0.211 increase in organization performance. However, at 5% level of significance and 95% level of confidence, cost reduction, technology adaption and quality has a significance influence on the organizational performance with p-values of 0.007, 0.036 and 0.042 respectively and therefore their coefficients should be retained in the final model. The P-value associated with the coefficient for risk is 0.165 and implication that though risk has an influence on the organizational performance, its effect is insignificant and so it may be dropped in reporting the final model. The results further infers that of all the predictors considered in this study quality improvement contributes the most to the organizational performance followed by technology adaption as implicated by their larger coefficients.

### CONCLUSIONS

As for each the regression equation established, holding all independent factors constant, then organization performance will be 1.828 units. From the regression equation holding all other independent variables a constant, a unit increase in cost will lead to a 0.118 improvement in organization performance; a unit change in quality will lead to a 0.225 increase in organization performance; a unit increase in technology adaption will lead to a 0.134 increase in organization performance and a unit increase in risks will lead to a 0.211 increase in organization performance. However, at 5% level of significance and 95% level of confidence, cost, technology adaption and quality have a significance influence on the organizational performance with p-values of 0.007, 0.036 and 0.042 respectively and therefore their coefficients should be retained in the final model. The P-value associated with the coefficient for risk is 0.165 and implication that though risk has an influence on the organizational performance, its effect is insignificant and so it may be dropped in reporting the final model.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

The results further infer that of all the predictors considered in this study quality contributes the most to the organizational performance followed by technology adaption as implicated by their larger coefficients.

### **RECOMMENDATIONS**

Based on the objective one which is cost, organizations should not expect guaranteed cost reduction in all the year marked areas. Even though respondents agreed there was cost reduction, this was only moderate in some areas. Therefore organizations should not outsource an activity fully until they have confirmed beyond doubt that the service provider is capable of handling the activity. Based on the second objective on quality, it turned out that it was very difficult to measure quality. It is therefore recommended that organization should engage the service provider on the quality standards which are expected before entering into the contract. Based on the third objective on technology adoption and in line with the ever changing technology it is believed that manufacturing operations will continue to become more and more complex and challenging. It is therefore recommended that when outsourcing organizations should select the service provider on the basis of consistent technical and managerial capabilities. The study finding show that technology has a significant influence on organization performance. Based on the fourth objective focusing on risks, organization ought to know that risk is a very sensitive issue which if wrongly handled can bring many problems for the firm. It was recommended that service providers should only handle particular risks which even if they occurred would not affect the entire organization performance. Organizations should never hand over all the responsibilities to service providers. Lastly the general recommendation was that organizations should outsource with a clear picture in mind as to why they want to outsource. When organizations outsource they should have measurable indicators in form of Key Performance Indicators (KPI) for the service provider



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EXPLORING THE IMPACT OF IOT-BASED IRRIGATION SYSTEM ON CROP FARMING: IMPLICATION FOR SMART AGRICULTURAL PRACTICES

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#### ABSTRACT

The incorporation of advanced technology into farming systems has helped to introduce innovative developments to the agriculture industry. Modern agricultural equipments are embedded with sensors that could communicate with each other and the users given its précised location and condition in real-time. Internet of Things (IoT) is a term that refers to the use of connected devices or systems embedded with sensors in real-time. Using simple terminology, IoT is the interconnectivity of devices or systems with embedded sensors that could send or receive data among them using the internet. Internet of Things (IoT) plays a very crucial role in the agriculture industry thereby helping to reduce the cost of wastage, enhancing effective usage of farm tools and increasing farm products. According to Laksiri, et al. (2019), the development of an effective IoT-based irrigation system is a crucial demand of farmers in the field of agriculture. This paper explores the impact of IoT- based irrigation system on crop farming. The paper discussed the major application areas of automated irrigation system and also highlighted some of its advantages. Conclusively, the paper affirmed that farmers' are able to monitor the conditions of their field (soil moisture, temperature, humidity, Light) from anywhere using sensors and automated irrigation system.

**Keywords:** Advanced Technology, Internet of Things (IoT), Irrigation System.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### INTRODUCTION

Modern day agricultural practices are now more precise, smarter and data-cantered.



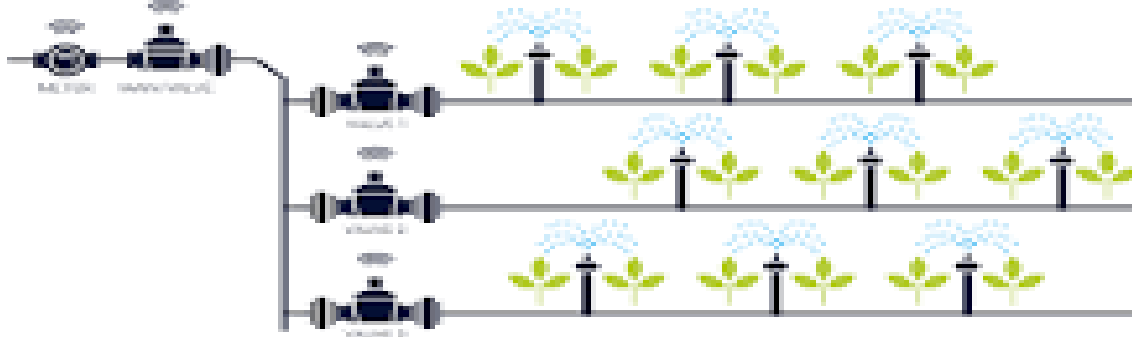
The development of Internet of Things (IoT) based technologies have helped to introduce innovative developments to that could help monitor soil moisture, humidity, temperature, light, etc using sensor enhanced devices for the irrigation system. Irrigation system requires automation to ensure that the moisture and temperature of the field do not fall below the brink. The light intensity control in the greenhouses is automated alongside with the irrigation system. Farmers are thereby able to monitor the field conditions from anywhere as they periodically receive notifications from their Internet of Things (IoT) based mobile devices. This paper work evaluates the impact of IoT-based irrigation system on crop farming.

### RELATED LITERATURE

The studies of Yunseop, et al. (2012) suggest that the total number of land that farmers use for food production has been experiencing a decline over past decades. The increasing need for food and the growing demands of consumer are key reasons why agriculture industry find it hard to develop techniques that will allow them to meet up with the rising requirements ( Jha, et al., 2019). Alexandros, et al. (2012) state that the need for smart agriculture arises considering the fact that farmers frequently need to visit their farm yard to have a better understanding of their crop conditions. In recent times, agriculture sectors are incorporating artificial intelligence (AI) systems and solutions into their farming operations (Mohr, 2021). According to Weersink, et al. (2018), modern agricultural practices now employ smart irrigation system so as to have a better understanding of their agricultural practices. The studies of Abedin, et al. (2017) reveal that smart irrigation system enhances crop farming and allows farmers to meet up with customers' demand with the newly adopted technique. Laksiri, et al. (2019) noted that the development of an effective IoT-based irrigation system is the concern

of farmers in the field of agriculture. Ayaz, et al. (2019) inferred that the use of Internet of Things (IoT) based technologies will further enable farmers to know the exact status of their crop field including the amount of water required, soil temperature, weather conditions and many more. Pei & Wu (2013) emphasized that Internet of Things (IoT) is beginning to impact several industries including agriculture in order to reduce inefficiencies and also improve the performance across all markets. Ghosh, et al. (2016) posits that the implementation of IoT technologies is considered vital and imperative for sustainable and successful agricultural operations and practices.

### **Applications areas of Smart Irrigation System**



The automation of the irrigation system is activated, accordingly after the pump rotor start working, Viz:-

1. Once the soil moisture sensor reaches the required threshold value, the motor pump automatically switched itself OFF
2. Once the weather condition changes and rain starts to fall, the micro-controller shuts down the motor pump until it stops raining. After which it checks if the sensor of the soil moisture has reached the threshold value or not. If yes, the motor pump remains shut down otherwise it will automatically start again.
3. In a situations when there is power supply failure and motor gets switched OFF. It automatically restarts itself when power supply is regained.
4. User can remotely switch OFF the motor by clicking on the web page, if need be.
5. Data of various sensor including moisture sensor, humidity sensor, temperature sensor, etc are displayed in graphical form on the BOLT cloud.

### **Advantages of Automated Irrigation System**

1. Monitoring and control:



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Automated irrigation systems have the potentials that enable farmers to remotely monitor and control their field thereby making it easy to make adjustments, at will.

2. Customizable irrigation:

Automated irrigation systems are customized to suit different crops, soil types and weather conditions thereby providing for the parameters needed for optimal growth.

3. Efficient water usage:

Automated irrigation systems make use of sensors and technology that can help measure and distribute water accurately thereby ensuring that crops receive the right amount of water needed and reduce water wastage.

4. Cost-effective:

Automatic irrigation systems are cost-effective as it reduces water wastage and labor costs thereby increasing farm productivity and profitability.

5. Convenience and time-saving:

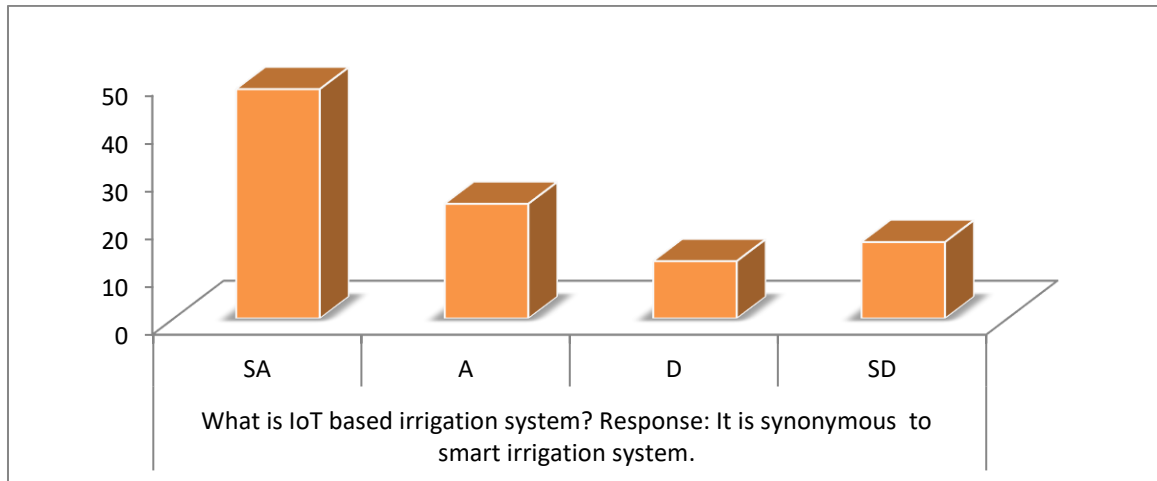
Automated irrigation systems are programmed to be operative at specific times thereby saving farmers' effort and time that would have been used to manually watering their crops.

### **MATERIALS and METHODS**

This paper is a descriptive survey approach on IoT- based irrigation system. Interview and field observation methods were used by the researcher for data collection purposes. A few number of farms were randomly selected as sample for the study. Carefully formulated questionnaire were administered by experts to respondents using online Google form questionnaire instrument. The responses gathered were subjected to Cronbach's alpha reliability analysis. The result of 0.92 gave a good reliability index of the instrument. The entire exercise took place within the space of 41 days before completion.

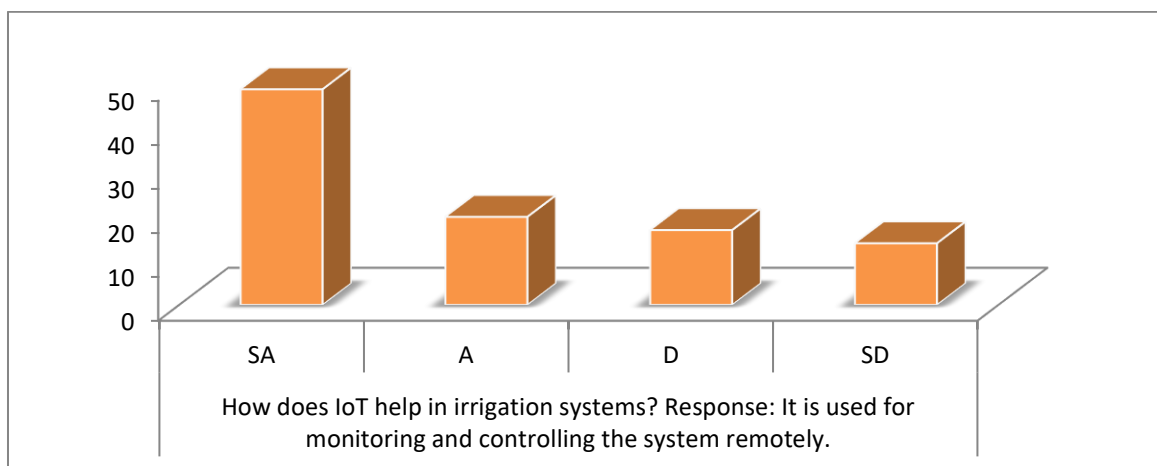
## RESULT and DISCUSSION

**Fig.1: Chat Analysis**



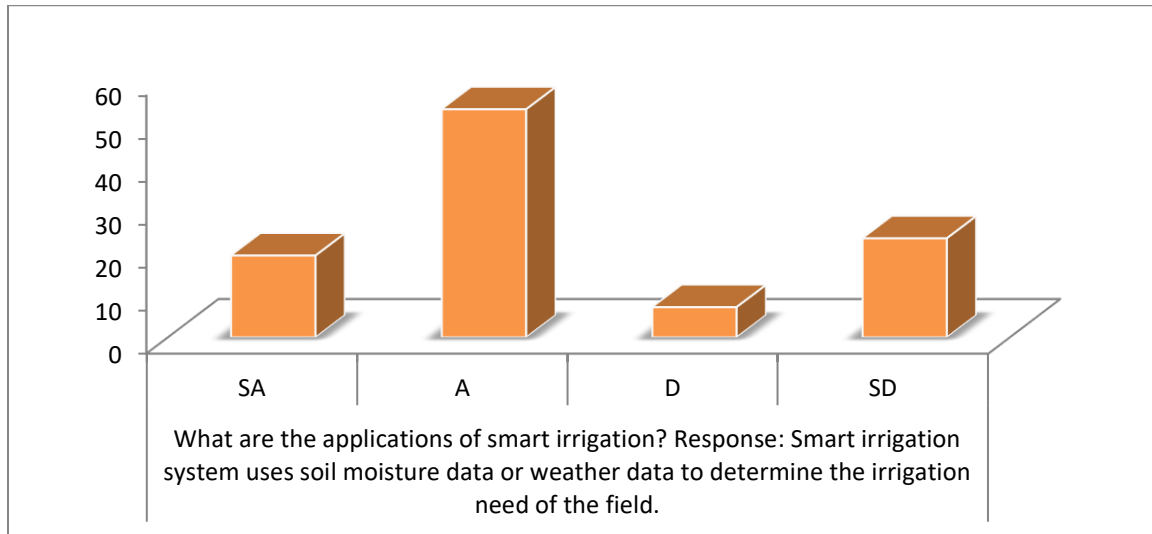
The graph plotted in figure 1 suggests that most of the respondents simultaneously agree with the given perception of what IoT based irrigation system meant. The respondents inferred that IoT based irrigation system is synonymous to smart irrigation system. According to the respondents, the automated irrigation system is IoT technology based. In simple terminology, it means that the mode of managing the irrigation system is done automatically.

**Fig.2: Chat Analysis**



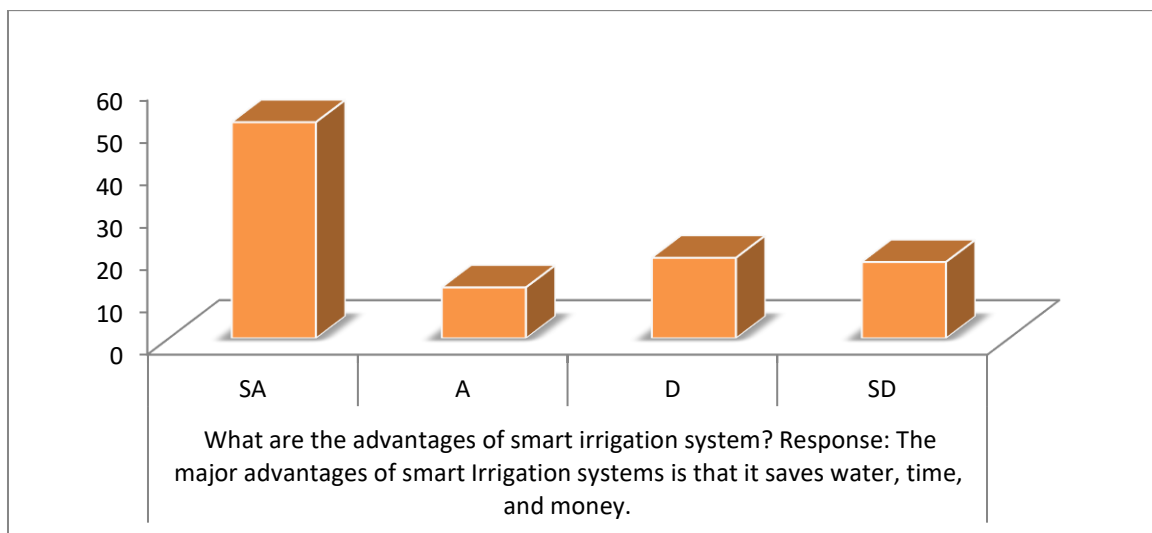
The graph plotted in figure 2 clearly indicate that a very large number of the respondents have good knowledge of IoT based irrigation system. According to the respondents, the IoT based irrigation system is essentially used for monitoring and controlling the irrigation system remotely. The respondents further explained that the technology uses IoT sensors to collect data from the field which are sent to a central monitoring console.

**Fig.3: Chat Analysis**



The chat analysis seen in Figure 3 reveals that majority of the respondents are aware of the key applications of smart irrigation system. The respondents explained that the smart irrigation system uses soil moisture data or weather data to determine the irrigation need of the field. The respondents also mentioned that the technology helps to maximize irrigation efficiency by reducing water waste and also maintain the crop health and quality.

**Fig.4: Chat Analysis**

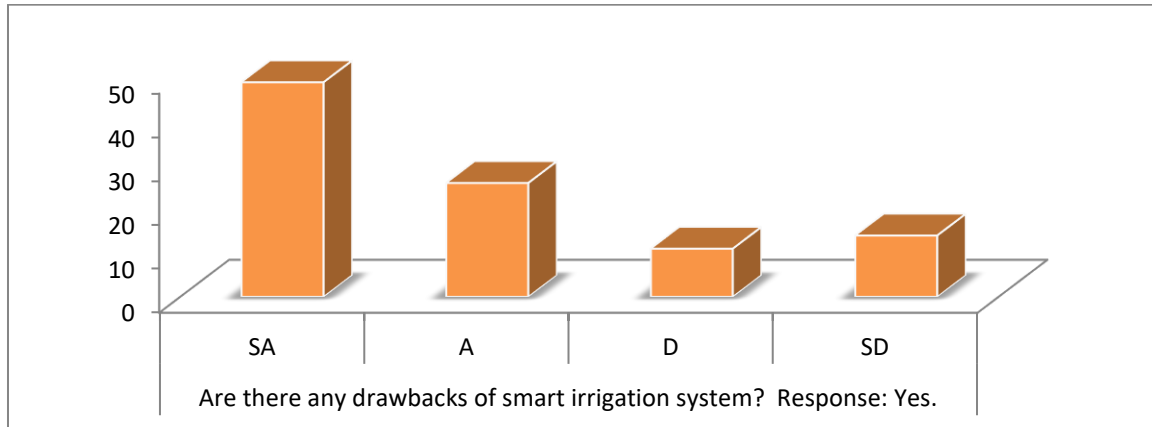


The graph plotted in figure 4 signifies that a huge amount of the respondents concurs that there are numerous advantages of smart Irrigation system. According to the respondents, practicing smart Irrigation systems could help to save water, time and money. The respondents also



pointed out that studies have shown that up to 50% of landscape water used for irrigation can be saved using IoT-based Irrigation system.

**Fig.5: Chat Analysis**



The graph plotted in figure 5 shows that a very high number of the respondents agree that besides the huge benefits derived in using smart irrigation system; there are still a number of its drawbacks. The respondents further mentioned that the challenges confronted in the implementation of smart irrigation systems can be categorized into twofold: The first is 'how to ensure that water is used responsibly and efficiently; and the second is 'how to ensure that the irrigation system is designed, implemented and managed in such a way that reduces environmental depreciation.

## CONCLUSION

This paper discussion is focused on IoT- based irrigation system. The paper work explores the impact of IoT- based irrigation system on crop farming. Also described in the paper are the key application areas of automated irrigation system and its advantages. The write-up asserts that in the paper enumerated that IoT based irrigation system plays a crucial role on crop farming as the technology detects the soil moisture level and automatically controls the associated field parameters as need arises. Conclusively, the paper affirmed that farmers' are able to monitor and regulate the conditions of their field using IoT based device sensors and automated irrigation system.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### EKOLOJİK RESTORASYONDA BİR KÖPRÜ: YABAN HAYATI GEÇİTLERİ

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#### ÖZET

Nüfusun artmasına bağlı olarak kentleşmenin hızlanması, uluslararası ticaret yollarına ihtiyaç duyulması gibi nedenler ile ulaşımı kolaylaştıran otoyolların yerküre üzerinde kapladığı alanlar her geçen gün artmaktadır. Ulaşım teknolojisinin gelişimi, insana büyük kolaylıklar sağlarken ekolojik dengenin devamlılığında sorunlara neden olabilmektedir. Kırsal peyzaj alanları üzerinde yapay izler olarak beliren otoyollar, peyzajın görsel algısını bölerken, yaban hayatı habitatlarını parçalayarak ekosistemin dengesini ve devamlılığını tehdit eden bir unsura dönüşmektedir. Yaban hayvanlarının güvenli geçişlerini sağlamak amacıyla tesis edilen geçitler ise gerek görsel gerekse işlevsel olarak kırsal peyzaj üzerindeki yırtılmayı yeniden diken birleştiriciler, bağlayıcı köprüler olarak tanımlanabilir. Araştırma, insanın kendi yaşamını kolaylaştırmak için doğada inşa ettiği bu yapay izlerin ekolojik etkilerini onarmak amacıyla tesis edilen yaban hayatı geçitleri üzerine odaklanmaktadır. Çalışma kapsamında öncelikle yaban hayatı geçitlerinin uluslararası literatürdeki yeri kavramsal olarak tartışılmış; otoyolların neden olduğu çevresel risk ve zararlar irdelenmiş; bu zararları indirgeyen ve önleyen bir çözüm olarak yaban hayatı geçitlerinin sağladığı faydalara değinilmiştir. Bu çalışmada, ekolojik restorasyonu sağlamada bir köprü olarak işlev yüklenen yaban hayatı geçitleri, insanın yaşam alanlarına müdahale ettiği yaban hayvanlarını anlamaya başladığının göstergesi olarak okunmuştur. Farklı ülkelerdeki örnekler planlama süreçleri ve tasarım kriterleri bağlamında karşılaştırmalardan faydalanılarak sunulmuş; ülkemizdeki örneklere referans oluşturmak amacıyla öneriler getirilmiştir.

