

SCIENTIFIC APPROACHES IN LANDSCAPE ARCHITECTURE

Editors

Zeynep PİRSELİMOĞLU BATMAN

Elvan ENDER ALTAY



LIVRE DE LYON

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Architectural Sciences

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Scientific approaches in Landscape Architecture

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LIVRE DE LYON

PREFACE

We set out to examine in detail the developments regarding current issues in landscape architecture. Due to the scientific discipline we belong to, in addition to being interested in many current scientific developments, we also have to face the problems that our world feels more and more intensely. We think that landscape architecture should evolve into an approach that will produce solutions for social problems that concern people, beyond focusing on areas such as plants, open spaces and equipment in planning and design. For this reason, we think that we should strive to intersect our profession with the fields of different technical and social sciences such as sustainability, equality, biomimicry, bioclimatics. Beyond these terms, in this book you will also have the chance to see comprehensive topics that will come to the fore, such as ethnobotany, or evaluations from a current perspective on much more specific topics such as Ulrich's supportive design. One of the most special problems of landscape architecture also opens great doors of opportunity for us. This is the perception of the technical accuracy of our work at the user level. The importance of the planning or design projects we produce emphasizes their impact on users after the implementation phase. This is an issue that will increasingly affect people's sensory and emotional states, beyond technical considerations such as microclimatic benefit. For us, designing spaces where people can breathe should go beyond just providing them with physical relief or making them feel good. As landscape architects, we must be willing to step outside our comfort zones and expand our areas of research by realizing the role we can actually have in our society. This book includes research within the discipline of landscape architecture in the light of current developments. Compiled from this perspective, this book has content that inspires researchers from all disciplines.

Zeynep PİRSELİMOĞLU BATMAN
Elvan ENDER ALTAY

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CHAPTER I

EVALUATION OF URBAN HEAT ISLAND EFFECT USING LAND SURFACE TEMPERATURE VALUE AND REMOTE SENSING DATA

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1. Introduction

The rapidly increasing world population is living in cities more and more (Ahmed et al., 2013). With the rapid changes and transformations in the environments we live in, while there is a development process in cities, problems such as the decrease in biodiversity, low air and water quality, floods, droughts, high energy consumption, urban heat island effect are increasing even more, especially in fast-growing cities. Natural resources are consumed rapidly and irreversibly, and this leads to the emergence of unhealthy places (Topal, 2022a,b). The environmental problems that arise as a result of increased human activities, the global climate change and the global increase in temperature as a result of these affect our lives more and more every day (Korkut et al., 2016; Hua and Ping, 2018; Tonyaloğlu, 2019).

In the 21st century, which we are in and called the “City century”, due to urbanization and the new needs that arise due to this, human beings have changed the terrestrial ecosystem and caused land use and land cover changes (Xiao and Weng, 2007; Sun et al., 2012; Bokaie et al., 2016; Kafy et al., 2020). Improper and uncontrolled realization of these changes in urban areas may increase the effect of the urban heat island and have an impact on the climate and the local environment (Hua and Ping, 2018). As a matter of fact, the temperature increase and the urban heat island effect as a result of these changes are highly evident in

our cities (Zhou and Wang, 2011; Pal and Ziaul, 2017; Das et al., 2021; Gohain et al., 2021).

According to Oke (1995), the urban heat island describes the difference between air temperatures in urban and non-urban areas (Zhou et al., 2011). An urban heat island is a situation in which an urban area is significantly warmer than the surrounding rural areas due to high impermeable surfaces (Choudhury et al., 2019). Such that, the transformation of the surfaces covered with vegetation and wetlands into residential areas dominated by impermeable surfaces, their transformation into agricultural lands and bare lands increases the surface temperature and the urban heat island effect (Ahmed et al., 2013; Pal and Ziaul, 2017). If we compare urban and rural areas, while permeable surfaces such as soil and vegetation are dominant in rural areas, there are impermeable floors such as asphalt and concrete in cities. These impermeable surfaces reduce evaporation, making cities warmer than their surroundings. For this reason, our cities with a high rate of construction are now more confronted with the problem of temperature increase (Zhou and Wang, 2011; Bokaie et al., 2016; Tran et al., 2017; Kafy et al., 2020).

The Land Surface Temperature (LST) value obtained from remotely sensed thermal infrared (TIR) images (Fu and Weng, 2016) is a value used to measure temperature changes in cities, to understand global climate change, to understand hydrological processes and land cover changes (Avdan and Jovanovska, 2016; Hulley et al., 2019). At the point where today's technology has come, geographic information systems (GIS) and remote sensing (RS) technology are tools used for monitoring land use/land cover (LULC) changes and calculating LST. (Tomlinson et al., 2011; Zhou and Wang, 2011; Kafy et al., 2020; Das et al., 2021; Gohain et al., 2021). Multi-time and high-resolution LST maps of the desired region can be created with RS studies, and the current situation in that region can be revealed and temporal changes can be determined quickly and economically (Feizizadeh et al., 2013; Mercan, 2020).

On the other hand, it has been proven that NDVI (Normalized Difference Vegetation Index) performs well in understanding vegetation transformations caused by urbanization, land cover classification and change analysis (Xu et al., 2016; Hussain and Karuppanan, 2023). The relationships between LST and NDVI have been questioned in many studies. In many ways, the NDVI is a valuable tool that can be used to examine vegetation performance at the landscape scale (Tan et al., 2020; Hussain and Karuppanan, 2023).

Excessive heat may cause risks in terms of human health, as well as negative consequences in terms of comfort and increase ozone production (Zhou

et al., 2011). The urban heat island (UHI) affects water resources, air quality, biodiversity and ecological functions (Schwarz et al., 2011). Understanding the heat island effects, which negatively affect the city and its inhabitants in various ways, is very important in terms of increasing the quality of life. Understanding how the model and structure of urban expansion affect the formation of urban heat island and making studies to prevent and reduce the urban heat island effect in cities is an important issue for planning professional disciplines in terms of urban environmental planning and natural resource management (Tran et al., 2017; Choudhury et al., 2019; Tonyaloğlu, 2019; Tan et al., 2020; Cao et al., 2021). In this context, these effects have been investigated for many large cities in order to solve many environmental problems (Guha et al., 2020).

The case of researching LULC changes to understand the effects of UHI is an important issue, especially for cities in developing countries where urbanization and industrialization are taking place rapidly (Tran et al., 2017). Because the density and spread of urbanization in developing countries is very high (Pal and Ziaul, 2017). In this context, Çorlu district of Tekirdağ province, which is one of the districts with the most populous population in Türkiye and whose developments related to the status of being a province due to its dense population structure and other conditions have been on the agenda in recent history (Anonymous, 2023a), has been considered in this study.