**Anahtar Kelimeler:** Peyzaj planlama, peyzaj tasarımı, kırsal peyzaj, ekoloji, sürdürülebilirlik



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### A PASSAGE IN ECOLOGICAL RESTORATION: WILDLIFE CROSSING

#### ABSTRACT

The area occupied by highways on Earth is increasing day by day due to factors such as the acceleration of urbanization, population growth and the need for international trade routes. While the development of transportation technology provides great convenience to humans, it can cause problems in the continuity of the ecological balance. Highways, which appear as artificial traces on rural landscape areas, while dividing the visual perception of the landscape, turn into an element that threatens the balance and continuity of the ecosystem by fragmenting wildlife habitats. Wildlife crossings established to ensure the safe passage of wildlife can be defined as connectors that re-stitch the tear on rural landscape, both visually and functionally, as binding bridges. The research focuses on wildlife crossings established to repair the ecological effects of traces that humans build in nature to make their own lives easier. Within the scope of the study, the place of wildlife crossings in the international literature was discussed conceptually; the environmental risks and damages caused by highways were examined; the benefits provided by wildlife crossings as a solution that reduce and prevent these damages were mentioned. In this study, wildlife crossings, which function as a bridge in providing ecological restoration, are interpreted as an indication that humans are beginning to understand the wildlife that they have intervened. Examples from different countries have been presented by taking advantage of comparisons in terms of planning processes and design criteria; suggestions have been made to serve as a reference in our country.

**Keywords:** Landscape planning, landscape design, rural landscape, ecology, sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. GİRİŞ

İnsanın kendi konfor ve ihtiyaçları için doğayı değiştiriyor ve dönüştürüyor olması kısa ve uzun vadede hem kendine hem de diğer canlıların biyoçeşitliliğine zarar vermektedir. Günümüzde bu hızlı değişim ve dönüşümlerin insan yaşamını ve dünyayı nasıl yaşanamaz bir yere dönüştürmekte olduğunun somut örneklerini deneyimlediğimiz bir süreci yaşıyoruz.

Ekosistemler, fiziksel çevreleriyle işlevsel bir birim olarak etkileşime giren bitki, hayvan ve mikroorganizmalardan oluşan dinamik topluluklar olarak insan faaliyetleri nedeniyle zarar görebilir, bozulabilir veya yok olabilir. Ekolojik restorasyon, bozulmuş, hasar görmüş veya yok edilmiş bir ekosistemin iyileşmesine ve geri kazanılmasına yardımcı olma sürecidir. Bu süreç değerlendirme, planlama ve tasarım, uygulama, sürdürülebilir yönetim, izleme ve geliştirme aşamalarını kapsar (FAO, SER & IUCN CEM., 2023).

Nüfusun artmasına bağlı olarak kentleşmenin hızlanması, küreselleşmenin etkisiyle uluslararası ticaret yollarına ihtiyaç duyulması gibi nedenler ile ulaşımı kolaylaştıran otoyolların yerküre üzerinde kapladığı alanlar da her geçen gün artmaktadır. Kırsal peyzaj alanları üzerinde yapay izler olarak beliren otoyollar, peyzajın görsel algısını bölerken, yaban hayatı habitatlarını parçalayarak ekosistemin dengesini ve devamlılığını tehdit eden hasara neden olmaktadır.

Bu gelişme sürecinde bilgiyi üreten ve kendi yararına kullanan insana da oluşturduğu zararı önlemek ve onarmak adına ekolojik restorasyonu sağlayacak yöntemler geliştirme görevi düşmektedir. Araştırma, insanın kendi yaşamını kolaylaştırmak için doğada inşa ettiği bu yapay izlerin ekosistem üzerindeki olumsuz etkilerini onarmak adına tesis edilen yaban hayatı geçitleri üzerine odaklanmaktadır.

George Simmel (1994)'in köprü kavramında tanımladığı gibi “insanın en gerekli etkinliği olan ilişki kurma ancak köprü ile mümkündür. “Seni anlıyorum” demek, bir köprü atmaktır iki yaka arasında”. Bu çerçevede iki yakayı, insan ve yaşam alanlarına müdahale ettiği diğer canlılar olarak okuyabiliriz. Çalışmada, ekolojik restorasyonu sağlama işlevi yüklenen yaban hayatı geçitleri, insanın yaşam alanlarına müdahale ettiği yaban hayvanlarını anlamaya başladığının göstergesi bir köprü kurma gayreti olarak okunmuş ve ülkemizdeki planlama süreci ve tasarım kriterlerine referans oluşturması amacıyla önerilere yer verilmiştir.

### 2. Genel Kavramlar

Çalışma içerisinde kullanılan yaban hayatı geçitleri ile ilgili kavram ve terimlerin açıklamaları ile uluslararası tanımlamalara yer verilmiş; otoyolların insan ve ekosistem üzerinde oluşturdukları olumsuz çevresel etkilere değinilmiştir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Otoyollar yaban hayvanlarının habitatlarını parçalayarak yırtıklar oluştururken yaban hayatı geçitleri bu yırtıkların dikilmesi yani onarımı için bir yaklaşım sunmaktadır. Yaban hayatı geçitleri yaban hayvanlarının otoyolun üstünden veya altından güvenli geçişini sağlamak üzere tasarlanmış ve inşa edilmiş çeşitli yapıları ifade eder. Yaban hayatı üst geçitlerinin tasarım kriterleri ve planlama süreci ile ilgili yapılan literatür araştırmasında 1993 yılında Fransa Ulaştırma Bakanlığı ile Çevre Bakanlığı'nın ortak çalışması olarak yayınlanan Büyük Hayvanlar için Geçişler Yollar ve Otoyollar için Teknik Kılavuz, 2016 yılında Fransa'da Vinci Otoyol Kuruluşu ile Ekolojik Geçiş ve Bölgesel Uyum Bakanlığı Araştırma Enstitüsü tarafından hazırlanan rapor ve 2011 yılında ABD Federal Karayolu İdaresi tarafından yayımlanan Kuzey Amerika Yaban Hayatı Geçitleri Yapım Kılavuzu olmak üzere yabancı ulusların bu konuda hazırlamış oldukları detaylı kılavuzlar olduğu görülmüştür (SETRA, 2006; Vinci Autoroutes&LPO France&Cerema, 2016; Clevenger & Huijser, 2011) Farklı türdeki yaban hayvanlarının güvenli geçişi için inşa edilmiş geçitler, bu kılavuzlarda yaban hayatı köprüsü, yeşil köprü, yaban hayatı üst geçidi, ekolojik köprü, peyzaj köprüsü ya da ekosistem köprüsü olarak da adlandırılmaktadır. İngilizce “wildlife crossing” veya “fauna passages” terimi ile Fransızca'da ise “écoponts” veya “passage à faune” ile ifade edilen yaban hayatı geçitleri, genel olarak üst geçitler ve alt geçitler olarak inşa edilmektedir. Üst geçitler kanopi şeklinde, viyadük olarak veya ülkemizdeki örneklerinde olduğu gibi köprü şeklinde inşa edilirken, alt geçitler farklı hayvan türlerinin geçişlerine imkân veren çeşitli boyutlarda yol altı kanal ve tünel geçişlerden oluşmaktadır (Beben, 2012). Türkiye'de inşa edilen geçitler üst geçit örnekleri olup, mevcut yol altı geçitleri veya menfezler sucul canlıların ihtiyaçları gözetilerek değil, suyun geçişini sağlamada hidrolik amaçlı tesis edilmiş yapılardır (Tercan, 2017). ABD'de genişliği en az 70 metre olan yaban hayatı geçitleri peyzaj köprüleri “landscape bridges” olarak tanımlanmakta; sadece yaban hayatı geçişi işlevi ile kullanılmakta olup bölünen alanların doğal bitki örtüsü ile devamlılığı sağlanmaktadır. ABD'de genişliği 70 metreden az olan geçitler, üst geçit “wildlifeoverpass” veya yeşil köprü “green bridges” olarak adlandırılmakta, işlev ve bitki örtüsü peyzaj köprüleri ile benzer uygulanmaktadır. Köprüler, yolun her iki tarafındaki arazinin bir uzantısı gibi görünmelerini sağlayan bitki örtüsüyle kaplıdır (Clevenger & Huijser, 2011). Fransa'da yaban hayatı üst geçitleri ekolojik köprü “écoponts” olarak adlandırılmakta genişlik en az 20-30 metre olarak belirlenmekte, çevrenin floristik yapısı göz önünde bulundurularak peyzajı doğal bitki türleri, su birikintileri, kaya ve



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

kütük yığınlarının kullanımı ile düzenlenmektedir (Vinci Autoroutes&LPO France&Cerema, 2016).

Otoyollar peyzaj desenlerini kesin bir sınır ile ayırırken, yaban hayatı habitatları olan doğal peyzajların parçalanmasına neden olmakta; hayvanların hareketlerini, sosyalleşmesini engellemekte, üreyerek gen aktarımının devamlılığının sağlanmasını sekteye uğratmakta, ava ve besine ulaşmalarını olumsuz etkilemektedir. Yol boyunca araçlardan kaynaklı gürültü, titreşimler, far ışıkları yaban hayatı yaşam alanlarını rahatsız etmektedir. Bu bahsi geçen etkiler biyoçeşitliliği doğrudan etkilerken, ekosistemin devamlılığını da etkileyerek insanın günümüzdeki ve gelecekteki doğal yaşam alanları üzerinde de olumsuz etkiler oluşturmaktadır (Tercan, 2017).

Yaban hayvanlarının yollardan geçişi maddi hasarlı, yaralanmalı veya ölümlü kazalara sebep olabilmektedir. Trafik Güvenliği Dairesi Başkanlığı'nın 2021 yılı Türkiye verilerine göre kent dışında gerçekleşen 40.230 adet kazadan 504 adedi hayvana çarpmadan kaynaklanmıştır (Trafik Güvenliği Dairesi Başkanlığı, 2022). Kanada Otoyolunda inşa edilen bir yaban hayatı geçidi ile ilgili yapılan araştırmada, geçidin tesisi öncesindeki 5 yıllık dönemde gerçekleşen trafik kazalarında 71 adet memeli hayvan ölümü yaşanmış, bu kayıpların maliyeti 770.021 \$ olarak hesaplanmıştır. Yaban hayatı geçidi tesisi sonrasındaki 5 yıllık döneme ait verilere göre 15 hayvan ölümü yaşanmış olup maliyet 105.385 \$ olarak hesaplanmıştır ki aradaki fark geçidin inşasında harcanan 525.000\$'dan fazladır (Lee ve diğ., 2012).

Plaschke ve arkadaşları tarafından 2021 yılında yapılan araştırmaya göre, 2020 yılında Almanya'da teyit edilen kurt ölümlerinin %76'sı kurt ve araç çarpışmasından kaynaklanmıştır. Araştırmada Almanya'nın Brandenburg Eyaletindeki A12 Otoyolu'nun bağlantısını sağlamak ve bariyer etkisini azaltmak amacıyla inşa edilen yaban hayatı geçidinin kurtlar, kızıl geyikler, karacalar ve yaban domuzları tarafından geçiş amaçlı kullanıldığı tespit edilmiştir. Yaban hayatı geçitleri ile ilgili bir diğer endişe, yırtıcı hayvanların geçiş yapan avı pusuya düşürmek için bölgede beklemesi durumunda, bu köprülerin bir av tuzağı görevi görebileceği yönündedir. Anılan çalışmada, kurt gibi avcı türlerin köprüden en çok kışın geçtiği, av türlerinin ise ilkbahar ve yaz aylarında daha sık geçtiği ve av tuzağı etkisi oluşmadığı, köprülerin biyoçeşitlilik üzerinde olumlu etkilerinin olduğu tespit edilmiştir (Plaschke ve diğ., 2021).

Bu örneklerden görüldüğü üzere, yaban hayatı geçitleri ekosistem devamlılığını ve biyoçeşitliliğin korunmasını sağlayan köprü görevinin yanı sıra, hayvanların ve insanların akut kazalar ile karşılaşmalarını önleyen bir güvenlik yöntemi olarak da önemli rol oynamaktadır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 3. MALZEME ve YÖNTEM

Yol ağları yaban hayvanları için bariyer etkisi oluştururken yol hattı boyunca kestiği doğal ve kırsal peyzaj alanlarının görsel bütünlüğünü de bozmaktadır. Araştırma, yolların üzerinden geçirilen üst geçit tipindeki geçitler ile sınırlı tutularak yolun ayırdığı peyzaj desenlerini yeniden birleştiren yaban hayatı geçitleri ülkemizde sıklıkla kullanılan ifadesi ile ekolojik köprüler, ekolojik sanat yapıtları olarak okunmuştur. Bu bağlamda öncelikle ekolojik sanat yapıtlarının planlama süreci ve tasarım kriterleri, Fransa A80 otoyolu üzerinde yer alan Varenne Köprüsü ile en uzun ekolojik köprülerden biri olan Hollanda N524 otobanı üzerindeki Natuurbrug Zanderij Crailoo ekolojik köprüsü örnekleri üzerinden incelenmiş, karşılaştırmalardan faydalanılarak Türkiye’de yapılan çalışmalara yönelik öneriler getirilmiştir.

### 4. BULGULAR

Avrupa ve ABD’de ekolojik köprülerin planlama ve tasarımının ilk aşamasında alanın sörvey analizleri yapılmakta, yaban hayvanlarının hareket takibi fotokapanlar ile gerçekleştirilmekte ve envanterler oluşturulmaktadır. Bu aşamada, yaban hayatı tarafından kullanılan geçiş yollarının mevcut otoyol ile kesiştiği yerler belirlenmekte; trafik yoğunluğu ve kaza verileri toplanmaktadır. Hayvan yetiştiriciliği yapanların ve bölgedeki avcılarının görüşleri alınmaktadır. Vejetasyon ve orman meşçere haritaları, tabiat parkları ve doğal sit alanlarının sınırlarına ait veri ve haritalar altlık olarak kullanılmaktadır (Vinci Autoroutes&LPO France&Cerema, 2016; Clevenger & Huijser, 2011).

Fransa A80 otoyolu üzerinde 2018 yılında yapımı tamamlanan Varennes Ekolojik Köprüsü 52 metre uzunluğa, 22 metre genişliğe sahiptir. Yaban hayvanlarını köprüye doğru emniyetli bir şekilde yönlendirmek adına panel ekranlar yerleştirilmiştir. Bu paneller aynı zamanda araç farları, gürültü gibi araçlardan kaynaklı olumsuz etkileri önleme ve hayvanların emniyetli geçişini sağlama amaçlı olup iki tarafta toplam 157 metre uzunluğundadır. Farklı hayvan türlerinin geçişlerde birbirini etkilemeyeceği çeşitli mekanlar oluşturmak amacıyla kütük ve saz yığınları, kaya yığınları ayırıcı olarak kullanılmış; çakıl ve kumdan patikalar bitkilendirmeler ile bütünleştirilerek peyzaj kurgulanmıştır. Kaya ve taşlar sıralanarak dört tekerlekli araçların köprüye geçişini engelleyecek düzenlemeler yapılmıştır (Le Bihan, 2018).

Avrupa’dan bir başka örnek ise Hollanda’da bulunan 800 metre uzunluk ve elli metre genişliğe sahip Natuurbrug Zanderij Crailoo doğa köprüsüdür. Geyik, yaban domuzu ve porsuk popülasyonlarının N524 otobanı ve yakınındaki tren yolu üzerinden güvenli geçişine imkân sağlayan bu köprü, çevresindeki peyzaj alanları ile benzer bir doku oluşturma hedefi ile



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

kurgulanmış, hayvanlara doğal yaşam alanlarının etkisini yaratan bir peyzaj atmosferi sunulmuştur. Araçlardan kaynaklanan gürültü ve ışığı engellemek amacıyla çalılardan oluşan çit ile köprü boyunca bariyer yapılmıştır. Eski bir kum ocağının rehabilite edilmesi ile fundalık ve orman peyzajlarını birbirine bağlayan bu köprü, flora ve faunasının yanı sıra yürüyüşçüler, bisikletçiler ve binicilik için imkân veren rekreatif alanları ile uzun bir koridor şeklinde düzenlenmiştir (Vista landscape architects, 2023).

### 5. SONUÇ ve ÖNERİLER

Yol ağları yaban hayvanları için bariyer etkisi oluştururken yol hattı boyunca kestiği doğal ve kırsal peyzaj alanlarının görsel bütünlüğünü ve peyzaj bileşenlerini olumsuz etkilemektedir. Yaban hayatı geçitlerinin, çevresindeki ekosistem ile bütünleşebilmesi, bulunduğu peyzaj ve coğrafyanın bir parçası haline gelebilmesi, sonradan inşa edilmiş bir yapı olarak değil peyzajın doğal bir ögesi olarak var olabilmesi sağlanmalıdır.

2023 Ocak ayı itibariyle Türkiye'deki toplam yol ağı 68.700 km'dir. Yol ağı verileri incelendiğinde 2002 yılında 1.714 km olan otoyol miktarının 2023 yılında iki katı artarak 3633 km'ye çıkmış olması bu alandaki hızlı değişimi ortaya koymaktadır (T. C. Ulaştırma ve Altyapı Bakanlığı, 2023). Bu bağlamda, Türkiye'deki hızlı otoyol inşa süreci göz önünde bulundurularak yaban hayatı geçitlerinin de aynı hızla tesis edilmesi gerekmektedir. Diğer ülkelerde uygulanmakta olan teknik kılavuzlar ile benzer hedefleri gözeterek ülkemiz ihtiyaçlarına yönelik yöntemleri kapsayan kılavuzların hazırlanarak uygulanması ve ekolojik restorasyonun değerlendirme, planlama ve tasarım, uygulama, sürdürülebilir yönetim, izleme ve geliştirme aşamaları gözetilerek yönetilmesi önerilmektedir.

ABD ve Fransa'daki örneklerde okunduğu üzere, alınacak kararlar uzun bir gözlem sürecini zorunlu kılmaktadır. Yaban hayvanlarının bulunduğu coğrafyadaki sosyalleşme alışkanlıkları ekolog ve coğrafyacılar tarafından izlenmeli, yapılacak planların bütüncül bir yaklaşımla ele alınması sağlanmalıdır. Ekolojik köprüler olarak ifade edilen yaban hayatı geçitlerinin planlama ve tasarım sürecinde sivil toplum kuruluşları, araştırma enstitüleri, ekoloji alanında uzmanlaşmış meslek insanları ve akademisyenler ile yerel halkın görüş ve deneyimlerinden yararlanılarak oluşturulacak proje ekiplerinin iş birliği içerisinde olması önem arz etmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **YOL PLANLAMASININ EKONOMİK VE SOSYAL YAPIYA ETKİLERİ: ORDU KENT MERKEZİ (D010 KARAYOLU) ÖRNEĞİ**

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#### **ÖZET**

Kent içi yollar; bir yerden başka bir yere ulaşımı sağlama, ticaret ve lojistik hareketliliği kolaylaştırma ve kent içi iklimi düzenleme gibi pek çok işlevi yerine getiren çizgisel boşluklardır. Ordu kent merkezinden geçen D010 karayolu ise kenti doğrusal bir engel olarak ikiye böldüğünden, bu işlevlerinin yanında sınırlama işlevi de taşımaktadır. Kentin denize kıyısı olan kuzey mahalleleri ile güneydeki mahalleler arasında geçişkenliği ve sürekliliği azaltan bu fiziksel sınırın, sosyo-ekonomik ve sosyo-kültürel farklılıkları da beraberinde getirdiği düşünülmektedir. Söz konusu farklılıkların karayolunun kuzey ve güneyindeki mahalleler ölçeğinde niceliksel olarak değerlendirilebilmesi için birtakım gösterge değişkenler belirlenmiştir. Bunlar; arsa rayiç bedeli, satılık ve kiralık daire fiyatları, mülk türü, nüfus dağılımı, eğitim durumu, kişi başı gelir ve hane gelir düzeyleri, park sayısı, toplam park büyüklüğü ve kişi başına düşen park alanıdır. Değişken ortalamalarının mahalleler arasındaki farklılık düzeyleri istatistiksel yöntemler kullanılarak ortaya konulmuştur. Çalışmanın bulguları; kuzey ve güney mahalleler arasında birçok değişken bakımından anlamlı farklılıklar olduğunu göstermiştir. Yolun kuzeyindeki arsa rayiç bedeli ortalaması güneye göre metrekare bazında 594 TL daha yüksektir. Karayolunun kuzeyi ve güneyinde yer alan bununla birlikte benzer özellikleri paylaşan daireler arasında ortalama satış fiyatı bakımından 960 bin TL fark bulunmaktadır. Kişi başı gelir ve hane gelirleri de kuzey mahallelerde güneydekilere göre önemli ölçüde yüksek seyretmektedir. Yolun kuzeyindeki mahalleler park sayısı ve toplam park büyüklüğü bakımından güneydeki mahallelere göre daha avantajlı durumdadır. Mülklerin türü bakımından genel olarak kuzeyde konutlar ağırlıkta iken güneyde işyerlerinin oranı kuzeye göre daha fazladır. Yolun güneyindeki Karapınar Mahallesi istisna olmak üzere, eğitim durumu lisans ve lisansüstü düzeyde olanların oranı kuzeydeki mahallelerde daha yüksek bulunmuştur. Elde edilen bulgular ışığında; yol planlamasının kentlerdeki ekonomik, sosyal ve kültürel yapı üzerinde azımsanmayacak etkileri olduğu sonucuna varılmıştır.

**Anahtar sözcükler:** Karayolu, yol planlaması, ekonomik yapı, sosyal yapı.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### **EFFECTS OF ROAD PLANNING ON ECONOMIC AND SOCIAL STRUCTURE: THE CASE OF ORDU CITY CENTRE (D010 HIGHWAY)**

#### **ABSTRACT**

Urban roads are linear spaces that fulfil many functions such as providing transportation from one place to another, facilitating trade and logistics mobility and regulating the urban climate when planted. Because the D010 highway passing through the city center of Ordu divides the city as a linear barrier, it also has a delimitation function in addition to these functions. This physical boundary, which reduces the transitivity and continuity between the seaside northern neighbourhoods of the city and the southern neighbourhoods, is thought to bring socio-economic and socio-cultural differences. To quantitatively evaluate these differences at the scale of the neighbourhoods north and south of the highway, many indicator variables were determined. These variables are land market price, prices of flats for sale and rent, type of property, population distribution, educational status, per capita income and household income levels, number of parks, total park size, and park area per capita. Differences in the levels of variable averages between the neighbourhoods were revealed using statistical methods. The findings of the study show that there are significant differences between the northern and southern neighbourhoods in terms of many variables. The average land market price in the north of the road is 594 TL higher than that in the south on the basis of square metre. There is a difference of 960 thousand TL in terms of average sale price between the flats located in the north and south of the highway, which share similar characteristics. Per capita income and household incomes are also significantly higher in the northern neighbourhoods than in the southern ones. Neighbourhoods to the north of the road are more advantageous in terms of the number of parks and total park size than the neighbourhoods to the south. In terms of property types, the north is dominated by residential properties, whereas the south has a higher proportion of workplaces than the north. The proportion of those with bachelor's and graduate degrees was higher in the northern neighbourhoods (except Karapinar neighborhood in the south). Considering these findings, we conclude that road planning has significant effects on the economic, social, and cultural structures of cities.

**Keywords:** Highway, road planning, economic structure, social structure.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

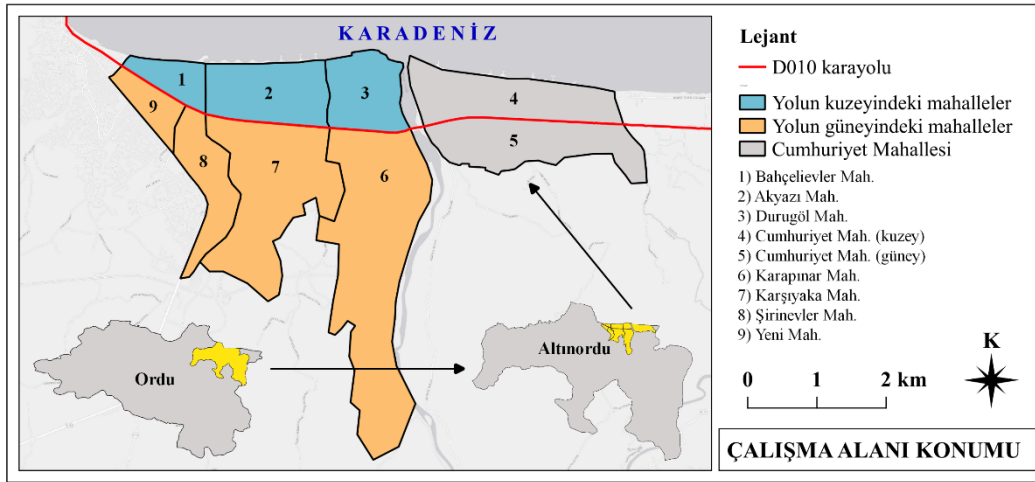
Ulaşım, bir yerden başka bir yere gerçekleştirilen hareket sonucunda meydana gelen yer değiştirme olarak tanımlanmaktadır (Mansuroğlu & Dağ, 2021). Kentlerde ulaşımın iskeletini oluşturan kent içi yollar; kentlerde yaşamı kolaylaştıran ve kentlerin gelişiminde yönlendirici etkiye sahip önemli yapılardır (Küçük & Gül, 2005). Yollar, kentlerdeki farklı kullanımlar ile kentsel-kırsal bölgeler arasında bağlantı sağlama işlevi taşımaktadır (Erdoğan & Özer, 2009). Bununla birlikte yollar kentlerdeki bölgeleri birbirlerinden ayırabilmektedir (Çelikyay, 2017). Bu nedenle, ulaşımın bel kemiğini oluşturan kent içi yollar bazı durumlarda sınırlayıcı-kısıtlayıcı bir engel olarak karşımıza çıkmaktadır. Lynch (1960), fiziksel çevrede yolların bir sınır ögesi olabileceğini ifade etmiştir. Sınırlayıcı bir unsur olarak yollar, kentlerdeki çeşitli bölgeler arasında ekonomik, sosyal ve kültürel farklılıkların oluşmasına neden olabilmektedir. Bu durumun en çarpıcı örneklerinden biri İstanbul'da yer alan Ataköy ve Şirinevler mahalleleridir. Ataköy; gelir düzeyi yüksek ailelerin yaşadığı, yapılaşmanın son derece planlı olduğu ve kişi başına düşen yeşil alan oranının yüksek olduğu bir mahalledir. Şirinevler ise plansız ve çarpık yerleşme ile karakterize edilen, gelir düzeyi nispeten düşük ailelerin yaşadığı ve yaşam kalitesinin düşük olduğu bir mahalledir (Gündüz, 2019). Aralarından E5 karayolu geçen, birbirine komşu bu iki mahalle arasında demografi, eğitim durumu, ekonomik gelir ve kent planlaması gibi pek çok parametre bakımından önemli farklılıklar bulunmaktadır. İki mahalle örneğinde, kentsel donatı elemanları ve kent kimliği ekseninde gerçekleştirilen bir araştırmaya göre mahalleler arasındaki sosyo-ekonomik ve sosyo-kültürel farklılığın kentsel donatı elemanlarının kalitesine ve bunların kullanım şekillerine önemli etkileri olduğu vurgulanmıştır (Gündüz, 2019). Kentlerin içerisinde geçen ve kenti bölümleyen yollar, konut piyasaları açısından da farklılıklara neden olabilmektedir. İstanbul'un Anadolu yakasında yürütülen bir çalışmada, E5 karayolunun kuzeyi ile güneyi arasında konut fiyatları bakımından önemli farklılıklar saptanmıştır (Alas, 2021).

Ordu kent merkezinden geçen D010 karayolu, kenti doğu-batı doğrultusunda ikiye bölerek yolun kuzeyi ve güneyinde yerleşim alanlarının oluşmasına neden olmuştur. Kentin denize kıyısı olan kuzey mahalleleri ile güneydeki mahalleler arasında geçişkenliği azaltan bu fiziksel sınırın, diğer kentlerdeki örneklerde olduğu gibi sosyo-ekonomik ve sosyo-kültürel farklılıkları da beraberinde getirdiği düşünülmektedir. Söz konusu farklılıkların belirlenebilmesi için çeşitli ekonomik, sosyal ve demografik göstergeler bulunmaktadır. Bu çalışma kapsamında; konut

piyasası, parklara ilişkin özellikler, gelir dağılımı ve nüfusa ilişkin bilgiler ışığında karayolunun kuzeyi ve güneyi arasındaki farklılaşmanın izleri aranmıştır.

### MATERYAL ve YÖNTEM

D010 karayolu; Türkiye'nin kuzeyinde yer alan, Sakarya ilinin Karasu ilçesinden başlayıp Kars'a kadar devam eden 1474 km uzunluğunda bir şehirler arası karayoludur. Ordu ilinin Altınordu ilçesindeki kent merkezinden geçen karayolu, kenti doğrusal bir engel olarak ikiye bölmektedir (Şekil 1). Bahçelievler, Akyazı ve Durugöl mahalleleri bütünüyle karayolunun kuzeyinde yer alırken Cumhuriyet Mahallesi'nde karayolunun kuzeyi ve güneyi olmak üzere iki bölüm bulunmaktadır. Bu bölümler resmi olarak tanımlanmamakla birlikte bu çalışma kapsamında, değerlendirilmenin kolaylaştırılması bakımından kuzey-güney biçiminde iki bölüm olarak ele alınmıştır. Yeni, Şirinevler, Karşıyaka ve Karapınar mahalleleri ile Cumhuriyet Mahallesi'nin bir bölümü karayolunun güneyinde yer almaktadır. D010 karayolunun kuzeyindeki mahalleler aynı zamanda Karadeniz'e sınırı olan mahallelerdir. Bu nedenle karayolunun kuzeyindeki mahalleler ortalama mesafe olarak görece denize daha yakındır.



**Şekil 1.** Çalışma alanının konumu

Çalışmadaki temel varsayım; D010 karayolunun kuzeyi ve güneyindeki mahallelerin çeşitli sosyal ve ekonomik parametreler açısından farklılık göstereceği üzerine kurulmuştur. Bu varsayım doğrultusunda mahalleler ölçeğinde ekonomik ve sosyal yapının değerlendirilebilmesi için çeşitli verilere ihtiyaç duyulmuştur. Kullanılan veriler, verilerin kaynakları ve varsa internet adresleri Tablo 1'de sunulmuştur. Mahallelerde yaşayan nüfusa ilişkin 2022 yılına ait güncel verilere Türkiye İstatistik Kurumu (TÜİK) tarafından sunulan





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Adrese Dayalı Nüfus Kayıt Sistemi (ADNKS) üzerinden erişilmiştir. Hektar başına düşen kişi sayısı olarak ifade edilen nüfus yoğunluğunun hesaplanmasında kullanılan mahallelerin yüzölçümü değerleri, bir coğrafi bilgi sistemi (CBS) yazılımı olan QGIS 3.16.6 ortamında elde edilmiştir (QGIS Development Team, 2023). Ardından her mahallenin nüfusu hektar cinsinden mahalle alanına bölünerek nüfus yoğunluğu hesaplanmıştır.

Arsa rayiç bedelleri, Altınordu Belediyesi'nin oluşturduğu E-Belediye Uygulaması'ndan sorgulanarak kaydedilmiştir. Bu sistem, Altınordu ilçesinde yer alan tüm mahallelerdeki her bir cadde/sokak için daha önceden hesaplanmış olan arsa rayiç bedellerini kullanıcıya sunmaktadır. Çalışma kapsamına giren mahallelerdeki tüm cadde ve sokaklar için arsa rayiç bedeli sorgulanarak Microsoft Excel ortamında veri tabanı oluşturulmuştur. Arsa rayiç bedellerinin dışında satılık ve kiralık konut fiyatları açısından da değerlendirme yapılmıştır. Bu amaç doğrultusunda, üç farklı çevrimiçi satış ve kiralama platformundaki (sahibinden.com, hepsiemlak.com ve remax.com.tr) Eylül 2023 verilerinden yararlanılmıştır. Burada daire satış ya da kira fiyatı için belirlenen tek kriter oda ve salon sayısının 3+1 biçiminde olmasıdır. Mahalleler ölçeğinde kişi başı gelir, hane geliri, eğitim durumu ve mülk türü verilerine Endeksa adlı çevrimiçi platformdan ulaşılmıştır. Endeksa, büyük veri analizi ve makine öğrenimi yöntemlerini kullanarak gayrimenkul değeri, lokasyon veri analizi ve öngörülerini sunan bir platformdur (Endeksa, 2023). Çalışma alanı içerisindeki parkların sayısı, toplam park büyüklüğü ve kişi başına düşen park alanı miktarına mahalleler ölçeğinde CBS yazılımı kullanılarak tespit edilmiştir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

**Tablo 1.** Çalışmada kullanılan veriler

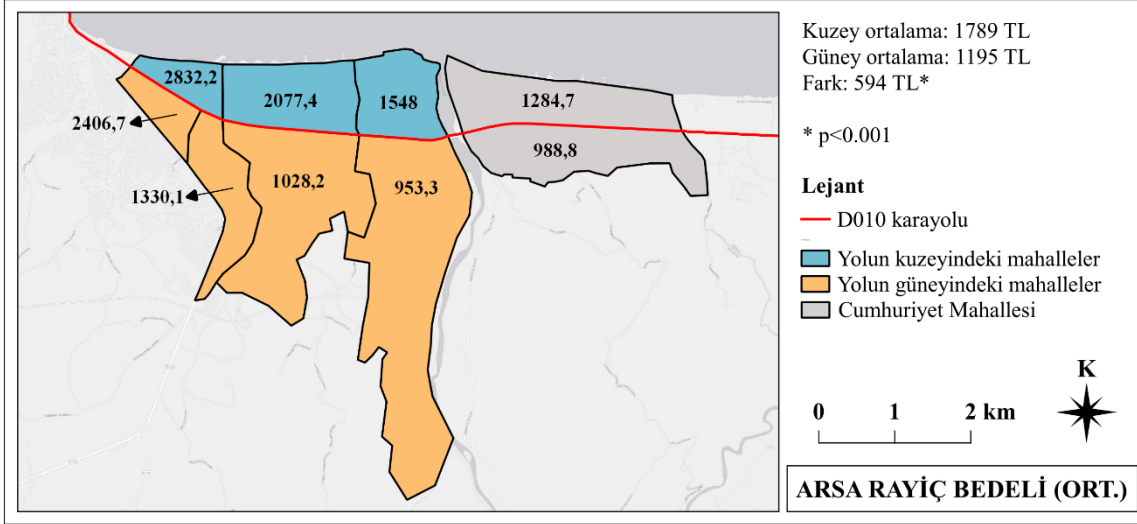
Kullanılan veri	Kaynak	İnternet adresi
Nüfus (kişi)	TÜİK - Adrese Dayalı Nüfus Kayıt Sistemi (ADNKS)	<a href="https://biruni.tuik.gov.tr/medas/?kn=95&amp;locale=tr">https://biruni.tuik.gov.tr/medas/?kn=95&amp;locale=tr</a>
Nüfus yoğunluğu (kişi/ha)	TÜİK - ADNKS + Coğrafi Bilgi	
Arsa rayiç bedeli (TL)	Altınordu Belediyesi	<a href="https://ebelediye.altinordu.bel.tr/web/guest/5">https://ebelediye.altinordu.bel.tr/web/guest/5</a>
Satılık ve kiralık konut fiyatı (TL)	Sahibinden.com Hepsiemlak.com Remax.com.tr	<a href="https://www.sahibinden.com">https://www.sahibinden.com</a> <a href="https://www.hepsiemlak.com">https://www.hepsiemlak.com</a> <a href="https://www.remax.com.tr/emlak/ord">https://www.remax.com.tr/emlak/ord</a>
Kişi başı gelir (TL)		
Hane geliri (TL)		
Eğitim durumu	Endeksa.com	<a href="https://www.endeksa.com/tr">https://www.endeksa.com/tr</a>
Mülk türü		
Park sayısı		
Toplam park büyüklüğü (m <sup>2</sup> )	CBS	-
Kişi başına düşen park alanı		

Tablo 1’de sunulan tüm değişkenlere ilişkin veriler QGIS 3.16.6 ve Adobe Photoshop CC 2014 yazılımları kullanılarak mekânsal olarak görselleştirilmiştir. D010 karayolunun kuzeyi ile güneyi arasındaki parametre ortalamalarının istatistiksel yönden anlamlı biçimde farklılaşma durumu bağımsız örneklem T testi ile değerlendirilmiştir (Ross & Willson, 2017). Bu testin yapılabilmesi için verilerin gruplar ölçeğinde normal dağılım göstermesi gerekmektedir. Bu nedenle normalliğin sağlanma durumu Shapiro-Wilk testi ile analiz edilmiştir (Shapiro & Wilk, 1965). Çalışmada yararlanılan istatistiksel analizler Jamovi 2.2.5 yazılımında gerçekleştirilmiştir (The Jamovi Project, 2023).

### BULGULAR ve TARTIŞMA

Arsa rayiç bedeli, bir arsanın piyasada kabul gören güncel alım-satım değeri olarak tanımlanmaktadır. Bir bölgede arsa rayiç ortalamalarının yüksek olması, o bölgedeki arsaların görece daha değerli olduğunu göstermektedir. Altınordu Belediyesi’nin çevrimiçi olarak sunduğu “Arsa Rayiç Bilgileri” sorgulama ekranı kullanılarak cadde/sokak ölçeğinde arsa rayiç bedellerine erişilmiştir (Altınordu Belediyesi, 2023). D010 karayolunun kuzeyi ve güneyindeki mahalleler ölçeğinde arsa rayiç bedeli ortalamaları Şekil 2’de verilmiştir. Karayolunun kuzeyinde yer alan mahallelerin denize yakınlıkları göz önüne alındığında arsa rayiç bedeli ortalamasının bu mahallelerde daha yüksek olması beklenir. Çalışmanın sonuçları bu beklentiyi desteklemektedir. Arsa rayiç bedeli ortalaması bakımından kuzey ve güney mahalleleri arasında

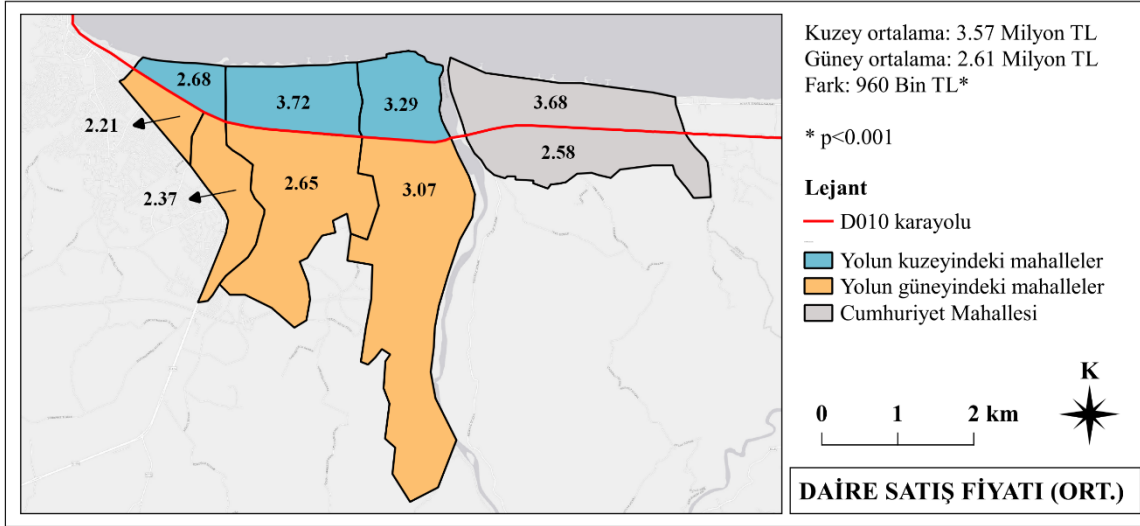
anlamli bir fark bulunmaktadır ( $p<0.001$ ). Karayolunun kuzeyinde arsa rayiç bedeli ortalaması güneye göre metrekare başına 594 TL daha yüksektir. Cumhuriyet Mahallesi'nin kendi içinde değerlendirildiğinde, mahallenin kuzeyi ile güneyi arasında arsa rayiç ortalaması bakımından metrekare başına yaklaşık 296 TL fark olduğu görülmüştür. Karayolunun kuzeyi ve güneyinde yer alan karşılıklı mahalleler arasında bu fark 425-1502 TL arasında değişmektedir (Şekil 2).



Şekil 2. Arsa rayiç bedeli ortalamaları

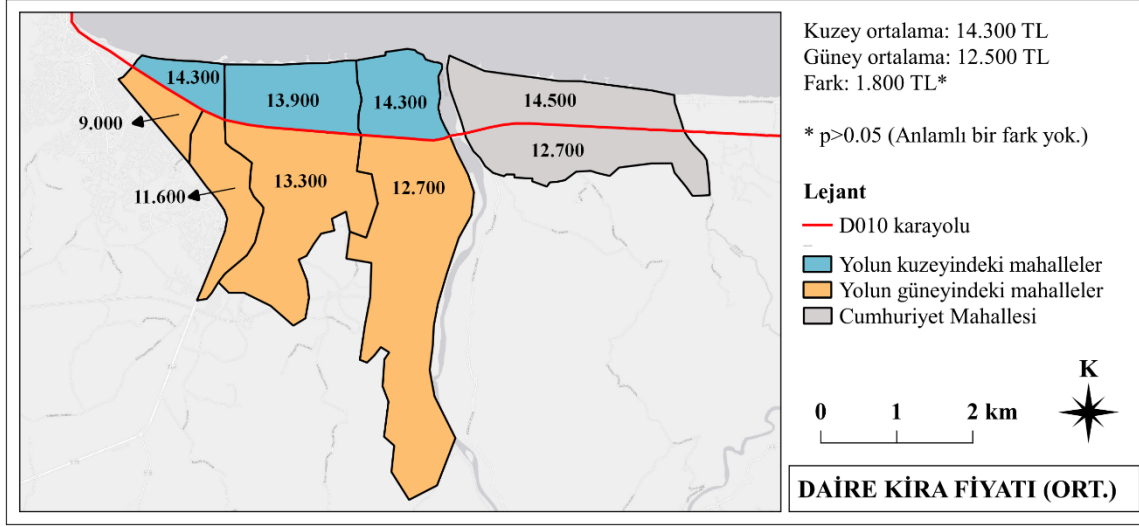
Çevrimiçi satış platformları üzerinden alınan verilere göre, D010 karayolunun kuzeyi ve güneyindeki mahalleler ölçeğinde daire satış fiyatı ortalamaları Şekil 3'te verilmiştir. Arsa rayiç bedeli değerlendirmesindeki bulgulara benzer şekilde, ortalama daire satış fiyatı bakımından da yolun kuzeyi ve güneyi arasında istatistiksel olarak anlamlı bir farklılık bulunmaktadır ( $p<0.001$ ). Yolun kuzeyinde daire satış fiyatı ortalaması güneydeki dairelerin ortalama satış fiyatından 960 bin TL daha yüksektir. Cumhuriyet Mahallesi'nin kuzey bölümünde yer alan bir dairenin satış fiyatı, aynı oda sayısına (3 oda + 1 salon) sahip fakat mahallenin güneyinde yer alan bir diğer daireye göre ortalama 1.1 milyon TL daha yüksektir. Dairelerin ortalama satış fiyatları arasındaki fark diğer karşılıklı mahalleler ölçeğinde 220 bin TL ile 1 milyon TL arasında değişmektedir (Şekil 3). Dairelerin ortalama satış fiyatları arasındaki farka odaklanan bu değerlendirmenin sınırlı bir zaman dilimindeki veriler kullanılarak gerçekleştirildiği unutulmamalıdır. Dahası kriter olarak yalnızca oda sayısı esas alınarak 3+1 oda sayısına sahip dairelerin satış fiyatları kullanılarak veri tabanı oluşturulmuştur. Dairelerin satış bedellerini etkileyen pek çok faktör bulunmaktadır. Ordu kent merkezindeki daireler örneğinde yapılan bir araştırmada; dairenin net büyüklüğü, dairede kullanılan ısıtma sistemi, dairenin denize yakınlığı

ve dairenin park manzarası görüp görmeme durumu daire fiyatları üzerinde belirleyici faktörler olarak tespit edilmiştir (Güzel vd., 2020). Dolayısıyla bu çalışmada diğer faktörler göz ardı edilerek yalnızca karayolunun kuzeyi ile güneyi arasındaki farklara odaklanılmıştır. Çalışmanın bulgularının bu sınırlayıcılar göz önüne alınarak yorumlanması önemlidir.