In this study, it is aimed to reveal the UHI effect through the LST value. In this context, land use/land cover classes were determined by using CORINE Land Cover maps for the year 2018. Using Landsat 8 OLI_TIRS satellite image, the LST value for Çorlu District of Tekirdağ province was calculated and the relationships between these values and LULC changes were examined. In addition, the relationship between LST value and vegetation distribution was evaluated using RS methods. In this direction, the NDVI (Normalized Difference Vegetation Index) algorithm was used and the relationships were questioned by correlation analysis. Finally, the effects of LULC change and NDVI value on LST and UHI were evaluated. In this context, measures that can be taken to reduce the effect of UHI in cities while urban growth takes place are presented.

2. Material and Method

2.1. Study Area

The material of the study is Çorlu District of Tekirdağ Province (Figure 1). Çorlu District is located in the Thrace part of the Marmara Region. It is the largest district of Tekirdağ province. The district, which consists of 26 neighborhoods,

is 38 km from the center of Tekirdağ. Its area is 409 km². The elevation of the district from the sea is 193 m. Cold air masses descending from the north and humid-warm air currents coming from the Mediterranean and Aegean in the south affect the climate structure of the region. Winter months are cold and rainy (Anonymous, 2023b).

Soils in the district are very fertile. These soils are red brown soils with a thickness of 30-40 cm. Mostly wheat, corn, sunflower and barley are cultivated in agricultural lands. The district, where agriculture and animal husbandry found a wide field of activity, was known as an agricultural city until the 1980s. However, after these years, it has come to the fore with its industry. Flour, sunflower, brick factories, paint and leather industry, machinery manufacturing, ice cream and soft drink factories were established in the district, where the industry is highly developed. The contribution of the district to the country's economy is great. Due to its development, it is one of the districts with a high rate of immigration (Çorlu Municipality, 2020).

Çorlu is the district with the highest population of Tekirdağ. According to the data of TÜİK, the population of Çorlu district is 262.862 as of 2018. According to 2018 data, the most populated neighborhood of the district is Muhittin with a population of 38.296. Considering the neighborhoods with a population over 10.000, this is followed by Şeyhsinan with 38.256 inhabitants, Reşadiye with 34.575, Nusratiye with 19.032, Kemalettin with 15.863, Esentepe with 13.230, Çobançeşme with 10.528, and Havuzlar with 10.320 (TÜİK, 2023). Çorlu district is one of the biggest districts of Turkey with its population more than many other provinces (Çorlu Municipality, 2020).

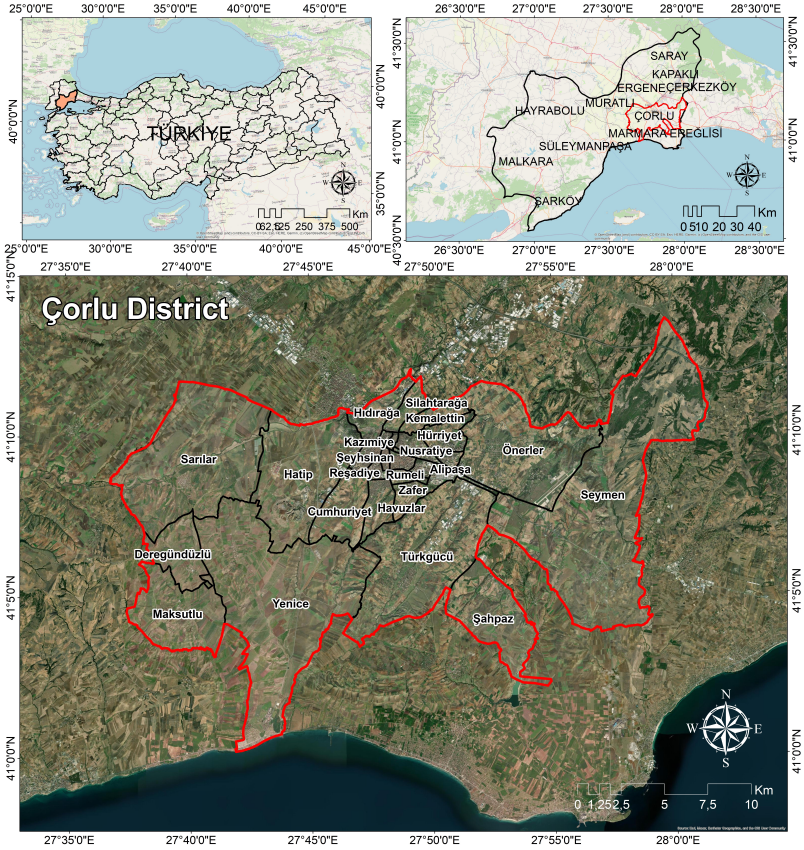


Figure 1. Study area

2.2. Method

2.2.1. Data

In the study, Çorlu district boundaries data was obtained by downloading from www.openstreetmap.org. (OpenStreetMap, 2023). 2018 data from CORINE land cover data, which was created by the European Environment Agency and based on the classification system, was used to produce LULC maps for the research area (Copernicus, 2023a). In the study, Landsat 8 OLI_TIRS satellite image of 2018 was used to calculate NDVI and LST values. This image was downloaded free of charge from the website of the US Geological Survey (USGS) (USGS, 2023). When choosing the image, the image with a cloudiness rate below 10% was preferred. The properties of the image used are given in Table 1.

Table 1: Features of the Landsat satellite image used in the study

Product_ID	Sensor_ID	Path/Row	Date_Acquired	Cloud_Cover (%)
LC08_L1TP_181031_20180703_20200831_02_T1	OLI_TIRS	181/31	2018-07-03	<10

2.2.2. CORINE Classification

CORINE standard land use/land cover classification consists of 5 main groups and 44 subgroups of land use/land cover classes in a three-level hierarchical structure. In the classification, 5 different classes are defined at level 1, 15 at level 2, and 44 different classes at level 3 covering all types of land cover, and these 3 levels of 44 class nomenclature are the same for all countries. The smallest mapping unit is 25 hectares and the standard mapping scale is 1:100.000 (Steenmans and Bergström, 1998).

In the study, Level-1 and Level-3 of the CORINE system, which classifies land covers at three different levels, were taken as basis. At Level-1, lands are divided into 5 classes (artificial areas, agricultural areas, forest and semi-natural areas, wetlands, water surfaces), and at Level-3, 44 classes.

2.2.3. Calculation of NDVI

Considering the literature, one of the most widely applied index in environmental and climate change research is NDVI (Nasser Mohamed Eid et al., 2020). It was developed by (Rouse et al., 1973) NDVI uses spectral reflectance values obtained in the near-infrared and red part of the electromagnetic spectrum, respectively. The calculated value ranges from -1 to +1. NDVI values from -1 to 0 indicate no vegetation, while values close to +1 indicate the highest green vegetation density (Ekumah et al., 2020). According to the literature reviews, values below 0 represent water, snow, cloud. Values between 0 and 0.2 represent barren land /built up/rock. Values between 0.2 and 0.5 refer to the soil and vegetation mixture. Values above 0.5 represent areas covered with vegetation (Avdan and Jovanovska, 2016; Alex et al., 2017). This index is spectral index that is frequently used in land use and change analysis.