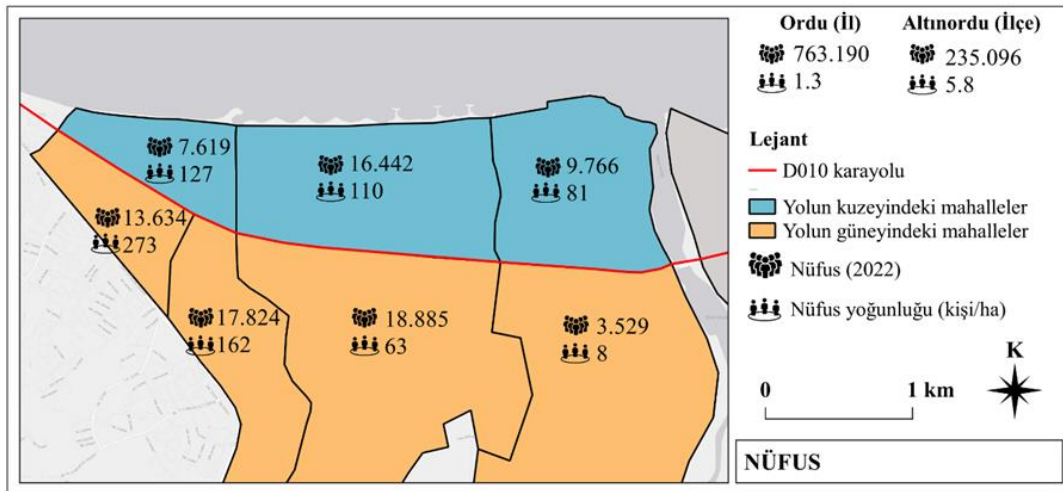
**Şekil 3.** Daire satış fiyatı ortalamaları

Karayolunun kuzeyi ve güneyindeki mahalleler ölçeğinde daire kira fiyatı ortalamaları Şekil 4'te verilmiştir. Dairelerin kira fiyatı ortalaması bakımından yolun kuzeyi ve güneyi arasında 1.800 TL fark bulunsa da istatistiksel yönden bu fark anlamlı değildir ( $p>0.05$ ). Yolun kuzeyinde kira fiyatı ortalaması 14.300 TL iken güneyde 12.500 TL'dir. Lokasyon bakımından mahalleler kendi içerisinde karşılıklı olarak değerlendirildiğinde, karayolunun kuzeyi ve güneyindeki dairelerin kira fiyatları arasında farkın 600-5300 TL arasında değiştiği görülmektedir. D010 karayolunun kuzeyi ile güneyindeki dairelerin kiralama bedelleri arasında istatistiksel yönden anlamlı bir fark olmamakla birlikte, aynı oda sayısına sahip (3+1) iki daireden yolun kuzeyinde olanın daha yüksek bedellere kiralanma eğiliminde olduğu anlaşılmaktadır.



**Şekil 4.** Daire kira fiyatı ortalamaları

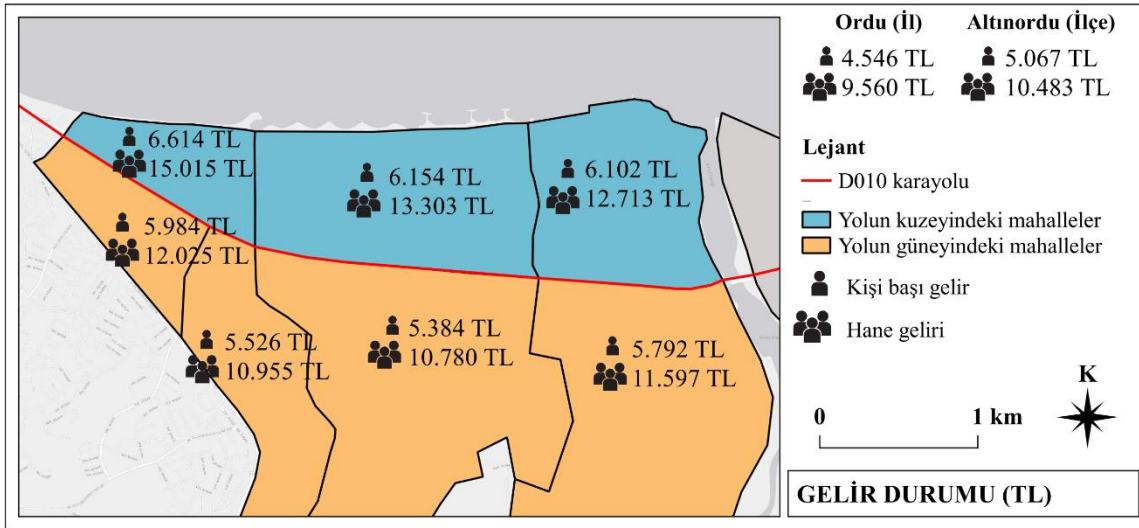
Emlak durumu dışındaki değişkenler için aynı mahallenin kuzeyi ile güneyi arasında mekânsal olarak bölünmüş verilere ulaşılamadığından, çalışmanın geri kalan bölümünde Cumhuriyet Mahallesi dışındaki 7 mahalle ölçeğinde değerlendirme yapılmıştır. D010 karayolunun kuzeyi ve güneyindeki mahallelerin 2022 yılındaki nüfusları ile nüfus yoğunluğu değerleri Şekil 5'te görülmektedir. Buna göre karayolunun güneyinde nüfus yaklaşık 20 bin daha fazladır. Yolun kuzeyindeki mahallelerde yaşayan toplam nüfus 33.827 iken güneydeki mahallelerde yaşayan nüfus 53.872'dir. Nüfus yoğunluğu ise kuzey mahallelerinde daha yüksek (102 kişi/ha), güney mahallelerinde daha düşüktür (60 kişi/ha). Çalışmanın bulguları, nüfus ve nüfus yoğunluğu bakımından kuzey ve güney mahalleleri arasında kayda değer bir örüntü bulunmadığını göstermektedir.



**Şekil 5.** Nüfus ve nüfus yoğunluğu durumu



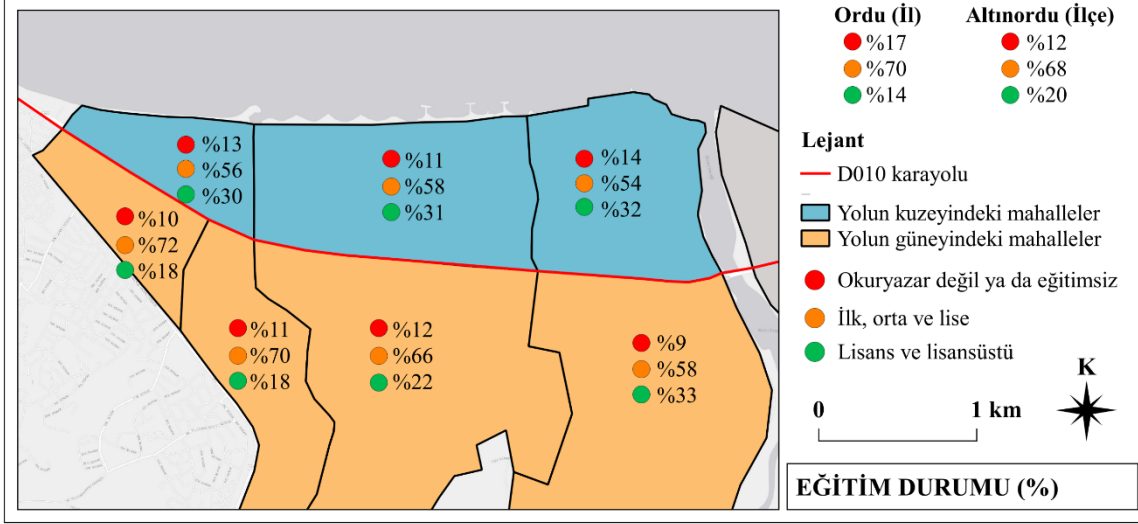
Gelir düzeyi yüksek ailelerin karayolunun kuzeyindeki denize daha yakın mahallelerde ikamet ettikleri öngörülmektedir. Dolayısıyla yolun kuzeyinde yer alan mahallelerde gelir düzeyi göstergeleri olarak seçilen kişi başı gelir ve hane geliri ortalamalarının güneydeki mahallelere göre daha yüksek olması beklenir. Çalışmanın sonuçları bu beklentiyi doğrular niteliktedir. D010 karayolunun kuzeyi ve güneyindeki mahalleler arasında, kişi başı gelir ve hane geliri bakımından farklılıklar bulunmaktadır. Kuzeydeki mahallelerde kişi başı gelir, 6.102 TL ile 6.614 TL arasında değişirken güneydeki tüm mahallelerde 6.000 TL'nin altındadır. Benzer şekilde hane gelirleri de kuzeydeki mahallelerde daha yüksektir. Karayolunun kuzeyinde en düşük hane geliri ortalaması 12.713 TL (Durugöl) iken güneyde en yüksek hane geliri ortalaması olan 12.025 TL (Yeni) dahi bunun altındadır (Şekil 6). Bu durum sosyo-ekonomik düzeyi yüksek birey ve ailelerin karayolunun kuzeyinde yaşadığını göstermektedir.



Şekil 6. Kişi başı gelir ve hane geliri durumu

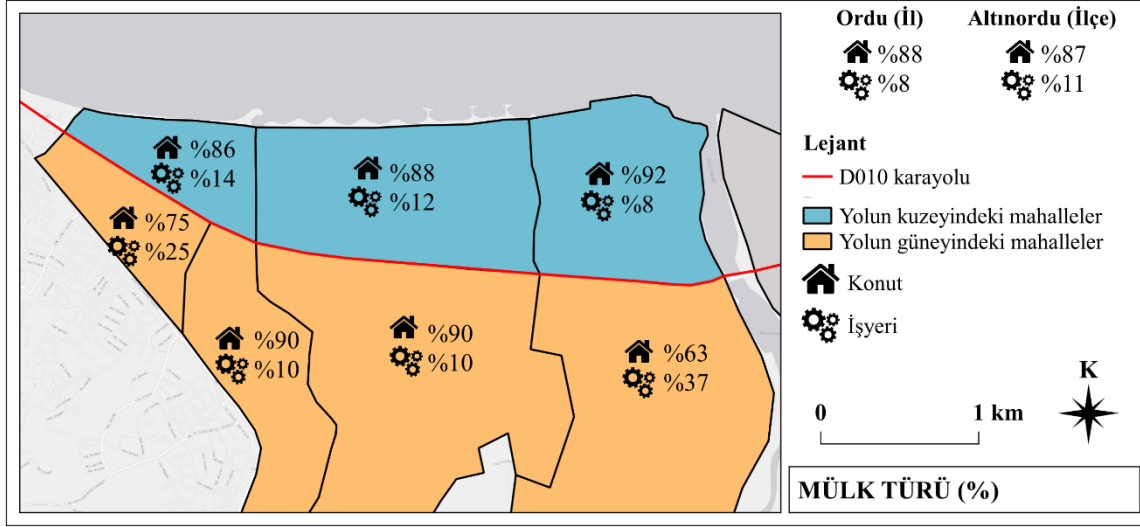
Karayolunun kuzeyinde yer alan mahallelerde, en az lisans düzeyinde eğitim almış bireylerin oranının güneydeki mahallelere göre daha yüksek olması beklenmektedir. Bu doğrultuda yedi mahalle ölçeğinde ve üç düzeyde (okuryazar değil ya da eğitimsiz, ilkokul-ortaokul-lise, lisans-lisansüstü) eğitim durumları analiz edilmiştir. Çalışma alanı içerisinde yaşayanların eğitim durumu dağılımı Şekil 7'de verilmiştir. Lisans ve lisansüstü eğitim düzeyine sahip olanların oranı D010 karayolunun kuzeyindeki mahallelerde %31 iken, güneydeki mahallelerde bu oran %21'dir. Karayolunun kuzeyinde yer alan üç mahallede, lisans ve lisansüstü düzeyde eğitim almış olan vatandaşlar toplam mahalle nüfuslarının %30'u ile %32'sini oluşturmaktadır. Güney mahallelerde ise bu oran % 18-22 arasında değişmektedir. Bununla birlikte yolun güneyinde yer

almasına rağmen lisans ve lisansüstü eğitim alanların oranı %33 olan Karapınar Mahallesi güneydeki diğer mahallelerden bu yönüyle farklılaşmaktadır.



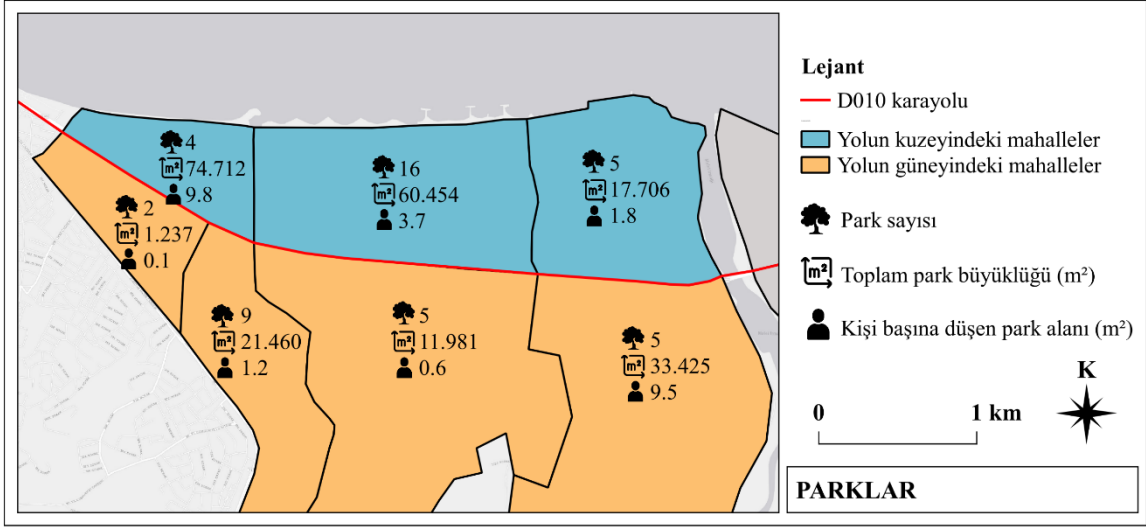
Şekil 7. Eğitim durumu

Çalışma kapsamında, bir mahallenin karayolunun kuzeyi ya da güneyinde yer almasının mülk türlerinin dağılımı üzerinde etkili olabileceği varsayılmıştır. Bu nedenle iki temel mülk türü olarak konut ve işyerlerinin tüm mülkler içerisindeki oranları değerlendirilmiştir. Konut ve işyeri oranları mahalleler ölçeğinde Şekil 8’de verilmiştir. İşyeri oranının en yüksek olduğu mahalle Organize Sanayi Bölgesi’nin içerisinde yer aldığı Karapınar’dır. İşyeri oranı bakımından Karapınar Mahallesi’ni Yeni Mahalle izlemektedir. Mahalle sınırlarında yer alan İsmetpaşa ve Zübeyde Hanım caddeleri üzerinde pek çok alışveriş mağazası bulunmaktadır. Bu nedenle işyeri oranı çevresindeki diğer mahallelere göre daha yüksektir. Mahalleler ölçeğinde bakıldığında karayolunun kuzeyi ve güneyi arasında mülk türlerinin oranı bakımından anlamlı bir örüntü olmasa da genel tabloda kuzeyde konut oranı %89, işyeri oranı %11; güneyde ise konut oranı %80, işyeri oranı %20’dir.



Şekil 8. Mülk türü olarak konut ve işyerlerinin oranı

Çalışma alanı içerisindeki parklara ilişkin niceliksel bilgiler mahalleler ölçeğinde Şekil 9’da verilmiştir. D010 karayolunun kuzeyinde yer alan mahallelerdeki toplam park sayısı 25 iken yolun güneyindeki mahallelerde toplam park sayısı 21’dir. Kuzey mahallelerindeki 25 parkın toplam büyüklüğü 152.872 m<sup>2</sup>, güneydeki mahalleler için toplam park büyüklüğü 68.103 m<sup>2</sup>’dir. Park sayısı ya da toplam park büyüklüğünün yanı sıra kuzey ve güney mahallelerinin bütünü için kişi başına düşen park alanı hesaplanmıştır. Mahalleler ölçeğinde bakıldığında genel olarak kuzeydeki mahallelerde kişi başına düşen park alanı miktarının güneydeki mahallelere göre oldukça yüksek olduğu görülmektedir. Ancak 2023 yılının başlarında, Karapınar Mahallesi sınırları içerisinde ve Melet Nehri’nin kıyısında oluşturulan yaklaşık 1.7 ha büyüklüğündeki sahil parkı bu miktarı 9.5 m<sup>2</sup> düzeyine çıkarmıştır. Bununla birlikte genel değerlendirmeye göre kuzeyde kişi başına düşen park büyüklüğü 4.5 m<sup>2</sup> iken güneyde bu miktar yalnızca 1.3 m<sup>2</sup>’dir. Karayolunun kuzeyinde kişi başına düşen park alanı miktarı güneye göre 3.2 m<sup>2</sup> daha fazladır.



Şekil 9. Parklara ilişkin niceliksel bilgiler

### SONUÇ ve ÖNERİLER

Yol planlamasının bir kentteki hangi faktörler üzerinde etkili olabileceği konusundaki araştırmalar oldukça kısıtlıdır. Kentlerin içinden geçen ve proje hızının yüksek olduğu yollar, kentlerde fiziksel ve doğrusal sınırlar oluşturarak geçişkenliği ve yaya erişilebilirliğini azaltmaktadır. Bu durum sonucunda farklı karakterlere sahip bölgeler oluşabilmektedir. Ordu kent merkezinden geçen D010 karayolu, kenti doğu-batı doğrultusunda fiziksel olarak ikiye bölerek kuzey ve güneyde yerleşim alanlarının oluşmasına neden olmuştur. Bu bağlamda çalışmamız; D010 karayolunun Ordu kent merkezindeki mahalleler arasında ekonomik, kültürel ve sosyal farklılıkların oluşmasına neden olduğu hipotezinden yola çıkılarak hazırlanmıştır. Bu çalışma kapsamında D010 karayolunun kuzeyi ve güneyindeki mahallelerin belirli faktörler bakımından farklılıkları irdelenmiştir.

Çalışmada değerlendirilen faktörlerin D010 karayolunun kuzeyi ile güneyi arasındaki farklılaşma durumları Tablo 2’de sunulmuştur. Buna göre çalışma kapsamında ele alınan 10 faktörden 5’i için karayolunun kuzeyi ile güneyi arasında anlamlı bir örüntü bulunmamıştır. Daire kira bedellerinin karayolunun kuzeyinde istatistiksel olarak anlamlı düzeyde yüksek olması beklenirken ortaya çıkan fark anlamsızdır. Nüfus ve nüfus yoğunluğu açısından yolun iki tarafı birbirlerinden farklı değildir. Lisans ve lisansüstü mezunu olan bireylerin oranının kuzeydeki mahallelerde daha yüksek olması bekleniyordu. İncelenen mahalleler arasında genel olarak böyle bir ilişki olsa da, güneyde yer almasına rağmen lisans ve üzeri mezuniyet derecesine sahip olanların oranı kuzeydeki mahalleler ile denk olan Karapınar Mahallesi



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

beklenen örüntüyü bozmaktadır. Kuzeydeki ve güneydeki mahalleler için konut ve işyerlerinin toplam mülkler içerisindeki oranları arasında kayda değer bir örüntüye rastlanmamıştır. Kişi başına düşen park miktarı karayolunun kuzeyindeki mahallelerde görece daha yüksek olsa da Karapınar Mahallesi, kişi başına düşen 9.5 m<sup>2</sup> park miktarı ile tüm mahalleler içerisinde ikinci sırada yer aldığından kuzey-güney farklılığı eksenindeki örüntü bozulmaktadır (Tablo 2).

Karayolunun kuzeyinde yer alan ve lokasyon olarak denize daha yakın konumda yer alan mahallelerde beklenildiği şekilde arsa rayiç bedelleri ve daire satış fiyatları daha yüksektir. Yolun kuzeyinde kişi başı gelir ve hane gelirleri de güneye göre oldukça yüksektir. Bu durum sosyo-ekonomik düzeyi yüksek kişi ve ailelerin yolun kuzeyindeki mahallelerde yaşama eğiliminde olduğunun bir göstergesidir. Park sayısı ve toplam park büyüklüğü de karayolunun kuzeyinde daha fazladır. Yeşil alanların sayısı, büyüklüğü ve kişi başına düşen yeşil alan miktarı gibi faktörlerin niceliksel olarak fazla olması, bir bölgedeki yaşam kalitesi ile doğrudan ilişkilendirilmektedir. Çalışmada değerlendirilen faktörler bağlamında varılan sonuç; nispeten gelir düzeyi yüksek kişilerin kuzey mahallelerinde yaşadığı, bu mahallelerin yeşil alanlar bakımından güneydeki mahallelere göre daha avantajlı olduğu ve bu yönüyle bölgedeki yaşam kalitesini artırdığı, kuzey mahallelerinin denize olan yakınlığı ile arsa rayiç ve satılık daire bedellerinin yüksek olduğudur.

**Tablo 2.** Çalışmada değerlendirilen faktörler ve D010 karayolunun kuzeyi ile güneyi arasındaki farklılık durumları

Değerlendirilen faktör	Sonuç
Arsa rayiç bedeli	Kuzeyde daha yüksek.
Daire satış bedeli	Kuzeyde daha yüksek.
Daire kira bedeli	Kayda değer bir örüntü yok.
Nüfus & nüfus yoğunluğu	Kayda değer bir örüntü yok.
Kişi başı gelir & hane geliri	Kuzeyde daha yüksek.
Eğitim durumu	Kayda değer bir örüntü yok.
Mülk türü	Kayda değer bir örüntü yok.
Park sayısı	Kuzeyde daha fazla.
Toplam park büyüklüğü	Kuzeyde daha fazla.
Kişi başına düşen park miktarı	Kayda değer bir örüntü yok.

Çalışmada değerlendirilen faktörlerin sayısı ve kullanılan veriler kısıtlı olduğundan, karayolunun kuzeyi ile güneyindeki farklılaşmayı bütünüyle ortaya koymak mümkün olmamıştır. Ancak belirli açılardan farklılıklar vurgulanmıştır. Bununla birlikte daha detaylı ve kapsayıcı analizlerin yapılması gerekmektedir. Karayolunun kuzeyinde yer alan mahallelerde yaşayan insanlar ile güneyindeki mahallelerde yaşayan insanlar arasında; çevre algısı,





## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

rekreasyonel tercihler, siyasi eğilimler, evcil hayvan sahiplenme oranı, suç oranı vb. pek çok faktör bakımından da farklılık olabileceği öngörülmektedir. Bu nedenle kent ölçeğinde yol planlamasından kaynaklanan bu tip sosyal ve mekânsal ayrışmaların tespit edilmesinde; mimarlık, şehir ve bölge planlama, sosyoloji, çevre psikolojisi ve emlak danışmanlığı gibi disiplinlerin birlikte çalışması gerekmektedir. Ordu kent merkezi ve diğer ilçe merkezlerinden geçen önemli karayollarının neden olabileceği farklılık ve ayrışmaya vurgu yapan bu çalışmanın gelecekte yapılacak olan çalışmalar için bir çıkış noktası oluşturabileceği düşünülmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### KORUNAN ALANLARIN SÜRDÜRÜLEBİLİR YÖNETİMİ

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#### ÖZET

Ekolojik ve kültürel değerlerin gelecek nesillere ulaşmasında önemli yeri olan korunan alanlar insan baskısı ve iklim değişikliği tehditleri altındadır. Bu alanlardan sağlanan çeşitli ekosistem hizmetlerinin sürdürülebilirliği için hem sistemlerin biyolojik yapısı ve işlevleri için biyokimyasal süreçlerin yönetilmesi hem de sosyal, ekonomik ve politik süreçlerin yönetilmesi gerekmektedir. Biyolojik olarak ekosistemin hizmetinin ortaya çıkmasını sağlayan süreçler, tahrip unsurları ve biyolojik çeşitliliğe odaklanılması gerekmektedir. Sosyal ve politik etkenler için öncelikle korunan alanları tehdit eden mevzuat ve uygulamaların ele alınması, kaynak ve alan yönetimi konusunda alınacak kararlarda paydaş katılımına önem verilmesi gerekmektedir. Ayrıca doğal alanlar ve kaynakların yönetimi, toplumun gelecekteki ekosistem hizmetlerine olan talepleri ve demografik değişimleri göz önüne alınarak planlanmalıdır.

**Anahtar Kelimeler:** Korunan alanlar, kaynak yönetimi, sürdürülebilirlik



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### SUSTAINABLE MANAGEMENT OF PROTECTED AREAS

#### ABSTRACT

Protected areas, which have an important place in the achievement of ecological and cultural values to future generations, are under human pressure and climate change threats. For the sustainability of various ecosystem services provided from these areas, it is necessary to manage both biochemical processes for the biological structure and functions of the systems and to manage social, economic and political processes. From a biological point of view, it is necessary to focus on the processes that enable the emergence of ecosystem services, elements of destruction and biodiversity. For social and political factors, first of all, it is necessary to address legislation and practices that threaten protected areas, and stakeholder participation should be given importance in decisions to be made on resource and area management. In addition, the management of natural areas and resources should be planned taking into account the future demands of society for ecosystem services and demographic changes.

**Keywords:** Protected areas, resource management, sustainability



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

Korunan alan belirli bir coğrafi bölgenin ve bağlantılı olduğu kültürel değerlerin uzun vadeli korunmasına ayrılmış sahalara olarak tanımlanabilir. Her biri belirli hedefleri ve yönetim gereksinimleri olan milli parklar, doğal yaşam rezervleri, biyosfer rezervleri ve deniz koruma alanları gibi çeşitli statüdeki alanları kapsamaktadır. Korunan alanlar biyolojik çeşitliliği, ekosistemlerin yapısı ve işleyişini ve kültürel mirası korumak için hayati öneme sahiptir. Korunan alanların hem ekolojik hem de kültürel değerleri olduğundan bu sahaların yönetiminde sadece ekolojik yönüne değil sistemin bağlantılı olduğu kültürel değerlere de odaklanması gerekmektedir. Ekolojik değerler genel olarak biyolojik çeşitlilik, ekosistem hizmetleri ve doğal yaşam alanları gibi değerleri içermektedir. Kültürel değerler ise geleneksel bilgiler, arkeolojik alanlar ve kutsal yerler gibi değerleri kapsamaktadır. Bu değerlerin tanınması ve korunması, hem doğal hem de kültürel mirasın korunmasını sağladığından sürdürülebilir yönetim için esas teşkil etmektedir.

### Tahrip

Ormanlar, tarih boyunca insanlar için önemli olmuştur. Şimdi de önemliler ve gelecekte de önemli olacaklar. Bununla birlikte, değişen iklim koşulları ve insan tahribatı nedeniyle orman alanları baskılar altındadır. Binyıl Ekosistem Değerlendirmesi'ne (2005) göre, tarımın gelişmesiyle birlikte son üç yüz yılda orman arazileri önemli oranda daralmıştır. Biyolojik kaynaklar da, kendini yenileme potansiyelinden daha hızlı tüketilmektedir. Örneğin, dünyadaki kullanılabilir karasal ekosistemlerin yarısı tarım ve mera arazisine dönüştürülmüştür. Dünyadaki birincil üretimin (fotosentez)  $\frac{1}{4}$  ila  $\frac{1}{2}$  oranı insan kullanımına kanalize edilmektedir. Bu kaynak sömürsü birçok canlının ve yaşam alanlarının yok olmasına neden olmaktadır. Örneğin, Uluslararası Doğayı Koruma Birliği'nin (IUCN) raporlarına göre kuşların % 12'si, memelilerin % 23'ü, amfibilerin % 32'si ve koniferlerin % 25'i yok olma tehlikesiyle karşı karşıyadır. Hükümetlerarası Biyoçeşitlilik ve Ekosistem Hizmetleri Bilim ve Politika Platformu (IPBES) tarafından 2019 yılında yayınlanan rapora göre, dünya çapında bir milyon tür tehdit altındadır. Dünya Yaban Hayatı Federasyonu'nun (WWF) "2020 Yaşayan Gezegen Raporu", insan faaliyetlerinin etkisiyle omurgalı popülasyonlarının 1970 ile 2016 yılları arasında ortalama % 68 oranında azaldığına vurgu yapmaktadır (WWF-2021 TR Rapor). Dolayısıyla, biyosferin sağlıklı işleyişini garanti altına almak için bilim adamları karasal ve deniz ekosistemlerinin en az üçte birinin (% 30) korunması gerektiğine işaret etmektedirler (WWF-2021 TR Rapor).





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### İklim Değişikliği

İklim değişikliğinin olduğu ve devam edeceği konusunda artık tüm dünyada genel bir kanaat oluşmuştur (Allen et al. 2010; Lindner et al. 2010; Boisvert-Marsh et al. 2014; Cailleret et al. 2017). Dünya çapında elde edilen iklim verileri (sıcaklık ve yağış kayıtları) değişimin hızını açıkça gösterilmektedir. Küresel iklim değişikliği, Dünyanın bazı bölgelerinde belirli zamanlarda şiddetli kuraklıklara yol açarken bazı zamanlarda sel ve taşkınlar gibi afetlere neden olmaktadır.

İklim değişikliği dünyanın oluşumundan beri devam eden bir gerçektir. İklim her zaman değişiyordu, ancak geçmişte bu değişiklik nispeten yavaştı. Türler, geçmişte yavaş yavaş meydana gelen iklim değişikliğinde coğrafik olarak yer değiştirebiliyordu. Ancak günümüzde pek çok tür bu hızlı değişime ayak uyduramamaktadır (Kimmins, 1999). İklim değişikliğine bağlı olarak ortaya çıkacak bölgesel farklılıklar, türlerin dağılımını, ekosistemlerin yapısını, işlevini ve hizmetlerini etkileyen önemli tehditlerden biri olarak kabul edilmektedir.

İklim değişikliğinin ormanlar üzerindeki en belirgin etkileri doğrudan kuraklığın yarattığı stres ve türlerin dağılımındaki olası değişikliklerdir. Ayrıca kuraklıkla birlikte şiddetli ve tehlikeli yangın risklerinin artma olasılığıdır. İklim değişikliğinin ormanlar üzerindeki en önemli dolaylı etkisi ise stres koşullarına bağlı olarak bitkilerin direncinin azalması ve böcek ve diğer zararlıların yaşam döngüsündeki değişime bağlı olarak ormanlar üzerindeki tahrip etkilerinin artması olabilir.

Kuraklık projeksiyonlarına göre, Türkiye'nin birçok bölgesi gelecekte kuraklığı çok daha şiddetli hissedecektir (Cherlet ve ark., 2018). Zaten ülkenin önemli bir kısmında son yıllarda uzun süreli ve şiddetli kuraklıklar deneyimlenmektedir. Dolayısıyla iklim değişikliği Türkiye'deki orman ekosistemlerinin yapısını, işlevini ve dağılımını etkileyecektir. Azalan yağış miktarı nedeniyle birçok alanın daha kuru hale gelmesi beklenmektedir. Artan sıcaklıklar bitkilerden ve topraktan su kaybını artıracak, böylece yağış artsa bile bitkilerin suya erişimi azalacaktır.

İklim değişikliği senaryolarına göre kuraklık durumunda iletim borularında (traheid) su kolonunun kırılması yapraklı türlere (trahe) göre daha az olduğundan birçok bölgede konifer türlerinin bitki kompozisyonundaki oranı artabilir (Yıldız ve ark., 2022). Ağaçlarda ve diğer bitki formlarında ölüm oranları artabilir, üreme ve gençleşme başarısı düşebilir. Yaşam alanları ve bitki toplumlarının yer değiştirmeleri gözlemlenebilir (Parmesan and Yohe, 2003; Wiens, 2016; EEA, 2017; IPCC, 2019; IPBES, 2019). Bitki toplumlarında termofilik türlerin ağırlığı



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

artabilir. Kış uykusuna yatan hayvan türlerinin biyolojik saatlerindeki sapmalar üreme ve dolayısıyla popülasyon büyümelerine etkide bulunabilir.

### **KORUMA VE SÜRDÜRÜLEBİLİRLİK**

Topluma birçok hizmet sunan ekosistemler yapısal ve işlevsel olarak durağan değildir. Tarihsel kayıtlar, uzun vadeli istikrarın ekosistemler için istisna olduğunu ve değişimin kural olduğunu göstermektedir (süksesyon). Ancak sadece ekosistemin yapısı ve işlevi değil, toplumun yapısı ve ekosistemden beklenen talepleri de zaman içinde çeşitlenmekte ve değişmekte ve hatta daha önce hiç tahmin edilemeyecek yeni talepler ortaya çıkabilmektedir. Bu bağlamda sürdürülebilirlik hem ekosistemin değişen yapısı ve işlevini hem de örtük te olsa toplumun artan ve değişen taleplerini dikkate alan bir kavramdır.

Orman ekosistemlerinin verimliliğinin, biyolojik çeşitliliğinin ve diğer bileşenlerinin sürdürülebilirliğinin değerlendirilmesi için bazen birkaç tahrip ve toparlanma döngüsünün (ekolojik rotasyon) gözlemlenmesi gerekebilir. Bu nedenle sürdürülebilirlik hakkında karar verilmesi daha çok bir süreç sorunudur. Fakat bu tahrip ve toparlanma süreçlerini gözlemlemek uzun zamanlar aldığından olası senaryolar için modeller kullanılmaktadır. Bu modellerle farklı ekosistem değerlerinin değişen süreçlere göre yönetim stratejileri geliştirilmektedir.

### **KORUNAN ALANLAR KAVRAMININ TARİHSEL GELİŞİMİ VE İLGİLİ MEVZUATLAR**

Dünyada doğa koruma uygulamalarının kurumsal bir yapı altında örgütlenmesi ve sistematik politikaların geliştirilmesi 1872 yılında Yellowstone ve çevresinin milli park olarak belirlenmesiyle başlamıştır. ABD'den sonra yirminci yüzyılın ortalarından itibaren dünyanın birçok ülkesi milli parkları ve diğer alan koruma sistemlerini kendi yapılarına dahil ederek uygulamaya başlamıştır.

Özellikle ikinci dünya savaşı sırası ve sonrasındaki çalışmalar sonucu ekosistemler ve ekosistemlerle olan ilişkiler hakkında bilgilerin artmasına bağlı olarak doğayla olan ilişkimiz koruma paradigmasından evrilerek sürdürülebilir kavramı ağırlık kazanmaya başlamıştır. Bu bağlamda Yeşil Politika 1960'ta önemli bir konu haline gelmiştir. Çevre aktivistleri tarafından düzenlenen ilk "Dünya Günü" nden bu yana çevreye olan ilgi giderek artmıştır. 1972'de de Club of Rome, "Büyümenin Sınırları" adlı bir rapor yayınlamıştır. "Büyümenin Sınırları" raporunun dünyada sürdürülebilirlik kavramının temelini attığı kabul edilmektedir. Uluslararası çevre politikasının başlangıcı olarak kabul edilen ilk BM çevre konferansı 1972'de İsveç'in Stockholm kentinde gerçekleşmiştir. Bu konferans, daha iyi bölgesel ve küresel çevre



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

korumasını teşvik etmek için devletlerin ve uluslararası kuruluşların çevresel faaliyetlerini koordine etmekten sorumlu olan Birleşmiş Milletler Çevre Programı'nın oluşturulmasına yol açmıştır. Dünya çevre ve kalkınma komisyonu 1987 yılında "Ortak Geleceğimiz" başlıklı raporu yayınlamıştır. Rapor, sürdürülebilir kalkınmaya özel bir vurgu yaparak çevre ve kalkınma arasındaki ilişkiye dikkat çekmiştir. Rio'daki dünya zirvesinde "Sürdürülebilir Kalkınma Komisyonu" kurulmuştur. Dünya Zirvesi'nden on yıl sonra dünya sürdürülebilir kalkınma zirvesi Güney Afrika'nın Johannesburg kentinde toplanmıştır. Rio Dünya Zirvesi'nin 20. yıldönümünde (2012) Rio +20 BM Sürdürülebilir Kalkınma Konferansı Brezilya'nın Rio kentinde düzenlenmiştir. Yine 1946 yılında kurulan Birleşmiş Milletler Eğitim, Bilim ve Kültür Örgütü (UNESCO) de doğa korumanın çeşitlendirilmesine önemli katkılarda bulunmuş ve 1971 yılında "Biyosfer Rezervi" kavramını dünyaya tanıtmıştır. Bütün bu çabalar sonucu korunan alanların 1970'lerde dünya genelinde karasal alanlara oranı % 2,6 iken, Haziran 2020 itibarıyla dünya genelinde 244 ülke ve bölgede toplam yüzölçümü 20.323.301 km<sup>2</sup> olan 245.210 karasal alan korunma statüsüne dahil edilmiştir. Bu alanlar dünyanın karasal yüzeyinin % 13,2'sine tekabül etmektedir.

Özellikle 1970'lerden bu yana doğa koruma alanında uluslararası işbirliğinin geliştirilmesi ve güçlendirilmesine yönelik birçok uluslararası sözleşme imzalanmıştır. Türkiye, Göçmen Yabani Hayvan Türlerinin Korunmasına İlişkin Sözleşme (Bonn Sözleşmesi) hariç uluslararası anlaşmaların hepsini imzalamıştır.

Modern anlamda korunan alan kavramı ve bu düşüncenin pratiğe dönüştürüldüğü milli park ve benzeri korunan alanlar, dünyada ortaya çıktıktan yıllar sonra ülkemize girmiştir. Türkiye'deki ilk milli park, ABD'deki örneğinden 86 yıl sonra 1958'de (Yozgat Çamlığı) ilan edilmiştir. Türkiye'de diğer korunan alan uygulanmalarında da gecikmeler yaşanmış ve ilk tabiat parkı 1988 yılında kurulmuştur. Buna rağmen özellikle 1980'lerden sonraki dönem, yasal altyapının oluşturulması ve korunan alanların çeşitlendirilmesi açısından önemli bir yere sahiptir.

Türkiye'deki korunan alanlar genel olarak;

6831 sayılı Orman Kanunu,

2873 sayılı Milli Park kanunu,

4915 Karasal Avcılık Kanunu,

2863 sayılı Kültür ve Tabiat Varlıklarını Koruma Kanunu,

1380 sayılı Su Ürünleri Kanunu,

3194 sayılı İmar Kanunu



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

2872 sayılı Çevre Kanunu ile yönetilmekte olup korunan alanlar konusunda üç farklı bakanlığa yetki verilmiştir.

### **SÜRDÜRÜLEBİLİR YÖNETİM İÇİN YAPILASI GEREKENLER**

Korunan alanların çoğu doğal, doğala yakın veya ona göre restore edilmiş ekosistemlerdir. Her birinin yönetim hedefleri önemli ölçüde değişiklik gösterebilmektedir. Korunan alanların farklı yönetim amaçları olduğu için en başarılı yönetim şekli amacına en yakın ulaşan yönetimlerdir. Korunan alanların sürdürülebilir yönetimindeki en iyi uygulamalar, izleme ve uygulama için teknolojinin kullanımını, toplum temelli koruma girişimlerini ve halkı bilinçlendirme kampanyalarını içermektedir. Ayrıca geleneksel bilgi ve yerel uygulamaların yönetim stratejilerine entegre edilmesinin kültürel değerlerin korunmasında ve ekosistem direncinin artırılmasında etkili olduğu kanıtlanmıştır.

Korunan alanların sürdürülebilir yönetimi, biyolojik çeşitliliğin korunmasını, sürdürülebilir kaynak kullanımını, ekosistem süreçlerini ve toplum etkileşimini kapsayan ilkelerin, direktiflerin ve uygulamaların entegrasyonunu gerektirmektedir. Bu ilkeleri benimseyerek, direktifleri takip ederek ve örnek çalışmalardan ve en iyi uygulamalardan öğrenerek korunan alanlar, gelecek nesiller için ekolojik ve kültürel değerlerini koruyacak şekilde yönetilebilir.

Biyçeşitliliğin korunması, korunan alanların birincil hedefidir. Biyolojik çeşitliliğin korunması kritik habitatları belirlemeyi ve korumayı, tehdit altındaki ve nesli tükenmekte olan türlerin popülasyonlarını yönetmeyi ve tahrip olmuş ekosistemleri restore etmeyi içermektedir. Ayrıca, korunan alanlar arasındaki bağlantıyı sağlamak, hem türlerin hareketini kolaylaştırır hem de genetik çeşitliliği artırabilir.

Ekosistem süreçlerinin yönetimi, korunan alanların ekolojik işleyişinin devamını sağlamayı gerektirmektedir. Bunun için, tahrip unsurlarının yönetilmesi, tahrip olmuş ekosistemlerin restorasyonu, istilacı türlere dikkat edilmesi ve tahrip olmamış ekosistemlerin korunarak doğal süreçlerin devamının sağlanması gerekmektedir.

Korunan alanların sürdürülebilir yönetimi için paydaş katılımı kritik öneme sahiptir. Yerel topluluklar, devlet kurumları, STK'lar ve özel sektör dahil olmak üzere çeşitli paydaşlarla etkileşim kurmak, işbirliğini, paylaşılan sorumluluğu ve etkili karar vermeyi teşvik eder. Paydaşları karar alma süreçlerine dahil etmek, farklı bakış açılarından ve bilgi birikimlerinden faydalanmayı sağlar. Ancak günümüzde paydaşların çoğu, ekosistem hizmetlerinden etik ve çevresel değerlerin geleneksel odun üretimi değerinden daha önemli olduğunu düşünmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Bu nedenle artık orman alanlarından odun üretimi yerine, diğer ekosistem hizmetlerinden faydalanma arzusu ekosistem yönetimi paradigmasında ağırlık kazanmıştır. Bu ekosistem hizmetleri çok çeşitli değerler içermektedir (Fitter ve ark., 2010).

Ayrıca ormancılar dışındaki çıkar gruplarının da doğal kaynakların sürdürülebilirliğine ilişkin duyarlılıkları artırmıştır. Ormancıların ve diğer çıkar gruplarının yaklaşımı genellikle birbiriyle çelişmektedir. Bu çelişki, doğal kaynak yönetimi ile ilgili güncel tartışmaların ana nedenidir. Günümüzde birçok insan, ormanlara esas olarak estetik değerleri, manzara güzellikleri ve gezip takdir edecekleri yerler olarak veya etik nedenlerle değer vermektedir. Bu bakış açısına sahip kişilerin orman ekosistemlerine bakışı ve tutumları, üretim ormancılarınınkinden oldukça farklıdır.

### ÖNERİLER

Korunan alanların sürdürülebilir yönetimi için etkin yönetim politikaları çok önemlidir. Fakat etkin bir yönetim için öncelikle korunan alanlarda birden fazla kurumun yetkisinin tek bir kurumda toplanması gerekmektedir.

Son yıllarda ekonomik nedenlerle maden kanununda yapılan değişiklikler korunan alanlar üzerinde risk oluşturmaktadır. Ayrıca Turizmi Geliştirme Kanunu'nda yapılan değişiklikler, orman alanlarının yanı sıra milli parklar, tabiat rezervleri, tabiat parkları ve tabiat anıtlarının turizm yatırımlarına tahsis edilmesine olanak tanımaktadır (Atmış, 2018). Bu gibi mevzuat değişiklikleri sonucu korunan alanların asıl amacının ikinci plana atılması bu sahalar üzerinde tahrip riskini arttırmaktadır.

Farklı senaryolara göre uyarlanabilir yönetim yaklaşımları, korunan alan yönetimindeki belirsizlikleri ve karmaşık zorlukları ele almak için hayati öneme sahiptir. Yönetimce yapılan müdahalelerinin etkinliğini değerlendirmek ve farklı durumdaki alanlarını belirlemek için etkili izleme ve değerlendirme sistemlerinin uygulanması gerekmektedir. Düzenli değerlendirme ve geri bildirimler, uyarlanabilir yönetim ve kanıta dayalı karar vermeyi mümkün kılacaktır.

Bu ekosistemler üzerindeki en önemli tahrip unsurları rekreasyonel faaliyetler ve iklim değişikliğidir. Rekreasyonel faaliyetler, daha kısa sürede meydana gelen tahrip unsurlarıdır, iklim değişikliğinin etkileri ise nispeten daha uzun bir sürede ortaya çıkmaktadır. Bu nedenle rekreasyonel faaliyetlerin kısa vadede olumsuz etkilerine yönelik önlemler alınırken, iklim değişikliğinin etkilerini azaltan uzun vadeli uyum stratejilerinin de geliştirilmesi gerekmektedir.





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Rekreasyon kavramı insan merkezli bir kavramdır. Burada daha çok insanın eylemi ön plana çıkarılmaktadır. Fakat sistemin taşıma kapasitesinin göz ardı edildiği insan merkezli rekreasyonel faaliyetler, hâlihazırda kırılğan bir yapıya sahip olan bu kaynaklarda zaman içinde yapısal ve işlevsel tahriplere neden olmaktadır. Bu nedenle öncelikle rekreasyon kavramında bu antroposentrik bakış açısı yerine ekosistem yapısının ve işlevinin ön plana çıkarıldığı ve insan eyleminin daha pasif kaldığı ekosentrik anlayışı öne çıkarmak gerekmektedir. Böylece ekosistemler üzerindeki tahripler kısmen azaltılabilir. Örneğin insanın aktif olduğu ve fiziksel gücüne dayalı, piknik, yürüyüş, kamp vb. faaliyetler yerine, bitki örtüsünün, doğal yaşamın, su yüzeylerinin ve manzaraların vurgulandığı estetik, kültürel, eğitsel ve yaratıcı faaliyetlere önem veren zihinsel faaliyetlere vurgu yapılmalıdır.

Parktaki biyolojik çeşitliliği korumak ve geliştirmek için bir koruma planı hazırlanmalıdır.

Rekreasyonel faaliyetlere ilişkin talepler yaş gruplarına göre farklılıklar gösterdiğinden uzun vadede toplumun demografik yapısını tahmin etmek ve faaliyetleri yaş grubuna göre planlamak gerekmektedir.

Parkın kullanımını zamansal olarak analiz edilmelidir. Örneğin mevsimlik ziyaretçi kullanımı, hafta sonları ve tatil günlerinde kullanım miktarı değerlendirilmelidir. Parka yapılan ziyaretin mevsimi, tahribin şiddetini değiştirebilir. Bu nedenle mevsime göre alınabilecek tedbirler de değişecektir. Örneğin, renk değişiminden kaynaklanan manzara güzelliğini seyretmek için parka en fazla ziyaretçi akını yaprak dökülme döneminde yani sonbaharda gerçekleşiyor olabilir. Bu dönem ayrıca yağışın başladığı dönemdir. Dökülen yapraklar kısmen tampon etkisi görse de yağışlı dönemde sahada dolaşmak toprak sıkışması riskini arttırmaktadır. İlkbahar ve yaz ayları büyüme mevsimi olduğu için bitkiler bu dönemde tahriplere karşı daha hassastır. Bitki ve çiçeklerin insanlar tarafından koparılması da bu dönemlerde daha olasıdır. Bu nedenle çiçeklenme döneminde yürüyüş yollarında rota değişiklikleri yapılabilir. Özellikle çiçeklenme döneminde endemik türlerin bulunduğu bölgelere erişim kısıtlanabilir. Yani yoğun kullanım alanları mekânsal ve zamansal olarak değişkenlik gösterirse tahribin etkisi kısmen azaltılabilir. Orman içindeki dikili kurular yaban hayatı için yaşam alanı oluşturacağından, ormanlık alanlarda belirli sayıda dikili kuru bulunması teşvik edilmelidir.