The NDVI formula is given in the following equation (Rouse et al., 1973; Tucker and Sellers, 1986):

$$\text{NDVI} = (\text{NIR} - \text{Red}) / (\text{NIR} + \text{Red}) \quad \text{eq (1).}$$

2.2.4. Calculation of Land Surface Temperature (LST)

Global thermal data can be obtained with the Landsat-8 TIRS sensor. LST is one of the most important variables measured using the thermal bands of these sensors (Gümüş and Durduran, 2022). The process steps are briefly summarized below (Table 2).

Table 2: Process steps followed in calculating the LST value

Explanations	Equations
The first step in calculating the LST value is the conversion Spectral radiance value transformation is applied to the thermal image band values (DN: Digital Number) that will be used to determine the land surface temperature, with the help of the parameters in the metadata file of the satellite image. In this equation, $L\lambda$ represents the temperature of atmospheric spectral radiance, $M L$ represents the band-specific multiplicative rescaling factor from the metadata, $Q cal$ represents the quantized and calibrated standard product pixel values (DN), and AL represents the radiance additive rescaling factor (from satellite metadata) (Kumari et al., 2018; Akyürek, 2020).	$L\lambda = ML * Qcal + AL$ eq (2).
After this conversion, the TIRS band data is converted from spectral brightness to brightness temperature (BT) using the thermal constants provided in the metadata file. Results in Celsius are obtained by adding absolute zero to the radiation temperature and revising it (Avdan & Jovanovska, 2016). The BT luminance temperature (°C) in this equation calculated by is taking $L\lambda$; Spectral radiation, $K1$: band specific thermal conversion constant 774.8853, $K2$: band specific thermal conversion constant 1321,0789 (Güneş et al., 2021).	$BT = \frac{K2}{\ln\left(\frac{K1}{L\lambda} + 1\right)} - 273.15$ eq (3).
After this step, NDVI must be calculated in order to determine the Earth's surface emissivity and vegetation ratio. In determining the LST, NDVI values should be obtained from reflectance values, not DN values. The NDVI value is calculated using the reflectance values of the near infrared and red bands. For Landsat 8 these are Band 5 and Band 4 respectively (Akyürek, 2020). (eq (1)).	$NDVI = (NIR - Red) / (NIR + Red)$ eq (1).
After calculating the NDVI value, the proportion of the vegetation (Pv) is calculated using the equation below. Then, the land surface emissivity LSE (ϵ) value suggested by Sobrino et al.(2004) is calculated using the equation below (Kumari et al., 2018).	$Pv = \frac{(NDVI - NDVI_{MIN})}{(NDVI_{MAX} - NDVI_{MIN})^2}$ eq (4).
	$\epsilon = 0.004Pv + 0.986$ eq (5).
After calculating the LSE (ϵ) value, the last step is to calculate the LST value.	$LST = \frac{BT}{1 + \frac{(BT/p)}{\ln\epsilon\lambda}}$ eq (6).
Here, wavelength $\lambda=10.895$ is used while calculating LST as Celsius (°C), and BT is at-sensor BT (°C) (Avdan & Jovanovska, 2016). The p value here is a fixed value and is calculated with the help of the formula given here:	$p = h * c/s = 1.438 \times 10^{-2} \text{ mK}$ eq (7).
	(h: Planck constant (6.626 * 10 ⁻³⁴ Js), s: Boltzmann constant (1.38 * 10 ⁻²³ J/K), c: Speed of light (2.998 * 10 ⁸ m/s) (Akyürek, 2020).

3. Findings and Discussion

3.1. Findings on the CORINE Classification

With the CORINE land classification, 5 classes at Level-1 and 16 classes at Level-3 were determined for Çorlu district (Table 3). It has been observed that continuous urban fabric areas coded 1.1.1 cover 342.39 ha and constitute 0,84% of the total area. These areas are especially concentrated in the central neighborhoods of Çorlu district. These areas include the neighborhoods of Şeyhsinan, Reşadiye, Muhittin where there is a high population density. These areas also cover part of the Kemaliye, Nusratiye and Kazimiye neighborhoods. It is seen that the discontinuous urban fabric areas coded 1.1.2 are located all around the continuous urban fabric areas. These 1.1.2 coded areas cover 1,516.88 ha and constitute 3,70% of the total area. It is seen that these areas are located in the district center, especially in Şeyhsinan, Çobançeşme, Havuzlar, Rumeli, Zafer, Alipaşa, Cemaliye, Nusratiye, Kazimiye, Esentepe, Hürriyet, Silahtarağa and Önerler. Çorlu district is a highly developed district in terms of industrial or commercial units. These areas with the code 1.2.1 in the district cover 1,071.79 ha. It is seen that the areas with this code are located in the Zafer, Türkgücü and Önerler neighborhoods, which are located in the central region. It is seen that most of these areas are located in the northern parts of the district in the Hatip and Hıdırağa neighborhoods. These areas cover 2,62% of the total area. Here, mostly Çorlu's industrial areas are located. E-80 highway forms a large part of the road and rail networks and associated land areas with code 1.2.2 in the district. This road connects Istanbul to Europe. Çorlu Atatürk Airport has been operating since 1998 (Çorlu Municipality, 2020). The airport covers an area of 342.90 ha, which is 0,17% of the total area. These areas have the code 1.2.4 according to the CORINE classification. According to the CORINE classification, mineral extraction sites with the code 1.3.1 are distributed in different parts of the district, including Yenice, Türkgücü, Hatip, Hıdırağa and Önerler neighborhoods. Areas with this code cover an area of 347.68 ha and constitute 0,85% of the total area. According to CORINE classes, sport and leisure facilities areas in the district cover 190.74 ha and these areas constitute 0,47% of the total area. According to CORINE classes, non-irrigated arable land areas with the code 2.1.1 constitute the largest land use/land cover class in Çorlu district. These areas, which cover a very large part of the district, cover 31,890.67 ha and constitute 77,89% of the total area. In fact, the district of Çorlu is one of the districts with the largest

agricultural areas in the Thrace region. According to 2018 data, the cultivated agricultural areas in the district are 314.886 decares (Tekirdağ Provincial Directorate of Agriculture and Forestry, 2018). Agriculture-based industry is one of the most important livelihoods of the region. Another large-area land use/land cover class is pastures, with the code of 2.3.1, which covers an area of 1,393.25 ha and constitutes 3,40% of the total area. Complex cultivation patterns areas with the code of 2.4.2 in the district cover 166.26 ha and these areas are 0,41% of the total area. Considering the spatial distribution of these areas, it is seen that they are located far from the central districts. It is seen that these areas are located in the Maksutlu, Yenice and Türkgücü neighborhoods of the district. Land principally occupied by agriculture, with significant areas of natural vegetation areas with the code 2.4.3 covers 1,648.42 ha and these areas proportionally cover 4,03% of the total area. Broad-leaved forest areas with the code 3.1.1 according to CORINE classes are located in the northeast of the district. These areas, which cover 406.33 ha and 0,99% of the total area, are located in the Seymen and Önerler neighborhoods. Transitional woodland-shrub areas in the district are classified with the code 3.2.4 according to CORINE classes and these areas cover 1,374.93 ha. When evaluated proportionally, these areas constitute 3,36% of the total area. All of these areas are located in the northeast of the district. The inland marshes with the code 4.1.1 in the study area cover 72.01 ha and these areas are 0,18% of the total area. These areas are located in the Yenice neighborhood, which is the coastal part of the district where it meets the sea. Water bodies with the code 5.1.2 according to the CORINE classification in the district cover an area of 100.31 ha and when evaluated proportionally, they constitute 0.25% of the total area. Sea and ocean areas coded 5.2.3 cover 8.39 ha and these areas constitute 0.02% of the total area. The CORINE Level-3 map showing the land use/land cover classes (LULC) and their spatial distribution in the Çorlu district for 2018 is given in Figure 2.