Türkiye'de nüfus artışı nedeniyle kırsal rekreasyon taleplerini karşılayacak alanlar yetersiz kaldığından mevcut sahalar yoğun baskı altındadır. Aslında sorunun en önemli nedeni çok dar alanlarda girerek artan toplum taleplerini karşılanmaya çalışılmasıdır. Mevcuttaki parklar üzerindeki baskıyı azaltmanın en önemli yollarından biri alternatif rekreasyon alanlarının



## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

oluřturulmasıdır. Avrupa'daki kırsal alanların yaklaşık% 2'si rekreasyonel amaçlı kullanılırken, Türkiye'de bu oran Avrupa'dakilerin sadece 20'de biri (% 0,01) kadar. Türkiye son 50 yılda yıllık %1'in üzerinde bir nüfus artışı sahiptir (TUİK, 2020). Bu nedenle kişi başına düşen orman alanı 0,48 hektardan 0,27 hektara düşmüştür (Tarımorman, 2023). Bu oran dünya ortalamasının yaklaşık yarısıdır. Bu nedenle toplumun artan rekreasyonel faaliyet talebini karşılamak ve halihazırda var olan rekreasyon sahalarındaki baskıyı azaltmak için alternatif rekreasyon alanlarının belirlenmesi gerekmektedir.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### İKLİM DEĞİŞİKLİĞİ, KURAKLIK VE İÇ ANADOLU'DA AĞAÇLANDIRMA ÇALIŞMALARI

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#### ÖZET

İklim değişikliği karşısında en hassas ekosistemlere sahip İç Anadolu kurak sahalarında ağaçlandırma çalışmalarının sürdürülebilirliği için şimdiye kadar elde edilen veriler ve iklim tahminleri dikkate alınarak geleceğe dönük öngörülerin belirlenmesi gerekmektedir. Bu bağlamda yörede su kaynaklarının daha da azalacağı dikkate alınarak giderek etkisi artacak olan kuraklık koşullarında hangi türlerin varlığına devam edebileceğinin araştırılıp ortaya konması ve ona göre ağaçlandırma stratejilerinin belirlenmesi gerekmektedir. Ağaçlandırma yapılacak yerde bitkinin suyu hangi kaynaktan aldığı bilinmesi su kaynakları ile ağaçlandırma arasında ilişkinin daha iyi anlaşılmasına yardımcı olacaktır. Böylece elde edilen sonuçlara dayanarak olası iklim değişikliğinde ve azalan su kaynaklarının olduğu ortamda hangi türlerin sahada kalma şansının daha fazla olduğu tahmin edilip uygulamacıya önerilerde bulunulabilir.

**Anahtar Kelimeler:** İç Anadolu, ağaçlandırma, kuraklık, iklim değişikliği





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CLIMATE CHANGE, ARIDITY AND AFFORESTATION PRACTICES IN CENTRAL ANATOLIA

#### ABSTRACT

For the sustainability of afforestation sites in the arid areas of Central Anatolia, which have the most sensitive ecosystems in the face of climate change, it is necessary to determine future-oriented forecasts by taking into account the data obtained so far and climate forecasts. In this context, considering that the water resources in the region will decrease even more, it is necessary to investigate and reveal which species can continue to exist in afforestation sites in the harsher drought conditions in the future. Knowing from which source the plants uptake water at the place where afforestation will be carried out will help to better understand the relationship between water resources and afforestation practices. The water source used by plants can be compared easily and accurately using the stable isotope method. Thus, based on the results obtained, it can be forecast which species have a better chance of surviving in increasing drought stress resulted in the event of possible climate change. And suggestions can be made to the practitioner about which species to use.

**Keywords:** Central Anatolia, afforestation, drought, climate change



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### GİRİŞ

İç Anadolu kurak sahaları uzun yıllardır otlatma ve tarım amaçlı kullanımlar nedeniyle tahrip edilmiştir. Özellikle 1950'lerden sonra marjinal sahaların tarıma açılması sonucu koruyucu bitki örtüsünü kaybeden topraklar şiddetli rüzgar erozyonları etkisinde kalmıştır (Tavşanoğlu, 1976; Yıldız ve ark., 2017; 2018, Yıldız, 2019). Rüzgâr erozyonunu önlemek amacıyla 1950'lerin ikinci yarısından itibaren ağaçlandırma çalışmaları başlamış ve çok sayıda tür farklı yörelerde kullanılmıştır. Bu çalışmaların hemen hemen hepsi iyi tasarlanmış öncü araştırma projelerinden yoksun olup doğrudan uygulama projeleri olduğundan verilerin değerlendirilmesi oldukça zordur. Örneğin, aynı tür farklı yerlerde farklı tutma ve büyüme başarılarına sahiptir. Bu farklılıkların dikim yılındaki ve takip eden yıllardaki su açığından mı yoksa sahadaki başka değişkenlerden mi kaynaklandığının belirlenmesi oldukça zordur. Ayrıca bu çalışmaların çoğu genelde ilk yıllara ait fidan tutma ve büyüme başarısını vermekte fakat türlerin uzun yıllar boyunca tutma ve büyüme seyrini gösteren çalışmalar eksiktir. Yıldız ve ark. (2022) tarafından yapılan bir çalışmada Ekecek dağından başlayarak güneyde Karapınar ve batıda Karaman'a kadar olan bölgedeki ağaçlandırma sahalarında farklı yaşlardaki türler örneklenmiş, toprak ve toprak üstü bileşenlerin değişim seyri tespit edilmiştir. Bu çalışmada ilk yıllarda başarılı gibi görünen bazı türlerin ileriki yıllarda aynı başarıyı göstermediği, ilk yıllarda önemli miktarda kayıp veren türlerin ise ileriki yıllarda yaşama oranı olarak durağan hale geldiği fakat büyüme performansının çok daha iyi olduğu görülmüştür. Dolayısıyla ağaçlandırma gibi uzun vadeli planlamalar için kısa vadeli sonuçlar değil uzun vadeli sonuçların değerlendirilmesinin daha sağlıklı olacağı görülmektedir.

İç Anadolu kurak sahalarında ağaçlandırmanın amacı daha çok rüzgâr erozyonunu önleme ve yeşil kuşak oluşturma olduğundan bu sahalarda restorasyonun hedefi de ekosistemi bu hizmeti sunacak yapı ve işleve dönüştürmektir. Fakat en önemli soru arzulanan hizmetlerin sürdürülebilmesi için değişen iklim ile birlikte sık sık yaşanan kuraklık koşullarında ekosistemin bu yapısının devamlılığının sağlanıp sağlanamayacağıdır. Geniş alanlarda uygulama çalışmalarının başarılı bir şekilde yürütülebilmesi ve gelecekte daha da kurak olacağı tahmin edilen koşullarda başarının devam ettirilebilmesi için uzun vadede sahada kalıp iyi bir büyüme performansı gösterecek türlerin belirlenmesi gerekmektedir.

### Amaç

Uzun yıllardır yörede yapılan çalışmalarda ağaçların belirli bir boy büyümesini geçememesi, bazı türlerin başlangıçta oldukça düşük performans göstermesine rağmen ileri yaşlarda daha iyi



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

performans göstermesinin nedeninin kullandıkları su kaynağından olduğu düşünülmektedir. Bu nedenle bu çalışmanın amacı öncelikle İç Anadolu Bölgesinde kuraklık ve ağaçlandırma konusunun şimdiye kadar elde edilen veriler ışığında tartışılması daha sonra iklim değişikliğinin etkisiyle gelecekte daha da kurak olacak olan yörede yapılacak ağaçlandırma çalışmalarında su kullanımına göre tür seçiminin değerlendirilmesidir.

### YÖNTEM

WorldClim veri tabanından (URL-1) yararlanarak 2040, 2060, 2080 ve 2100 yılları için sıcaklık, yağış ve kuraklık gibi aylık iklim verileri, 2021 IPCC altıncı değerlendirme raporunda (AR6) sunulan Paylaşılan Sosyo-ekonomik Yollar (SSP'ler) 245 ve 585 küresel iklim değişikliği senaryosuna göre oluşturulmuştur. Ayrıca yörede şimdiye kadar yapılan araştırma ve uygulama projeleri ile iklim, toprak ve ağaçlandırma verileri irdelenmiş, kuraklık ve sahalarda yapılan çalışma sonuçları değerlendirilmiş (Yıldız ve ark., 2017; 2018a, b, Yıldız, 2019a; Yıldız ve ark., 2021) ve iklim değişikliği ile ilgili öngörüler geliştirilmiştir. Sahada bitkilerin yaşamasını ve büyüme performansını etkileyen en önemli değişken su kaynağı olduğundan farklı türlerin toprakta kullandıkları su kaynaklarının belirlenmesine yönelik önerilerde bulunulmuştur.

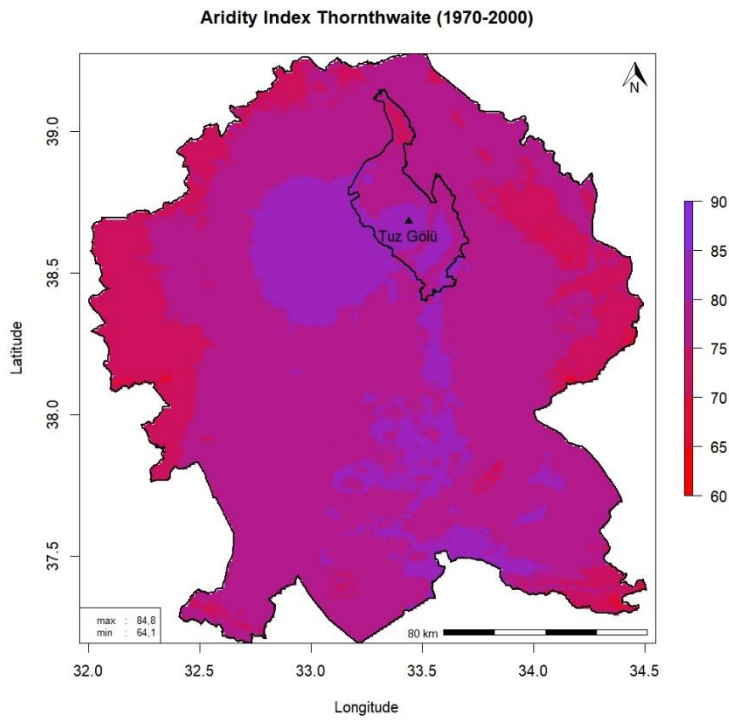
### BULGULAR

#### Kuraklık ve İç Anadolu Bölgesi

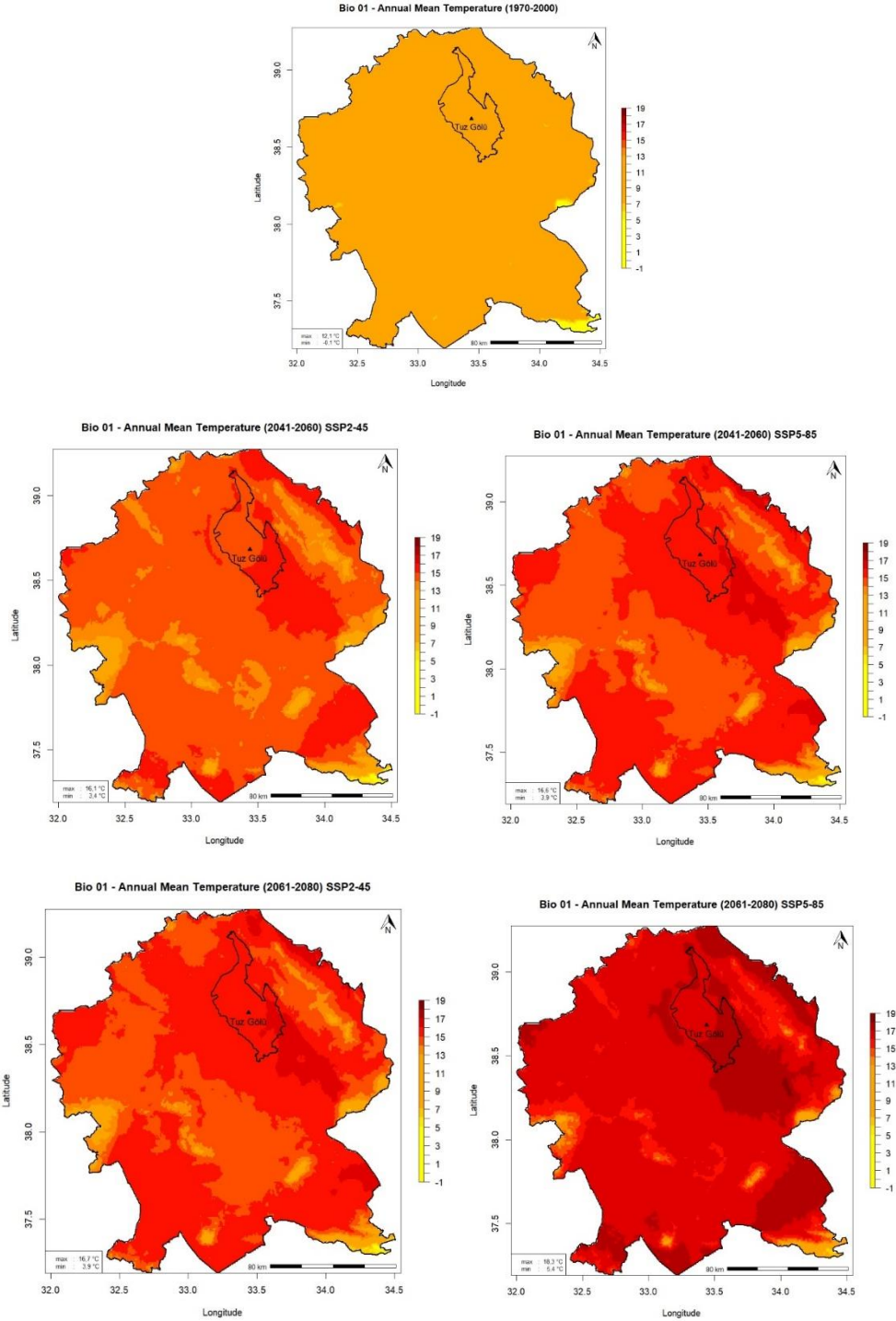
IPCC projeksiyonuna göre Türkiye'nin de içinde yer aldığı Akdeniz havzası da dahil birçok alan gelecekte çok daha şiddetli bir şekilde kuraklığı hissedecektir (Lee, 2007). Ceylan ve ark. (2009) bölgenin 300 mm civarında toplam yıllık yağış ve 11 C<sup>0</sup> ortalama sıcaklıkla Türkiye'nin en kurak sahalara sahip olduğunu belirtmektedir. Konya ve Ereğli istasyonlarının son 60 yıllık verileri kullanılarak yapılan hesaba göre Erinç yağış etkinliği indisi 15.63 olan yörenin yarı-kurak ile kurak sınırında yer aldığı görülmektedir. Aydın ve ark. (2019) 152 istasyon verisini kullanarak yaptıkları "Erinç Yağış Etkinlik İndisi'ne Göre Belirlenen Türkiye İklim Bölgelerinin Rejim Karakteristikleri" adlı çalışmasında Türkiye'nin % 1.7 sinin kurak sınıfta olduğunu ve bu alanların şimdiki çalışma alanlarını da kapsadığını belirtmektedir. Yine aynı şekilde MGM (2021) iklim sınıflandırmasına bakıldığında da bölgenin kurak sahalara içine dahil edildiği görülmektedir. Bölgenin tamamını yansıtabilecek şekilde Konya, Ereğli ve Aksaray

üçgenindeki meteoroloji istasyonlarının son 60 yıllık verileri kullanılarak oluşturulan Thornthwaite su bilançosuna göre bölgede Mayıs'tan Ekim'e kadar su açığı görülmektedir. Karasal iklim etkisi altında bulunan bölgede büyüme sezonu boyunca nem açığı bulunmaktadır (Özyuvacı, 1999; Atalay, 2002).

İklim değişikliği karşısında en hassas ekosistemlere sahip İç Anadolu kurak sahalarında uzun yıllardır yapılan ağaçlandırma çalışmalarında tür seçimi daha çok var olan koşullar dikkate alınarak yapılmaktadır.

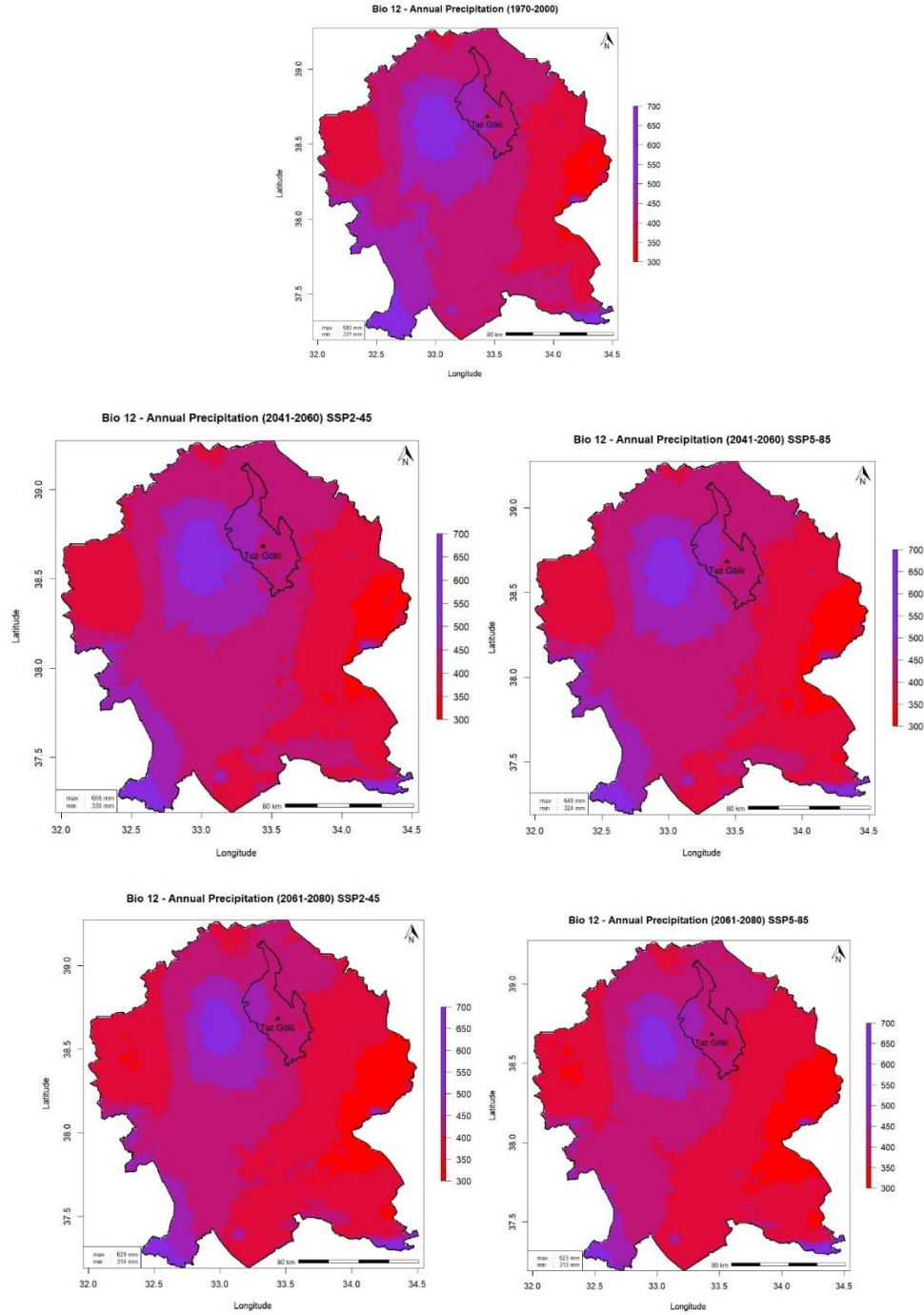


**Şekil 1.** Tuz Gölü ve çevresi için Thornthwaite kuraklık indeksi.



**Şekil 2.** Bio 01 – Tuz Gölü'ndeki farklı zaman dilimleri için Yıllık Ortalama Sıcaklık. Tuz Gölü ve çevresinde 1971-2000 yıllarını kapsayan referans dönemi için yıllık ortalama sıcaklık  $-0,1^{\circ}\text{C}$  ile  $12,1^{\circ}\text{C}$  arasında değişmektedir. 2041-2060 döneminde SSP245 senaryosuna göre  $3,4^{\circ}\text{C}$  ile  $16,1^{\circ}\text{C}$ , SSP585 senaryosuna göre  $3,9^{\circ}\text{C}$  ile  $16,6^{\circ}\text{C}$  arasında değişmesi beklenmektedir. 2061-2080 dönemi için SSP245 ve SSP585 senaryolarına göre yıllık ortalama sıcaklık beklentisi sırasıyla  $3,9^{\circ}\text{C}$  ile  $16,7^{\circ}\text{C}$  ve  $5,4^{\circ}\text{C}$  ile  $18,3^{\circ}\text{C}$  arasında olacaktır.





**Şekil 3.** Bio 12 – Tuz Gölü'nde farklı zaman dilimleri için Yıllık Yağış. Tuz Gölü ve çevresinde 1971-2000 yıllarını kapsayan referans dönem için yıllık yağış miktarı 331 mm ile 680 mm arasında değişmektedir. 2041-2060 döneminde yıllık yağışın SSP245 senaryosuna göre 330 mm ile 656 mm, SSP585 senaryosuna göre ise 324 mm ile 648 mm arasında düşmesi öngörülmektedir. 2061-2080 dönemi için SSP245 ve SSP585 senaryolarına göre yıllık yağış beklentisi sırasıyla 314 mm ile 629 mm ve 313 mm ile 623 mm arasında olacaktır.



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

Ağaçlandırma çalışmalarının gelecek koşullarda başarılı olabilmesi, yani iklim değişikliğine uyum ve etkilerinin azaltılabilmesi için şimdiye kadar elde edilen veriler ve iklim tahminleri dikkate alınarak geleceğe dönük stratejilerin belirlenmesi gerekmektedir. Bu bağlamda yörede su kaynaklarının daha da azalacağı dikkate alınarak giderek etkisi artacak olan kuraklık koşullarında hangi türlerin varlığına devam edebileceğinin araştırılıp ortaya konması ve ona göre ağaçlandırma stratejilerinin belirlenmesi gerekmektedir. Ağaçlandırma çalışmalarında kullanılan türlerin yararlandığı su kaynaklarının ortaya konulması bu stratejilerin belirlenmesine ve ağaçlandırma çalışmalarının başarısına önemli katkılar sağlayacaktır.

### **Bitkilerin Su Kullanımı**

Kurak sahalarda toprak suyu çoğu zaman bitki büyümesi için kıt olmasına karşı yağış rejimine bağlı olarak belirli zamanlarda artmaktadır. Topraktaki kaynaklar zamanla değiştiğinden bitkiler kaynakların yararlanıla bilirliliği açısından iki ayrı süreçle karşı karşıyadır. Kaynağın bol ve büyümenin çoğunun gerçekleştiği salım dönemi (pulse periyod) ve bitki alınımı için kaynağın çok kıt ve buna bağlı ölümlerin çoğunun gerçekleştiği salımlar arası dönem. Su sorunu olmayan ortamlarda salımlar arası dönem göreceli olarak kısa ve seyrek. Fakat kurak sahalarda salımların sıklığı (frekans) azalmakta ve salınımlar arası dönem uzamaktadır. Bu nedenle salınımlar arası dönem uzadıkça salınımlar arası süreçteki işlevler bireyler ve popülasyonların sürekliliğinde daha etkili olabilmektedir. Strese dayanıklı bitkilerin sahada varlığını sürdürmeleri salınımlar arası dönemde kıt kaynaklara rağmen yaşayabilme yeteneğine bağlıdır (Goldberg ve Novoplansky, 1997). Grime (1979) verimsiz ortamlarda zayıf rekabetçi fakat strese çok dayanıklı bitkilerin baskın olduğunu vurgulamaktadır. Bütün bu soruların yanıtı için farklı türlerin farklı yaşlarındaki bireylerinin kullandıkları su kaynağının belirlenmesi gerekir.

Bitkilerin kuraklığa karşı uyumunu sağlayacak farklı anatomik, morfolojik ve fizyolojik uyum stratejileri vardır. Örneğin, su iletimi sağlayan ksilem hücrelerinin yapıları ibrelilerde ve yapraklılarda farklılıklar göstermektedir. İbrelilerdeki traheidler birbirlerine uç uca eklenirken bağlantı noktalarındaki açıklık (pits) kenarlardaki hücre duvarlarının ince bir uzantısı ile kaplanmıştır. Yapraklılardaki trahe (vessel) hücrelerinin bağlantı noktalarında ise bu ince zar bulunmamaktadır. Bundan ve ayrıca trahelerin bağlantı noktalarında uçlarında daha fazla geçit olmasından dolayı trahe içinde su daha hızlı akabilmektedir. Bu yapı yapraklılara suyun bol



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

olduğu bölgelerde daha hızlı büyüme olanağı sağlayabilir. Fakat su kıtlığı olan dönemlerde ve bölgelerde ise bu yapı su kolonunun daha çabuk kırılmasına neden olabilmektedir.

İç Anadolu kurak sahalarında yağış, sıcaklık ve toprak özellikleri mekânsal ve zamansal (aylık ve yıllık) olarak değişkenlik göstermektedir. Yöredeki türlerin ağaçlandırma başarısında rekabetten çok iklim koşullarının belirleyici olduğu düşünülmektedir. Yağışların kesilmesiyle Mayıs sonu üst toprak kurumaya başlamaktadır. Dolayısıyla bu sahalarda çoğu bitkiler için büyüme sezonu kuraklıktan dolayı yaz ortasında sonlanmaktadır. Fakat derinlerdeki su kaynağına ulaşan bitkilerin büyümeye devam ettiği düşünülmektedir. Derinlerdeki su kaynağına ulaşımın ise ağaçlar büyüdükçe genel olarak arttığı düşünülebilir. Fakat her türün kök sistemi farklı olduğundan su kullanım kaynağı ağacın yaşının yanında türe de bağlı olduğu düşünülmektedir. Yıldız ve ark. (2022) tarafından yörede yapılan çalışmada karaçamların 2/3'ünün ağaçlandırmanın ilk yıllarında kurummasına ve kalan bireylerin de ilk yıllarda oldukça yavaş büyümesine rağmen 15-17 ve 25-25. yaşlara doğru karaçamın en hızlı boylanan tür olduğu görülmüştür. Özellikle 20-25 yıllık dönemdeki beş yıllık göreceli artım oranının diğer türlerinkinden yaklaşık % 50 daha yüksek olduğu belirlenmiştir. Bunun nedeninin ağaçlar boylandıkça kurak dönemde yapraklıların iletim borularında su kolonunun kırılmasının ibrelilerinkinden daha fazla olduğu tahmin edilmektedir. Bir diğer olasılık ise karaçam köklerinin toprak profilinin daha alt kısımlarındaki nemli toprağa ulaşmış olmasıdır. Eğer bu olasılık doğru ise iklim değişikliğinde yüzey topraklar daha kurak olacağından görece olarak derinlerdeki suyu daha çok kullanan türlerin ileride yaşama şansı artacaktır.

### ÖNERİLER

Ağaçlandırma yapılacak yerde bitkinin suyu hangi kaynaktan aldığının bilinmesi su kaynakları ile ağaçlandırma arasında ilişkinin daha iyi anlaşılmasına yardımcı olacaktır. Bitkilerin su kaynağının belirlenmesi için kök örnekleme hem zor hem de kökün bir toprak katmanında bulunmuş olması su kaynağının da aynı toprak katmanı olduğunu göstermez. Fakat durağan izotop yöntemiyle kaynaklar arası karşılaştırma bitkilerin farklı dönemlerde kullandıkları su kaynağı hakkında bilgi vermektedir (Walker ve ark., 2001; Yıldız, 2019b). Durağan izotop yöntemi (deuterium ( $^2\text{H}$  ve  $^{18}\text{O}$ ) kullanılarak su kaynakları çok daha kolay ve doğru olarak karşılaştırılabilmektedir (Schulze ve ark., 2005). Yeraltı suyu ve yüzey suyunun göreceli



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

fraksinyon oranları farklı olacađından bitkinin öz suyu ve farklı toprak katmanlarındaki sular izotopları bakımından karşılaştırılarak bitkinin kullandığı su kaynağı tespit edilebilir. Böylece elde edilen sonuçlara dayanarak olası iklim deđişikliğinde ve azalan su kaynaklarının olduđu ortamda hangi türlerin sahada kalma şansının daha fazla olduđu hakkında uygulamacıya proaktif önerilerde bulunulabilir.

### **Teşekkür**

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### CRYSTALLINE NANOCOMPOSITES OF ORGANIC LINKERS AND METAL IONS WITH RICH CHEMICAL TUNABILITY: NANOSCALE METAL–ORGANIC FRAMEWORKS (NANOMOFS)

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#### ABSTRACT

Metal-organic frameworks (MOFs), also known as coordination polymers, are a type of hybrid crystalline material with a periodic structure and porous interior that are formed by the self-assembly of coordination bonds between metal centres and bridging organic ligands. An attractive area of research in MOF chemistry is the synthesis of nanoscaled MOFs, which is accomplished by downsizing MOFs to the nanoscale range in at least one dimension. Nanomaterials can offer incredible chances in increasing the physical and chemical characteristics of materials and incredible behaviours for new applications due to their special size-dependence effects. There is a strong desire to understand how NanoMOFs and biosystems interact at the interface, as this may greatly expand the range of possible applications for these type of materials, including cutting-edge emerging applications smart nano/microrobotics, gene knockdown/editing, self-powered/on-site biosensors and others. NanoMOFs are quickly entering new domains in which function is no longer solely controlled by its constituent parts or by their synergistic action but rather by an organised response to certain surroundings or stimuli, precisely like living matter. Because of their intrinsic porosity, adjustable stability, molecular modularity, structural tunability, and biocompatibility, NanoMOFs are particularly well suited for biological applications. The development of novel energy nanomaterials has a very promising future due to the effective realisation of nanoscale MOFs with controllable size, shape, and tunable behaviour.

**Keywords:** Inorganic–organic hybrid crystal materials, nano metal–organic frameworks, nanoscale metal–organic frameworks, nanoMOFs, nMOFs



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

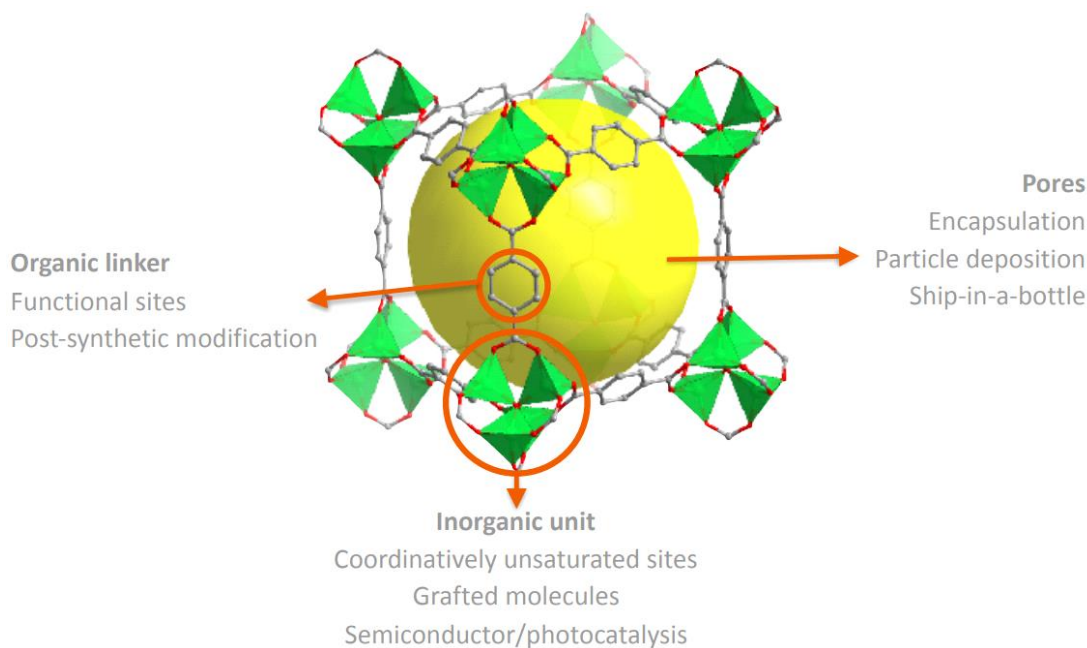
October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 1. INTRODUCTION

The self-assembly of coordination bonds between metal centres and bridging organic ligands, commonly referred to as coordination polymers, results in the formation of metal-organic frameworks (MOFs), a type of hybrid crystalline material with a periodic structure and porous interior (Wen et al., 2021). Metal cluster secondary building blocks and bridging ligands are used to construct MOFs. They combine functionality, porosity, crystallinity, and modularity to generate a special class of functional molecular materials (Ni et al., 2020a).

A microporous metal-organic compound with cobalt (Co, a transition metal) centres and 1,3,5-benzenetricarboxylate (BTC) as the building blocks was described in 1995 by Yaghi et al., (1995). It was developed for the selective integration and removal of guest aromatic molecules. In 1999, the same team developed a novel MOF skeleton known as MOF-5 (Li et al., 1999). With a surface area of 2900 m<sup>2</sup> g<sup>-1</sup>, MOF-5 demonstrated remarkable stability and great porosity. In particular, MOF-5 maintained its crystal structure and stability even after being entirely dissolved and heated to 300 °C. One may argue that MOF-5's appearance represents a significant step forward for hybrid MOF materials. In addition to MOF-5, scientists also synthesised a few other members of the MOF-n series, including MOF-177 in 2004 (Chae et al., 2004), and MOF-69 to MOF-80 in 2005 (Rosi et al., 2005).

MOF-177 was measured with a pore volume of 1.59 cm<sup>3</sup> g<sup>-1</sup> and an apparent Langmuir surface area of 4500 m<sup>2</sup> g<sup>-1</sup>, significantly beyond MOF-5 and previous synthesized porous crystalline zeolites. Following then, more information about the MOF-n series with ultrahigh porosity has been reported. The prepared MOF-210 has a greater pore volume (3.60 cm<sup>3</sup> g) and a higher Langmuir surface area (10 400 m<sup>2</sup> g) in 2010 (Furukawa et al., 2010). Overall, sufficient quantities of cargo can be loaded due to the greatly increased surface area (Wen et al., 2021). MOFs have emerged as promising candidates for a variety of applications, including gas storage and separation, luminescence, thin films, proton conduction, catalysis, drug delivery, and energy storage and conversion, as a result of their well-organized structures, enormous surface areas and pore volumes, well-defined pore size distributions, and easily-decorated channels. But MOFs frequently take the form of massive crystals, which significantly weaken physical and chemical processes on their surfaces and limit their uses (Zhong et al., 2021).



**Fig. 1.** Schematic representation of catalytic sites on a metal-organic framework (Ranocchiari, 2017).

The self-assembly of metal ions or clusters with organic linkers results in the formation of the intriguing and distinctive class of hybrid porous materials known as nanoscale MOFs (NMOFs or NanoMOFs) (Duman & Forgan, 2021). Synthesizing NanoMOFs by downsizing MOFs to the nanoscale range in at least one dimension has become a fascinating research focus in MOF chemistry. Utilising a variety of techniques, such as adjusting reaction conditions and coordination chemicals, liquid exfoliation, salt-template confinement, and others, numerous unique NanoMOFs were developed (Zhong et al., 2021).

## 2. Synthesis Strategies for NanoMOFs

MOFs are frequently made by coordinatively integrating metal ions/clusters and organic ligands. Metal ions, organic linkers, solvents, template reagents, and reaction conditions are only a few of the variables that might affect the formation of MOFs and offer several options for accurately adjusting the crystal sizes of target products. Numerous techniques have been developed to reduce MOFs to the nanoscale in order to produce NanoMOFs with greater properties than their bulk counterparts. The two primary types of NanoMOF construction techniques are known as bottom-up and top-down approaches. Two approaches are frequently used to reduce MOFs when using bottom-up techniques: **1)** Modifying the reaction's variables (metal ion and ligand concentrations and their molar ratios, pH, solvent, types of metal salts,



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

temperature, and duration). **2)** Adding coordination reagents, including acids, bases, inorganic salts, and surfactants (Zhong et al., 2021).

For top-down methods, etching methods like liquid exfoliation, salt-template confinement, etc. are used to produce nanoscale structures. Similar to the self-assembly of MOFs, bottom-up strategies generally begin from well-fabricated metal ions/clusters and organic linkers due to the inherent tailorability of MOFs. These tactics are comparable to self-assembly, which combines little atomic or molecular parts to build more complex nanoscale assemblies or controlled self-assemblies based on complex techniques and technologies. The main goal of this approach is to selectively limit growth along the horizontal or vertical axis in order to control the nucleation rates of certain crystal facets (Zhong et al., 2021).

Examples of some classical NanoMOFs materials in the literature are: **1)** IR-MOF-n, in regular or truncated octahedral morphology, in 200 to 300 nm size, with synthesis method of "Surfactant-assisted method" (Ma et al., 2011). **2)** MOF-5(Zn), in nanoparticles morphology, in 100 to 200 nm size, with synthesis method of "Surfactant and/or capping groups assisted solvothermal method" (Hermes et al., 2007). **3)** MOF-5(Zn), in nanoparticles morphology, in 30 to 150 nm, with synthesis method of "direct precipitation in solution" (Huang et al., 2003). **4)** MOF-5(Zn), in nanoparticles morphology, in 40 nm, with synthesis method of "direct precipitation in solution" (Tachikawa et al., 2008). **5)** Fe-soc-MOF, in cubic to spherical morphology, in 1  $\mu\text{m}$  to 200 nm, with synthesis method of "Tween-85 regulated reflux method" (Liu et al., 2019). **6)** Fe-MIL-88-NH<sub>2</sub>, in bipyramidal hexagonal prism morphology, in  $50 \pm 5$  nm length and  $30 \pm 5$  nm width, with synthesis method of "Non-ionic triblock copolymer and acetic acid regulated in situ growth method" (Pham et al., 2011). **7)** Fe-MIL-88-NH<sub>2</sub>, in octahedral morphology, in  $\approx 200$  nm, with synthesis method of "Acetic regulated in situ growth" (Liu et al., 2013). **8)** MIL-101(Cr), in nanoparticles morphology, in 50 nm size, with synthesis method of "Microwave irradiation technique" (Khan et al., 2011). **9)** MIL-53(Al), in nanoparticles morphology, in 20 to 60 nm size, with synthesis method of "Solvothermal method" (Zhou et al., 2014). **10)** NH<sub>2</sub>-MIL-125 (Ti), in nanocubes morphology, in  $\approx 300$  nm size, with synthesis method of "Solvothermal method" (Zhang et al., 2013). **11)** Cu(bdc)(S) MOF, in square morphology, in  $300 \times 300 \times 30$  to  $50 \times 50 \times 20$  nm sizes, with synthesis method of "Acetic acid regulated growth" (Sakata et al., 2013). **12)** HKUST-1(Cu), in octahedral morphology, in 400 to 90 nm sizes, with synthesis method of "Dodecanic acid or benzoic acid regulated in situ growth" (Bao et al., 2017). **13)** Cu-imidazolate MOF, in ellipsoid-like shape





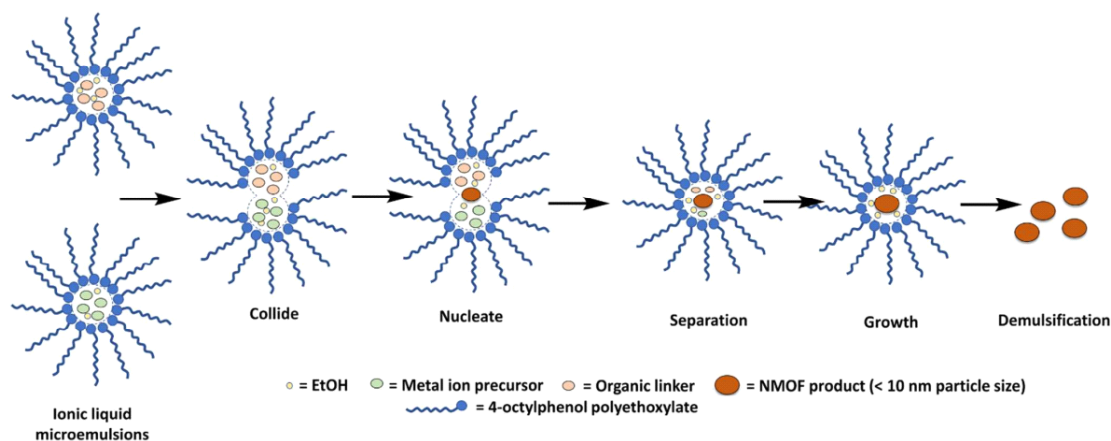
## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

morphology, in 150 to 500 nm length and 0.25 to 1  $\mu\text{m}$  width sizes, with synthesis method of "NH<sub>3</sub>-H<sub>2</sub>O regulated in situ growth" (Liu et al., 2013). **14**) HKUST-1(Cu), in cube to octahedron morphology, in 300 to 500 nm sizes, with synthesis method of "CTAB regulated in situ growth" (Liu et al., 2012). **15**) HKUST-1(Cu), in nanoparticles morphology, in Sub 5 nm sizes, with synthesis method of "Metal-organic-gel route" (Qi et al., 2017). **16**) HKUST-1(Cu), in Nano-cubes morphology, in 50–200 nm sizes, with synthesis method of "Two-ligand regulation strategy and self-assembly" (Xu, 2016). **17**) HKUST-1(Cu) , in nanoparticles morphology, in an average of 25 nm sizes, with synthesis method of "CO<sub>2</sub> pressure regulated ion liquid method" (Liu et al., 2015). **18**) HKUST-1(Cu), in nanooctahedrons morphology, in  $\approx$ 280 nm sizes, with synthesis method of "POM regulated microwave irradiation" (Xu et al., 2015). **19**) Cu(ndc)<sub>2</sub>(dabco), in nanocube to nanorod morphology, in  $80 \pm 20$  nm sizes, with synthesis method of "Acetic acid and pyridine regulated solvothermal reaction" (Pham et al., 2012). **20**) MAF-4 (Zn), in cube to particle morphology, in 1  $\mu\text{m}$  to 40 nm sizes, with synthesis method of "Synthesis parameters regulated solvothermal reaction" (Yan et al., 2017). **21**) ZIF-7(Zn), in nanoparticles morphology, in 30 nm sizes, with synthesis method of "Direct precipitation in solution" (Li et al., 2010). **22**) Dy(BTC)H<sub>2</sub>O, in rod-like to spherical morphology, 3  $\mu\text{m}$  to 71 nm sizes, with synthesis method of "Capping reagents regulated in situ growth" (Guo et al., 2012). **23**) Prussian blue, in nanocubes morphology,  $\approx$ 170 nm sizes, with synthesis method of "Trisodium citrate regulated in situ growth (Hu et al., 2013). **24**) ZIF-67(Co), in Polyhedral morphology,  $50 \pm 10$  nm sizes, with synthesis method of "Direct precipitation in solution" (Zhang et al., 2017).

The general synthetic techniques for NanoMOFs include solvothermal methods, microwave and sonochemical techniques, microemulsion or reverse microemulsion syntheses, and surfactant-mediated or templated solvothermal/hydrothermal methods (Majewski et al., 2018). The most thorough and efficient techniques for synthesising MOFs of all sizes are solvothermal techniques. Through quick and efficient energy transfer as well as high instantaneous temperatures, microwave heating achieves rapid synthesis and improved kinetics of crystal nucleation, which results in MOF size reduction. The size and composition of MOFs can be easily adjusted using microemulsion or reverse microemulsion synthesis (Dou et al., 2021). In addition, some unconventional methods were also exploited for NanoMOFs synthesis, such as centrifugation (Sánchez-Laínez et al., 2015), self-exfoliation (Garai et al., 2017) and spray-drying (Carné-Sánchez et al., 2013).

In the Solvothermal technique, the metal and organic ligand interact inside of an organic solvent (polar solvents like ethanol, dimethylformamide, etc. are typically utilised), whose type can affect the MOF's crystallisation and reactivity. It should be mentioned that the technique is known as hydrothermal when water serves as the solvent (Shahini et al., 2022).



**Fig. 2.** Schematic representation of ionic liquid microencapsulation induced growth of NanoMOF type "HKUST-1" (Zheng et al., 2017; Majewski et al., 2018)

The formation of MOF nanoparticles has been accomplished via a variety of synthetic techniques, including microemulsions (Diring et al., 2010), surfactant-mediated techniques, microwave-assisted approaches, and sonochemistry, however, it is still difficult to precisely control the size and form of MOF nanoparticles. A single capping reagent, or so-called modulator, has been reported to be used to synthesise MOF nanocrystals utilising selective coordination modulation techniques (Pham et al., 2012). For instance, utilising pperfluoromethylbenzenecarboxylate (pfmbc) as a modulator, nanosized MOF-5 has been synthesised (Hermes et al., 2007).