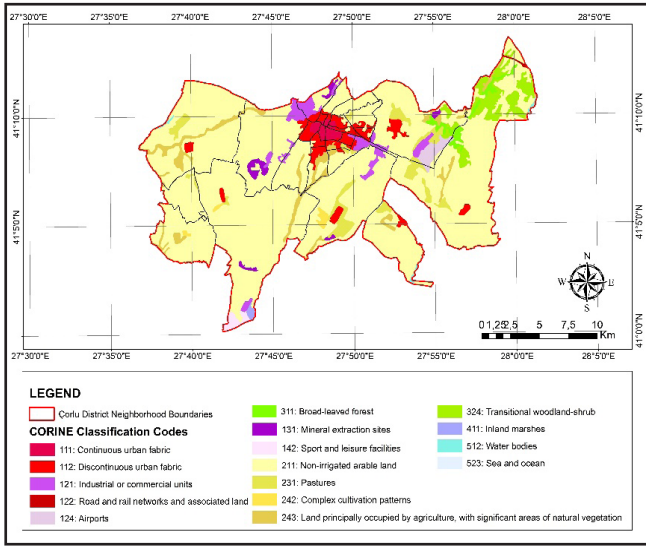


Figure 2. CORINE Level-3 map showing the land use/land cover (LULC) classes in Çorlu district for the year 2018

Table 3: CORINE Land Cover (CLC) class levels for study area

CORINE Class Levels		
Level-1	Level-2	Level-3
1. Artificial Surfaces	1.1 Urban fabric	1.1.1 Continuous urban fabric 1.1.2 Discontinuous urban fabric
	1.2 Industrial, commercial and transport units	1.2.1 Industrial or commercial units 1.2.2 Road and rail networks and associated land 1.2.4 Airports
	1.3 Mine, dump and construction sites	1.3.1 Mineral extraction sites
	1.4 Artificial, non-agricultural vegetated areas	1.4.2 Sport and leisure facilities
2. Agricultural areas	2.1 Arable land	2.1.1 Non-irrigated arable land
	2.3 Pastures	2.3.1 Pastures
	2.4 Heterogeneous agricultural areas	2.4.2 Complex cultivation patterns 2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation
3. Forest and seminatural areas	3.1 Forest	3.1.1 Broad-leaved forest
	3.2 Shrub and/or herbaceous vegetation associations	3.2.4 Transitional woodland/shrub
4. Wetlands	4.1 Inland wetlands	4.1.1 Inland marshes
5. Water bodies	5.1 Inland waters	5.1.2 Water bodies
	5.2 Marine waters	5.2.3 Sea and ocean
5 Main Class	12 Class	16 Class

Reference: Prepared using Copernicus, 2023b.

3.2. Findings on NDVI Calculations

Descriptive statistical data of the NDVI index calculated with the 2018 Landsat 8 OLI_TIRS image provided within the scope of the study were calculated as follows: NDVI min. -0,27089, NDVI max. 0,61957, NDVI mean 0,26956 and NDVI standard deviation 0,13076. When the results were evaluated, it was seen that the areas covered with vegetation were located in the district, especially in the Seymen neighborhood, some parts of Önerler and Şahbaz neighborhoods. When the map given in Figure 3 is examined, it is seen that NDVI values are quite low in Şeyhsinan, Muhittin, Reşadiye and Nusratiye neighborhoods, which are densely populated neighborhoods in the district center. However, NDVI values are low in some parts of Yenice, Hatip, Sarılar, Deregündüzlü and Maksutlu neighborhoods, which are covered with large agricultural lands. The results show that the district center is more deprived of vegetation areas than the rest of the district. On the other hand, it is seen that these results of the NDVI index on green areas also overlap with the CORINE data of the district. In addition, according to the NDVI results, the water/snow/cloud covered areas of the study area for the year 2018 were calculated as 80.16 ha. Barren land/built up/rock areas are calculated as 15,690.86 ha. Mixed areas of soil and vegetation areas were calculated as 22,943.73 ha. The areas covered with vegetation were calculated as 2,186.44 areas (Figure 3). As a result, it was found that the areas in the barren land/built up/rock class of these classified areas were located in the western and southwestern parts of the area, as well as the neighborhoods in the district center.

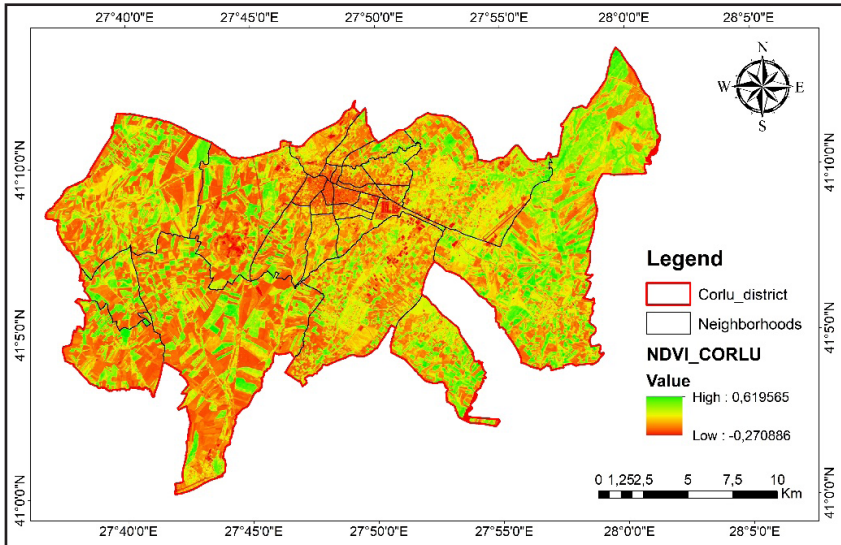


Figure 3. NDVI map of Çorlu district for the year 2018

3.3. Findings on LST Calculations

Using the Landsat 8 satellite image, the land surface temperature map of the study area for 2018 was produced by applying the process steps described in the land surface temperature calculations (Figure 4). It was observed that the land surface temperature values for 2018 varied between 23.0 °C and 40.5 °C. The land surface temperature values were classified as 23,0°C-25°C, 25°C-30°C, 30°C-35°C, 35°C-40°C- and >40°C areas, and the spatial distribution of the regions where these values were experienced was investigated. According to the classification results, areas between 23.0 °C-25 °C were calculated as 241.63 ha. Areas between 25°C-30°C were calculated as 22,619.69 ha. Areas between 30°C-35°C were calculated as 17,034.21 ha. Areas between 35°C-40°C were calculated as 1,011.81 ha. Areas with temperatures between 40°C -41°C cover small areas and are calculated as 0.32 ha. When the map given in Figure 4 is examined with these values, it is seen that the district center has land surface temperatures ranging from 30°C-40°C, while the areas with low population density and higher green areas (for example, Seymen neighborhood) have low temperatures. In addition, high temperatures were also calculated in Maksutlu and Yenice neighborhoods located in the southwestern part of the district. It can be said that this result is due to the sparse and undersized vegetation and the presence of bare agricultural lands here.

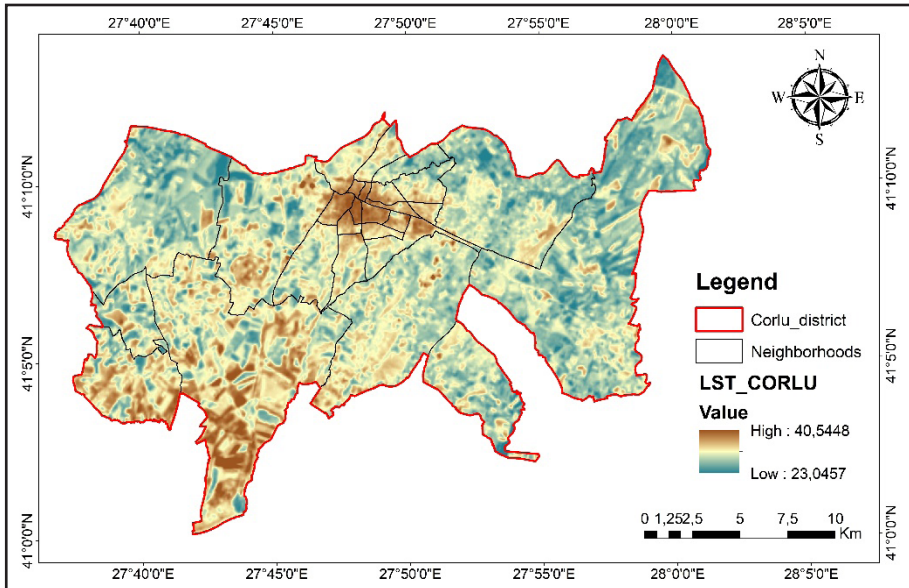


Figure 4. LST map of Çorlu district for the year 2018

3.4. Evaluation of the Relationship Between LULC and LST

Within the scope of the study, a section of the land was taken to observe how the urban surface temperature changes according to the land use/land cover changes (Figure 5).

Accordingly, it was seen that the LST value reaches the highest value in the built-up area. It was seen that it reaches the lowest value in the area covered with vegetation. Many studies (Zhou et al., 2011; Sun et al., 2012; Kumar et al., 2018; Karakuş, 2019; Alademomi et al., 2022) have shown that the LST value increases in built up areas and barren lands.

As a result, LST value differed in cultivated lands, bare lands, forest and vegetation covered areas and built-up areas. As stated by Moisa et al. (2022), increasing the vegetation is the most effective way to decrease the LST value.

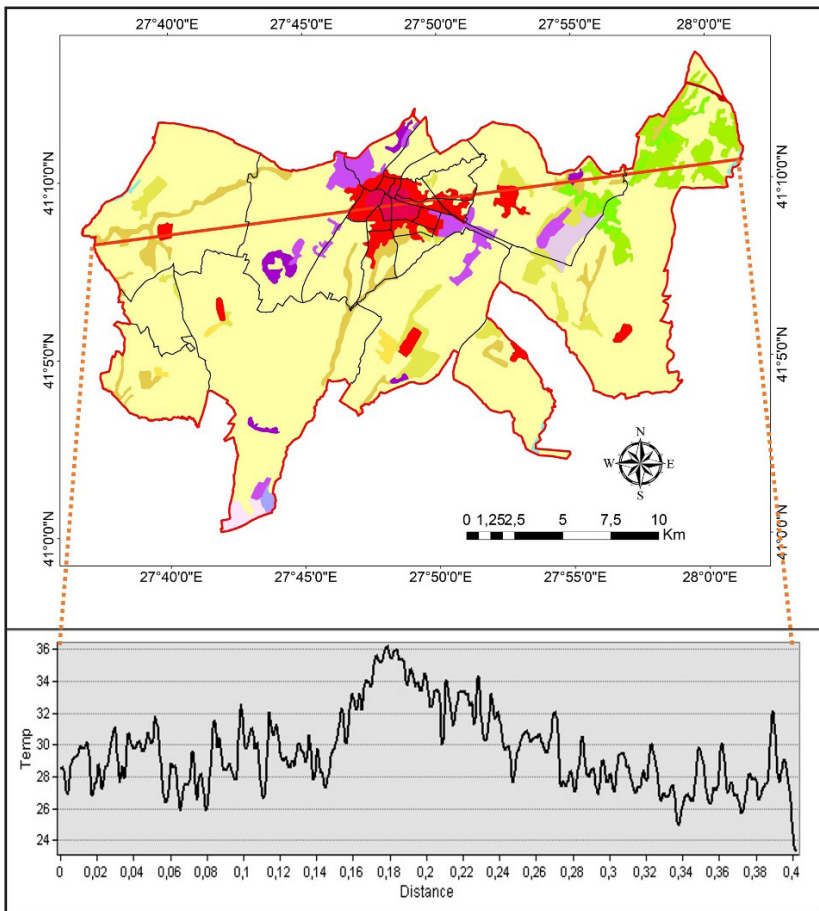


Figure 5. The relationship between the LULC and LST

3.5. Evaluation of the Relationships Between NDVI and LST

Correlation analysis was performed to explain the relationship between LST and NDVI, which is used to understand land use change. For this, 290 points were randomly selected from the area and correlation analysis was performed. This relationship is seen in Figure 6. As a result, NDVI values were found to be higher in regions where LST are low. Correlation analysis results show that land surface temperature is negatively correlated with NDVI. The correlation coefficient between land surface temperature and NDVI was calculated as -0,63104. The negative correlation finding regarding the NDVI value in the study is in line with the findings of previous studies (Karakuş, 2019; Alademomi et al., 2022; Moisa et al., 2022).