MOF-5 features an isotropic framework with a single coordination mode since it is made up of Zn<sub>4</sub>O clusters and a single type of linker, 1,4-benzenedicarboxylic acid. The coordination between the zinc and the linkers to control the rate of the framework extension can be hampered in the presence of the pfmbc by the modulator's carboxylate functionality. This technique can result in spherical or cubic MOF-5 nanocrystals since the pfmbc also binds isotropically to the particle surface (Pham et al., 2012). Using acetic acid as the modulator, Tsuruoka et al. (2009) reported the synthesis of [Cu<sub>2</sub>(ndc)<sub>2</sub>(dabco)]<sub>n</sub> nanorods (ndc = 1,4-naphthalene dicarboxylate;



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

dabco = 1,4- diazabicyclo[2.2.2]octane). The only product obtained is nanorods because the acetic acid specifically prevents the Cu-ndc coordination.

The shape and size of MOF crystals have been controlled at the micrometre scale using the selective modulation technology. By varying the concentration of the modulator (n-dodecanoic acid or lauric acid), Umemura et al. (2011) have recently reported the morphology-controlled synthesis of  $[\text{Cu}_3(\text{btc})_2]_n$  octahedron, cuboctahedron, and cubic microcrystals (btc = benzene-1,3,5-tricarboxylate) with a mean size of about 2  $\mu\text{m}$ . Additives which enable the protonation or deprotonation of the organic linkers were also used to alter the shape and size of MOF microcrystals. For instance, adding bases like diethylamine and triethylamine as well as acids like acetic acid or  $\text{HNO}_3$  enables changing the rate of particle generation as well as the size and shape of microcrystals (Pham et al., 2012).

One of the key tasks in nanoscience is controlling the shape of nanocrystals. The formation of NanoMOFs with a certain shape, such as an ultrathin two-dimensional film, hexagonal nanoplate, octahedron, cuboctahedron, concave octahedron, or hollow octahedron, was found to be quantitatively predicted by ligand solubility and modulator concentration. Topological design known as “reticular chemistry” enables modular construction of NanoMOFs from secondary building units (SBUs), but the search for a particular synthetic condition still involves labor-intense trial-and-error and systematic screenings that are sometimes guided by chemical intuition. Therefore, the search for the synthesis conditions for isorecticular nMOFs from ligands with identical geometry but distinct substitution groups may be time-consuming. The complicated nature of parameter adjustment can make scaling up NanoMOFs synthesis difficult. A quantitative understanding of the crystallization process is important in moving toward more controllable NanoMOFs engineering (Chen et al., 2020).

### 3. NanoMOFs for Cancer Immunotherapy

In order to generate biocompatible molecular nanomaterials with potential for use in biomedical applications, it was hypothesised that NanoMOFs may be produced through scaling down bulk MOFs to nanometer dimensions while retaining the synthetic flexibility, structural tunability, and multifunctionality of bulk MOFs. Through the enhanced permeability and retention effect and active targeting tactics, nanoparticles have been employed to extend blood circulation times and improve tumour uptake of chemotherapy. As opposed to other nanoparticles (NPs), NanoMOFs can be rationally designed to possess multiple synergistic functions for cancer



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

therapy without relying on cytotoxic agents, which often lead to severe general toxicity (Ni et al., 2020).

Because of their intrinsic porosity, adjustable stability, molecular modularity, structural tunability, and biocompatibility, NanoMOFs are particularly well suited for biological applications, especially cancer treatments. By delivering cancer vaccines, mediating photodynamic therapy (PDT), enhancing radiotherapy (RT), enabling radiotherapy-radiodynamic therapy (RT-RDT), catalysing chemodynamic therapy (CDT), and potentiating cancer immunotherapy, NanoMOFs have the potential to provide a new clinically deployable nanotechnology platform to promote immunostimulatory tumour microenvironments. Crystallinity and porosity are combined in NanoMOFs, which are constructed from organic linkers and metal cluster secondary building units (SBUs). NanoMOFs allow for the orthogonal design of several topologies and structures by utilising reticular chemistry. As molecular materials, NanoMOFs can perform a variety of functions and have good biocompatibility. The remarkable high payloads of medicinal and diagnostic cargoes were encapsulated using NanoMOFs' porosity. Significant efforts have been made to increase the potential of NanoMOFs as carriers to deliver TAs and immunoadjuvants as cancer vaccines in the context of immuno-oncology. Additionally, NanoMOFs have been developed and functionalized as immediate treatments that produce reactive oxygen species (ROS) for the immunogenic cell death (ICD) of tumour cells in response to either external energy stimuli or endogenous triggers. It is possible to think of NanoMOFs-induced immunogenic local therapy as an in situ cancer vaccine that works in conjunction with immune checkpoint blockade (ICB) to promote systemic anti-tumor immunity (Ni et al., 2020b).

The surface modification for active targeting and improved biocompatibility is made possible by the abundance of functional groups in NanoMOFs. As nanotechnology has developed over the years, nanomedicine has drawn a lot of attention due to its increased therapeutic impact and regulated drug delivery system. Numerous substances have been used as drug delivery carriers thus far, mostly organic substances (such as micelles, liposomes, and dendrimers) and inorganic substances (such as mesoporous silica nanoparticles (MSNs), gold nanoparticles (NPs), etc.). Although organic materials usually exhibit low toxicity and good biocompatibility, they are inadequate for the controlled cargo release in the absence of a well-defined porosity. On the other hand, inorganic materials have more distinctive properties, such as superior physical stability, that make them suitable for controlled drug administration, although their



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

biocompatibility and loading capacity still need to be improved. In order to combine the advantages of the aforementioned two materials and achieve both a controlled release profile and a large drug loading capacity, hybrid inorganic-organic materials have been developed to date (Wen et al., 2021).

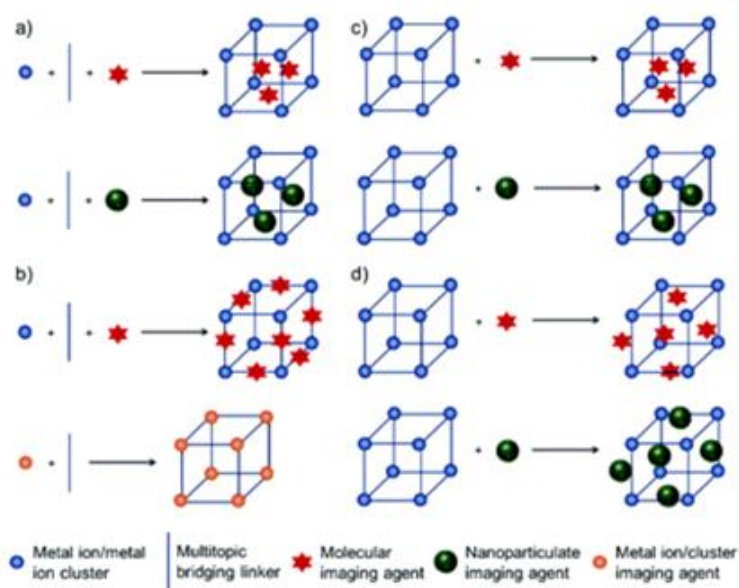
Qu et al., (2016) reported the use of ZIF-8 (ZIF denotes zeolitic imidazolate framework) to encapsulate ovalbumin (OVA), a modal antigen, and adsorb CpG oligodeoxynucleotide, an immunoadjuvant that binds toll-like receptor 9 in plasmacytoid DCs and B cells, to activate anti-tumor immune responses. Zhong et al. (2019) used two different OVA@ZIF-8 nanoparticles, ZNPs and ZANPs (doped with  $Al^{3+}$  for adjuvant effect), for cancer vaccination. They performed antigenspecific immune analysis and studied anticancer immune effects (Zhang et al., 2016).

#### **4. NanoMOFs as Imaging Agents in Biology and Medicine**

NanoMOFs are attractive agents for theranostic applications because of their high storage capacities, simple synthesis, simple surface functionalization, varied compositions, and excellent biocompatibilities. Diverse MOF structures with adaptable functionalities can be obtained and used in biomedical imaging and drug delivery by combining a wide range of metal ions and organic ligands, as well as incorporating desired molecular functionalities, such as imaging modalities and therapeutic molecules. The use of NanoMOFs as imaging agents in magnetic resonance imaging (MRI), optical imaging (OI), computed tomography (CT), photoacoustic imaging (PAI) and positron emission tomography (PET) has attracted much attention recently. In addition, MOFs' notable porosity enables them to be simultaneously loaded with a variety of medicines and imaging agents and used for multimodal imaging and therapy as a single unit. In comparison to conventional nanomaterials such organic nanocarriers of lipids or polymers, metal nanoparticles, mesoporous silica, quantum dots, and inorganic zeolites, NanoMOFs often have a higher cargo loading capacity, strong biocompatibility, and simpler functionalization. Because of their partially labile metal-ligand interactions, NanoMOFs are also intrinsically biodegradable over a longer period of time. The compositional and structural tunability of metal clusters and organic linkers, which is practically limitless, enables the formation of NanoMOFs with different pore diameters ranging from micropores to macropores, rigid or flexible skeletons, and a variety of surface chemistries. The synthesis of various NanoMOFs and the insertion of a wide range of molecular capabilities on their inner and outer surfaces, such as imaging modalities, therapies, and targeting ligands, are also made



possible by the mild synthetic conditions. An archetypal Hf MOF demonstrated superior contrast for computed tomographic imaging compared to an I-based agent, even at a lower dose, which could be promising in lowering the radiation dose to which the patients must be exposed. NanoMOFs-based MRI contrast agents have also demonstrated enhanced relaxivities compared to commercially available Gd contrast agents and even other Gd nanoparticulate systems. Moreover, NanoMOFs can be employed as multimodal imaging agents by the combination of multiple imaging functionalities in a single entity, and as image-guided therapy agents by achieving simultaneous imaging and therapy. For the synthesis of MOFs containing imaging agents, there are four main methods: 1) encapsulation of the agents within the pores of MOFs during the synthesis, 2) Their incorporation as intrinsic structural components of MOFs, 3) immersion of already synthesized MOFs in a solution of imaging agents and so loading them inside the pores by size effect, ion-exchange or post-synthetic modification, collectively known as the post-insertion method, and 4) attachment of imaging agents by covalent conjugation, or electrostatic or hydrophobic interactions, to the surface of MOFs (Fig. 3) (Duman & Forgan, 2021).



**Fig. 3.** Main approaches for the construction of MOFs with imaging capabilities. (a) The in situ encapsulation of imaging agents during MOF synthesis. (b) Their integration as intrinsic components of the MOF, either as a linker or metal ion or metal cluster. (c) Postsynthetic loading of imaging agents into the porosity of the MOF. (d) Postsynthetic functionalisation of the MOF particle surface with imaging units (Duman & Forgan, 2021).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

### 5. NanoMOFs for Energy Applications

The use of their porous nature in conjunction with customised reactivity at the metal struts and organic linkers offers useful tools for applications involving energy. Controlling MOF morphology to produce nanosheets, nanorods, and nanocrystals is an interesting new research topic that is projected to be very helpful for MOF use in energy-related applications. In addition to being simple to fabricate into thin films, nanoscale MOFs provide bigger exterior surface areas, quicker access to functional groups, and close interaction with other materials in hybrid structures that speed up electron and ion transfer. For solar energy conversion, supercapacitors, batteries, and fuel cells, this gives a recent development of nanoscale MOFs as pure materials or as a component in hybrid structures (Kuyuldar et al., 2019). MOFs are a form of promising inorganic-organic hybrid crystal material which have received a lot of attention in a variety of prospective sectors, particularly in energy storage and conversion. Effective methods to synthesise uniform NanoMOFs have recently been developed. These NMOFs not only maintain the inherent benefits of MOFs but also develop some improved advantages, such as shorter diffusion pathways for guest transportation and more accessible active sites for surface adsorption and reaction. Additionally, their nanometer size provides more opportunity for post-functionalization and hybridization. When utilised as electrodes in various battery applications, these benefits guarantee electrolyte penetration and enhance the electrochemical performance of NMOFs. NMOFs can be combined with inorganic elements, conductive organic polymers (such polyaniline and polypyrrole), or conductive substrates (such as carbon nanotubes, graphene, nickel foam, carbon paper, etc.) to modify their conductivity (Zhong et al., 2021).

### 6. Organic Dye Removal by Using Water-Stable NanoMOFs

The textile, printing, paper, leather, plastic, rubber, pharmaceutical, and cosmetic sectors all employ organic dyes extensively. Due to their possible negative impacts on human health, dyes in wastewater from these types of enterprises represent one of the most serious environmental concerns. Because some colours are poisonous and non-biodegradable as well as stable to light and oxidising chemicals, the issue becomes more serious. Hence, it is very crucial to remove dyes before wastewater discharge into the water resources and damage the environment. So far, several methods have been examined for dyes removal from wastewater. Adsorption on nanoscale materials with a high specific surface area has drawn the most interest among the many techniques since it is easy, highly effective, and reliable. Adsorption on activated carbon, polymers, zeolites and biomaterials have frequently been studied. MOFs are relatively new



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

class of nanoscale solids with large specific surface area and high porosity that have made them promising candidates for a wide range of application including adsorption (Hasanzadeh et al., 2019).

The application of MOFs for eliminating wastewater contaminants like organic dyes from the environment has already attracted the attention of several researchers. In their study of the adsorption of titanium-based MOFs towards various organic dyes, Fan et al. (2018a) discovered that MIL-125(Ti) after  $\text{NH}_2$ -functionalization had improved adsorption characteristics. Zhang et al. (2018) recently investigated the influence of mesopore diameters of hierarchical-pore MOFs on adsorption capabilities for various organic contaminants. It has also been investigated whether UiO-66 functionalized with an amine group (UiO-66- $\text{NH}_2$ ) may remove fluoride from an aqueous solution. Fan et al. (2018b) have also successfully used magnetic materials based on  $\text{Fe}_3\text{O}_4$ @MIL-100(Fe) to remove dyes from wastewater. In another study,  $\text{Fe}_3\text{O}_4$ /MIL-101(Cr) nanocomposites have been synthesized and utilized for removal of acid dyes. The obtained results demonstrated the potential of  $\text{Fe}_3\text{O}_4$ /MIL-101(Cr) for rapid and efficient removal of acid dyes from aqueous solutions as well as its reusability (Hasanzadeh et al., 2019). In addition to MOFs' distinctive microstructure and exceptional physicochemical characteristics, their low durability against hydrolysis in wet and humid settings poses a hurdle to their adsorptive capability. Zirconium-based MOFs outperform other MOFs in terms of structural stability against water. Recently, anionic and cationic dyes have been adsorptively removed from aqueous solutions using UiO-66. They demonstrated its 12-month stability in water (Hasanzadeh et al., 2019).

### 7. NanoMOFs for High-Performance Supercapacitors

In supercapacitors, MOFs have drawn more and more interest as viable electrode materials. Building nanoscale MOF materials was regarded as a successful tactic to improve electrochemical performances. Due to their high power density, fast charge-discharge process, exceptional cycling stability, and environmental friendliness, supercapacitors (SCs) as a type of promising electrochemical energy storage device, have drawn significant attention in many fields, such as hybrid electrical vehicles, emergency doors for aircrafts, etc. Surface area and redox active species of electrodes are two crucial factors that have a significant impact on the performance of supercapacitors, according to the charge storage mechanism. For electrochemical double layer capacitor (EDLC) as one type of supercapacitor, their charge-discharge rate and power density depend on their storing electrical energy on their internal



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

surface. A reversible Faradaic redox process is crucial for holding charges and demonstrating noticeably high capacitance and energy density in battery-type capacitors as another form of supercapacitor receiving significant interest. Consequently, materials made of MOFs that include redox metal centres and extremely high surface areas have been considered to be attractive candidates for use as supercapacitor electrode materials. In comparison to conventional electrode materials like activated carbon, metal oxides, hydroxides, nitrides, conducting polymers, and so forth, MOFs built of organic ligands and metal centres exhibit significant advantages because they can be rationally synthesised with high porosities, large specific surface areas, and uniform but tunable pore sizes, and because their structures can be predesigned or post-synthesized at a molecular level to suit the needs of specific applications. A large numbers of MOFs have been designed, prepared, and used in the electrochemical applications, exhibiting fascinating performances. However, the majority of them are MOF composites or nanomaterials generated from MOFs, where MOFs were used as sacrificial materials and then heated to form different metal oxides, metal nanoparticles, or their composites. It is very rare that pristine MOFs were directly used for the electrochemical applications, however, this is a very interesting and extremely important. Because of their low capacitance, MOF bulk materials have mostly experienced one unavoidable issue when used as electrode materials for direct electrochemical applications. It is a good solution to reduce the MOF material's particle size to the nanoscale range using an appropriate technique. The reduction in particle size will reduce the electrolyte ions' diffusion path and increase the material's active surface area. As a result, there is a noticeable improvement in the electrochemical performance. However, up until this point, reports of such NanoMOFs have been extremely rare, with the exception of a few well-known MOFs like HKUST-1, MOF-5, ZIF-8, ZIF-67, MIL-101, etc., because their composition may be easily altered while scaling down in size throughout the synthesis process under the same conditions. Therefore, the discovery of novel NanoMOFs became a very difficult and extremely important (Gu et al., 2020).

### **8. NanoMOFs as Fluorescence Sensors for Food Safety**

Fluorescence sensors made of bulk-size MOFs have some drawbacks, such as delayed signal response, poor dispersity, and instability, and use in the liquid phase is challenging (Wang et al., 2018). In order to prepare NanoMOFs for use as fluorescence sensors, various research groups have scaled down to the nano size. Due to its exceptional fluorescence detecting



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

capabilities and delicate, tailorable construction, NanoMOFs-based fluorescence sensors are being used more and more in food analysis. Additionally, these studies demonstrated that NanoMOFs have fascinating potential in the field of food safety (Dou et al., 2021).

Encouraged by the excellent properties of NanoMOFs, a series of NanoMOFs fluorescence sensors for food safety have been developed in past decades. Target analytes in these studies were **1)** Antibiotics (Tetracycline, Chlorotetracycline, Oxytetracycline, Ofloxacin, Nitrofurazone, Ciprofloxacin, Norfloxacin, Chloramphenicol, Ceftriaxone, Patulin) with diversified NanoMOFs (In-sbdc; FCS-3; Tb-L1; complex 1; Tb-dcpcpt; ZnMOF). **2)** Food additives (Nitrite, Tertiary butylhydroquinone, Sesamol) with diversified NanoMOFs (Tb-MOF; Sm-MOF; Sr-MOF). **3)** Pesticides (Nitenpyram, Parathion, Methyl parathion, Paraoxon, Fenitrothion, Glyphosate) with diversified NanoMOFs (MOF-5; MOF-Calix). **4)** Mycotoxins (Aflatoxin B1, 3-nitropropionic acid) with NanoMOF LMOF-241. **5)** Illegal additive Malachite Green with NanoMOF "Eu-TDA". **6)** Spoilage indicator Hydrogen Sulfide with NanoMOF "[UiO-66-(COOH)<sub>2</sub>"]. **7)** Cations and anions ( $\text{Cu}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{CrO}_4^{2-}$ ,  $\text{Cr}_2\text{O}_7^{2-}$ ) with diversified complex NanoMOFs. **8)** Food-borne pathogen (Ebolavirus RNA sequences, Ebolavirus conserved RNA sequences, Ebolavirus-encoded miRNA-like fragment) with diversified complex NanoMOFs (Dou et al., 2021).

Although some achievements have been acquired, it is expected that NanoMOFs-based fluorescence sensors can play more and more important role in food safety area. The pretreatment for food analysis is impacted by the different types of nutrition components and additives that are present in food matrix. The selectivity of sensors needs to be improved with remarkable progress. To increase efficiency, the target could be concentrated by making reasonable chemical modifications or combining NanoMOFs with recognition groups like antibodies and aptamers. Second, there are still just a few NanoMOFs applications associated with food safety. A similarly thoughtful approach to NanoMOFs-based fluorescence sensors development should increase the likelihood that these potentially revolutionary tools can help to guarantee a safer and higher-quality food supply (Dou et al., 2021).

### **9. NanoMOFs Based Nano/Micro/Millimeter-Sized Self-Propelled Autonomous Machines**

Engineering motion with small-scale matter has attracted a lot of interest over the past 20 years in a variety of academic fields, from robotics and automation to supramolecular chemistry and colloidal science. Small-scale swimmers are the result of the many innovations and discoveries made in the field of motile micro- and nanostructures. By converting various types of energy





## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

into mechanical motion, these artificial micro- and nanomachines can move through fluids. MOFs are quickly entering new domains in which function is no longer solely controlled by its constituent parts or by their synergistic action but rather by an organised response to certain surroundings or stimuli, precisely like living matter (Terzopoulou et al., 2020).

Biology (sensing, imaging, and therapy) and environmental applications have benefited greatly from synthetic nano/micro/millimeter-sized devices that capture energy from the surrounding environment and then convert it to motion. Autonomous motion is a key element of these devices. It is ideal to have a large surface area since it increases the capacity to load cargo or propellant. It has been shown that combining self-propelled machines with highly ordered and porous MOFs has a major impact on the development of nano/micro/millimeter-sized devices for a variety of applications. The combination of motors with MOFs may open up numerous new possibilities for synthetic nano-, micro-, and millimeter-sized machines (Khezri & Pumera, 2019).

Micro- and nanoscale swimmers herald a new era of biomedicine and on-the-fly chemistry applications. By interacting with molecules in their swimming environment or by using external energy sources including magnetic fields, electric fields, ultrasound, light, or mixtures of these, such tiny gadgets may move through a variety of fluids. Micro- and nanoswimmers are named distinctively as a function of the level of control of their motion: (a) small-scale motors refer to any micro- and nanostructure that converts an input of energy into motion; (b) small-scale robots refer to micro- and nanomotors, where the speed and trajectory are externally controlled by one or more energy source. MOFs in motion have the potential to change the future landscape of small-scale swimmers and their areas of application, for example, by enabling the successful translation of micro- and nanoswimmers into practice (Terzopoulou et al., 2020).

### **10. High-Energy (Energetic) NanoMOFs**

For practical applications, research into lead-free green primary explosives with excellent ignition performance is important. Using an innovative, environmentally friendly, and simple method, Xu et al. (2018) generated copper azide@porous carbon hybrids (CA@PC) using an ionic cross-linked hydrogel as the starting material and inexpensive cellulose derivatives as the copper azide nanoparticles. The reason for such a remarkable performance is the superior electric conductivity of nanoscale carbon cages. With the favorable unique structures, the as-prepared hybrids can greatly benefit a new type of energetic materials, which exhibit a very low electrostatic sensitivity of 1.06 mJ. It's interesting to note that the hybrids have a strong



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## **IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development**

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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propensity to ignite, and their flame sensitivity can even reach 47 cm, outperforming earlier, highly developed copper azide-based materials.

The development of novel energy nanomaterials has a very promising future due to the effective realisation of nanoscale MOFs with controllable size, shape, and tunable behaviour. Thus, it is anticipated that high-energy metal-organic frameworks (HE-MOFs) at the nanoscale will be used to enhance the associated physicochemical qualities, such as sensitivity and energetic performance (Zhang et al., 2016).



## IV-International Rural Areas and Ecology Congress Within The Framework of Sustainable Development

October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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October 05-06, 2023 / Girne-Turkish Republic of Northern Cyprus

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