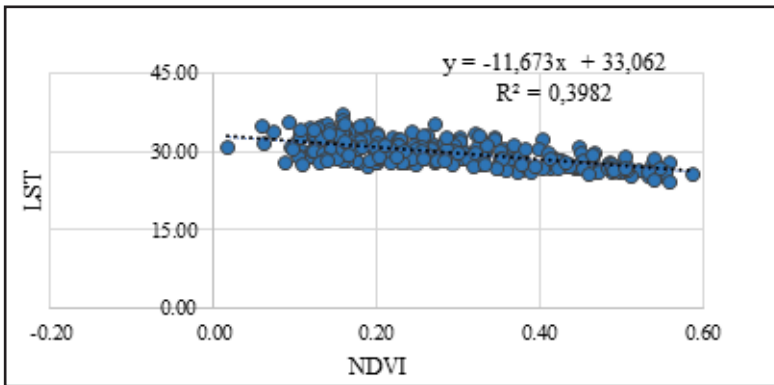


Figure 6. The relationship between the NDVI and LST

4. Conclusion and Evaluation

In this study, which was carried out in Çorlu district of Tekirdağ, the UHI effect was investigated by using the LST value. In this context, LULC classes were determined by using the maps of CORINE 2018. According to these data, 5 classes at Level-1 and 16 classes at Level-3 were determined in the district. It was observed that the areas with the highest spatial distribution in the district are non-irrigated arable lands. When the relationships between the calculated LST values and LULC changes were examined, it was seen that the LST reached the highest value on artificial surfaces. These areas are in the district center where continuous urban fabric and discontinuous urban fabric are located. It was observed that the LST value reached the lowest value in forest and seminatural areas. These areas are covered with broad-leaved forest

and transitional woodland/shrub. It was determined that there was a negative correlation between the NDVI values and the LST values calculated in the study.

LULC types and result of the correlation between and LST and NDVI can be effectively used to monitor and evaluate the future scenario of land cover (Kumar et al., 2018). On the other hand, studies reveal that UHI effects can be reduced by realizing appropriate land use plans (Sun et al., 2012). When the findings of LULC, NDVI and LST in this study were evaluated together, it was concluded that the surface temperature increased in urban areas and decreased in areas with dense vegetation. These results also show heat island effects in urban areas. It has been observed that these urban heat island effects are especially effective in the neighborhoods of Şeyhsinan, Reşadiye and Muhittin, which are the neighborhoods with high population density. It was observed that the Seymen neighborhood, which has a more dense vegetation and rural characteristics compared to other districts, was least affected by this warming (Figure 5).

With the increasing population, urban areas are growing and expanding day by day. As shown in this study, it is understood how important the existence of green areas in the newly planned areas is in order to minimize the UHI effect while cities grow and develop. Increasing the diversity and density of green areas, supporting the built-up areas with green corridors, roof garden and vertical garden applications, reducing impermeable floors and giving importance to the use of ecological materials are among the measures that can be taken in cities. On the other hand, high temperatures have negative effects such as decreasing thermal comfort, revealing health risks, and reducing the quality of life. In order to minimize these effects, it is important to implement such measures in cities. In addition, this issue is also important for creating sustainable and ecological living spaces and ensuring sustainable development.

In conclusion, this study analytically presents the environmental consequences of urbanization for areas where urbanization is so rapid, using the example of the Çorlu district. It is believed that these results will contribute by providing data to state departments related to urban planning, local governments, and other stakeholders for the new planning to be made.

References

Ahmed, B., Kamruzzaman, M., Zhu, X., Rahman, M. S., Choi, K. (2013). Simulating Land Cover Changes and Their Impacts on Land Surface Temperature in Dhaka, Bangladesh. *Remote Sensing*, 5(11), 5969-5998.

Akyürek, Ö. (2020). Termal Uzaktan Algılama Görüntüleri ile Yüzey Sıcaklıklarının Belirlenmesi: Kocaeli Örneği. *Doğal Afetler ve Çevre Dergisi*, 6(2), 377–390.

Alademomi, A. S., Okolie, C. J., Daramola, O. E., Akinnusi, S. A., Adediran, E., Olanrewaju, H. O., Odumosu, J. (2022). The interrelationship between LST, NDVI, NDBI, and land cover change in a section of Lagos metropolis, Nigeria. *Applied Geomatics*, 14(2), 299–314.

Alex, E., Ramesh, K., Hari, S. (2017). Quantification and understanding the observed changes in land cover patterns in Bangalore. *International Journal of Civil Engineering and Technology*, 8, 597–603.

Anonymous. (2023a). İl Olmaya Aday İlçeler Hangileri? <https://www.nufusu.com/blog/il-olmaya-aday-ilceler-hangileri-114> Access date: 03.08.2023.

Anonymous. (2023b). İlçemiz. Çorlu Belediyesi. <http://www.corlu.bel.tr/idet/72/259/ilcemiz>, Access date: 03.08.2023.

Avdan, U., Jovanovska, G. (2016). Algorithm for Automated Mapping of Land Surface Temperature Using LANDSAT 8 Satellite Data. *Journal of Sensors*, 2016, 1-8.

Bokaie, M., Zarkesh, M. K., Arasteh, P. D., Hosseini, A. (2016). Assessment of Urban Heat Island based on the relationship between land surface temperature and Land Use/ Land Cover in Tehran. *Sustainable Cities and Society*, 23, 94–104.

Cao, J., Zhou, W., Zheng, Z., Ren, T., Wang, W. (2021). Within-city spatial and temporal heterogeneity of air temperature and its relationship with land surface temperature. *Landscape and Urban Planning*, 206, 103979.

Choudhury, D., Das, K., Das, A. (2019). Assessment of land use land cover changes and its impact on variations of land surface temperature in Asansol-Durgapur Development Region. *The Egyptian Journal of Remote Sensing and Space Science*, 22(2), 203–218.

Copernicus. (2023a). Corine land cover. <https://land.copernicus.eu/pan-european/corine-land-cover> Access date: 01.07.2023.

Copernicus. (2023b). Corine land cover nomenclature guideline. <https://land.copernicus.eu/user-corner/technical-library/corine-land-cover-nomenclature-guidelines/html>, Access date: 01.07.2023.

Çorlu Municipality. (2020). Çorlu Tanıtım ve Turizm Rehberi. Çorlu Belediyesi Yayınları. https://www.corlu.bel.tr/upload/tr/dosya/yayinlar/turkce_18112020145132.pdf, Access date: 30.07.2023.

Das, N., Mondal, P., Sutradhar, S., Ghosh, R. (2021). Assessment of variation of land use/land cover and its impact on land surface temperature

of Asansol subdivision. *The Egyptian Journal of Remote Sensing and Space Science*, 24(1), 131–149.

Ekumah, B., Armah, F. A., Afrifa, E. K. A., Aheto, D. W., Odoi, J. O., Afitiri, A. R. (2020). Geospatial assessment of ecosystem health of coastal urban wetlands in Ghana. *Ocean and Coastal Management*, 193, 105226.

Feizizadeh, B., Blaschke, T., Nazmfar, H., Akbari, E., Kohbanani, H. R. (2013). Monitoring land surface temperature relationship to land use/land cover from satellite imagery in Maraqeh County, Iran. *Journal of Environmental Planning and Management*, 56(9), 1290–1315.

Fu, P., Weng, Q. (2016). A time series analysis of urbanization induced land use and land cover change and its impact on land surface temperature with Landsat imagery. *Remote Sensing of Environment*, 175, 205–214.

Gohain, K. J., Mohammad, P., Goswami, A. (2021). Assessing the impact of land use land cover changes on land surface temperature over Pune city, India. *Quaternary International*, 575–576, 259–269.

Guha, S., Govil, H., Gill, N., Dey, A. (2020). Analytical study on the relationship between land surface temperature and land use/land cover indices. *Annals of GIS*, 26(2), 201–216.

Gümüş, M. G., Durduran, S. (2022). Arazi kullanımı/arazi örtüsü değişiminin arazi yüzey sıcaklığı üzerindeki etkisinin Uzaktan Algılama ve Coğrafi Bilgi Sistemleri Tekniği kullanılarak araştırılması. IV. Uluslararası Türk Dünyası Fen Bilimleri ve Mühendislik Kongresi, 23-24 Haziran 2022, Niğde, Türkiye. pp. 1023-1032.

Güneş, C., Pekkan, E., Tün, M. (2021). Eskişehir Kent Merkezinde Yer Alan Üniversite Kampüslerindeki Kentsel Isı Adası Etkilerinin LANDSAT-8 Uydu Görüntüleri Üzerinden Araştırılması. *Ulusal Çevre Bilimleri Araştırma Dergisi*, 4(1), 22–32.

Hua, A. K., Ping, O. W. (2018). The influence of land-use/land-cover changes on land surface temperature: A case study of Kuala Lumpur metropolitan city. *European Journal of Remote Sensing*, 51(1), 1049–1069.

Hulley, G. C., Ghent, D., Götsche, F. M., Guillevic, P. C., Mildrexler, D. J., Coll, C. (2019). 3—Land Surface Temperature. In G. C. Hulley and D. Ghent (Eds.), *Taking the Temperature of the Earth* (pp. 57–127). Elsevier.

Hussain, S., Karuppannan, S. (2023). Land use/land cover changes and their impact on land surface temperature using remote sensing technique in district Khanewal, Punjab Pakistan. *Geology, Ecology, and Landscapes*, 7(1), 46–58.

Kafy, A.-A., Rahman, Md. S., Faisal, A.-A., Hasan, M. M., Islam, M. (2020). Modelling future land use land cover changes and their impacts on land surface temperatures in Rajshahi, Bangladesh. *Remote Sensing Applications: Society and Environment*, 18, 100314.

Karakuş, C. B. (2019). The impact of land use/land cover (LULC) changes on land surface temperature in Sivas City Center and its surroundings and assessment of Urban Heat Island. *Asia-Pacific Journal of Atmospheric Sciences*, 55, 669-684.

Korkut, A., Gültürk, P., Üstün Topal, T. (2016). Kentsel Peyzaj Yapılarında Zemin Geçirimsizliği Üzerine Bir Araştırma: Tekirdağ Örneği. *Kastamonu Üniversitesi Orman Fakültesi Dergisi*, 16(2), 412-422.

Kumar, P., Husain, A., Singh, R. B., Kumar, M. (2018). Impact of land cover change on land surface temperature: A case study of Spiti Valley. *Journal of Mountain Science*, 15(8), 1658-1670.

Kumari, B., Tayyab, M., Shahfahad, Salman, Mallick, J., Khan, M. F., Rahman, A. (2018). Satellite-Driven Land Surface Temperature (LST) Using Landsat 5, 7 (TM/ETM+ SLC) and Landsat 8 (OLI/TIRS) Data and Its Association with Built-Up and Green Cover Over Urban Delhi, India. *Remote Sensing in Earth Systems Sciences*, 1(3), 63–78.

Mercan, Ç. (2020). Yer Yüzey Sıcaklığının Termal Uzaktan Algılama Görüntüleri ile Araştırılması: Muş İli Örneği. *Türkiye Uzaktan Algılama Dergisi*, 2(2), 42–49.

Moisa, M. B., Dejene, I. N., Gameda, D. O. (2022). Geospatial technology-based analysis of land use land cover dynamics and its effects on land surface temperature in Guder River sub-basin, Abay Basin, Ethiopia. *Applied Geomatics*, 14(3), 451-463.

Nasser Mohamed Eid, A., Olatubara, C. O., Ewemoje, T. A., Farouk, H., El-Hennawy, M. T. (2020). Coastal wetland vegetation features and digital Change Detection Mapping based on remotely sensed imagery: El-Burullus Lake, Egypt. *International Soil and Water Conservation Research*, 8(1), 66–79.

OpenStreetMap (2023). Available online: <https://www.openstreetmap.org/>, Access date: 04.07.2023.

Pal, S., Ziaul, Sk. (2017). Detection of land use and land cover change and land surface temperature in English Bazar urban centre. *The Egyptian Journal of Remote Sensing and Space Science*, 20(1), 125–145.

Rouse, Jr. J. W., Haas, R. H., Schell, J. A., Deering, W., D. (1973). *Monitoring the vernal advancement and retrogradation (green wave effect) of natural vegetation*. (No. NASA-CR-132982).

Schwarz, N., Lautenbach, S., Seppelt, R. (2011). Exploring indicators for quantifying surface urban heat islands of European cities with MODIS land surface temperatures. *Remote Sensing of Environment*, 115(12), 3175–3186.

Steenmans, C., Bergström, R. (1998). State of Play of the EEA European Topic Centre on Land Cover. In *Land Cover and Land Use Information Systems for European Union Policy Needs* (ss. 37–43). European Communities, Proceedings of the seminar 21 - 23 January 1998, Luxembourg.

Sun, Q., Wu, Z., Tan, J. (2012). The relationship between land surface temperature and land use/land cover in Guangzhou, China. *Environmental Earth Sciences*, 65(6), 1687–1694.

Tan, J., Yu, D., Li, Q., Tan, X., Zhou, W. (2020). Spatial relationship between land-use/land-cover change and land surface temperature in the Dongting Lake area, China. *Scientific Reports*, 10(1), 9245.

Tekirdağ Provincial Directorate of Agriculture and Forestry. (2018). 2018 Yılı Tarım Raporu. https://tekirdag.tarimorman.gov.tr/Belgeler/TarimRaporlari/GTHB59_2018.pdf, Access date: 07.07.2023.

Tomlinson, C. J., Chapman, L., Thornes, J. E., Baker, C. (2011). Remote sensing land surface temperature for meteorology and climatology: A review. *Meteorological Applications*, 18(3), 296–306.

Tonyaloğlu, E. E. (2019). Kentleşmenin kentsel termal çevre üzerindeki etkisinin değerlendirilmesi, efeler ve İncirliova (Aydın) örneği. *Türkiye Peyzaj Araştırmaları Dergisi*, 2(1), 1-13.

Topal, T. Ü. (2022a). Nature- based Solutions for Biodiversity in Cities. In M. Özyavuz (Ed.), *Sustainability, Conservation and Ecology in Spatial Planning and Design* (pp. 211–228). Peter Lang.

Topal, T. Ü. (2022b). The New Normal for the Sustainable Future of Cities: “Biophilic Cities.” In Z. P. Batman and E. E. Altay (Eds.), *Current Studies in Landscape Architecture* (pp. 11–28). Gece Kitaplığı.

Tran, D. X., Pla, F., Latorre-Carmona, P., Myint, S. W., Caetano, M., Kieu, H. V. (2017). Characterizing the relationship between land use land cover change and land surface temperature. *ISPRS Journal of Photogrammetry and Remote Sensing*, 124, 119–132.

Tucker, C. J., Sellers, P. J. (1986). Satellite remote sensing of primary production. *International Journal of Remote Sensing*, 7(11), 1395–1416.

TÜİK (Türkiye İstatistik Kurumu). (2023). İstatistik Göstergeler. İl Göstergeleri, Toplam Nüfus. 2018 yılı İl ve İlçe Nüfusları. <https://biruni.tuik.gov.tr/ilgosterge/?locale=tr> Access date: 30.07.2023.

USGS (United States Geological Survey). (2023). EarthExplorer – Home. <https://earthexplorer.usgs.gov/> Access date: 30.07.2023

Xiao, H., Weng, Q. (2007). The impact of land use and land cover changes on land surface temperature in a karst area of China. *Journal of Environmental Management*, 85(1), 245–257.

Xu, L., Li, B., Yuan, Y., Gao, X., Zhang, T., Sun, Q. (2016). Detecting Different Types of Directional Land Cover Changes Using MODIS NDVI Time Series Dataset. *Remote Sensing*, 8(6), 495.

Zhou, W., Huang, G., Cadenasso, M. L. (2011). Does spatial configuration matter? Understanding the effects of land cover pattern on land surface temperature in urban landscapes. *Landscape and Urban Planning*, 102(1), 54–63.

Zhou, X., Wang, Y.-C. (2011). Dynamics of Land Surface Temperature in Response to Land-Use/Cover Change. *Geographical Research*, 49(1), 23–36.

CHAPTER II

LIFESTYLES DESIGNED BY LANDSCAPE ARCHITECTURE STUDENTS: ACTIVITIES, SPATIAL COMPONENTS, AND WELL-BEING IN RESIDENTIAL OPEN SPACES

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1. Introduction

Individuals and societies, by their nature, are under constant change in an effort to ameliorate their environment and conditions. Throughout different historical eras, this feature has been reflected in the cultural, socioeconomic, political, and ecological conditions of the societies and the lifestyles formed by these developments. Factors such as increased income, developments in transportation, and digital technologies have contributed to a rise in leisure time (Lyons et al., 2018) and have allowed citizens to afford novel items that may not have previously been within their economic reach. These behavioral changes have inevitably affected people's lifestyles (Zhou and Huang, 2016; Wei et al., 2015). Along with environment, human biology, and healthcare, lifestyle constitutes one of the principal elements affecting health (Sharpe et al., 2018). Parallel to this, the relationship between the characteristics of residential environments—and the affordances provided by these—and lifestyle, sustainability, environmental, and health concerns is becoming increasingly important. In order to understand and facilitate modern

lifestyles in urban settlements, research has become increasingly widespread. Kwon and Kim (2017) aimed to contribute to urban and social sustainability by identifying modern lifestyle characteristics in urban housing areas and the ever-changing meanings ascribed to these characteristics. Based on the impact of digital technologies on participation in work and leisure activities—both in spatial and temporal dimensions—Lyons et al. (2018) stated that the structure of how people are living their lives is changing and that these changes affect urban metabolisms and sustainability.

Post-modern landscapes are also influenced by this transformative process. According to Bruns et al. (2000), agriculture, various leisure activities, nature and landscape conservation, and environmental education are interwoven into new lifestyle landscapes. It is proposed that dynamic landscape changes will continue throughout the decades to come and, therefore, landscape professionals must conceptualize and manifest experimental ideas for the design of new landscapes to accommodate current and emerging lifestyles (Bruns et al., 2000). In this context, designers and prospective design students should be encouraged to consider evolving lifestyles and their relationship to issues such as health, sustainability, and awareness.

1.1. The Concept of Lifestyle

Although dependent on cultural context, each lifestyle includes the manners in which a group utilizes goods, places, and time (Chaney, 1996). Variability in eating habits, clothing patterns, family life, housing types and tastes, leisure time choices, vacation options, and many other aspects of social life pave the way for different lifestyles (Gençyürek Erdoğan, 2014). According to Kwon and Kim (2017), flexible and unconventional lifestyles exhibited by artists, musicians, and scientists are becoming increasingly prevalent. People want to work in a horizontal and interactive way that focuses on creating value and generating knowledge while remaining in an environment that fosters creativity (Kwon and Kim, 2017). Bruns et al. (2000) state that the demands on personal comfort are increasing and “lifestyle landscapes” that satisfy various leisure and outdoor activities have begun to emerge. Physical activities or leisure activities, which are regarded as an important indicator of lifestyle, are closely intertwined with environmental factors (Hunter et al., 2015; McCormack et al., 2010). Therefore, the design of man-made environments plays an important role in supporting one’s lifestyle. The dynamics of lifestyles inevitably exert an effect on the design of housings and their outdoor spaces. Today, in Turkey’s housing market,

there is no instance of residential projects presented to potential buyers without the accompanied promise of a new lifestyle. Houses are considered to be an important indicator of the lifestyle of their inhabitants (Saral Güneş and Kükrer Aydın, 2016) and, since at least the beginning of the 20th century, housing has been associated with health worldwide. In this period, improvements in housing conditions for the benefit of public health and well-being have become widespread. In this respect, the concept of home has changed into a source of material happiness and the house transformed into the foundation of national welfare, hygiene, and efficiency, which constitutes the essence of modern residential space. In the mid-20th century, under the social structure of consumer capitalism, housing was a means of symbolizing one's social status (Kwon and Kim, 2017).

Depending on social changes occurring in the West, the transformation of traditional lifestyles and houses into modern forms have been paralleled in Turkish society. By keeping up with this transformation, the residents—who value privacy above all—have adopted these Western influences in the form of multi-storey/apartment buildings. As the 21st century neared, high-rise residential settlements produced in the urban periphery began to emerge (Uysal and Baran Atalay, 2017). Today, factors such as urban densification, heavy traffic, and noise and air pollution have triggered the production of comprehensive, alternative living areas removed from the chaos of urban areas—especially big cities (Alyakut, 2017; Erdinç and Gür, 2017; Uysal and Baran Atalay, 2017). In the marketing of houses, mottos with promises such as “comfortable, peaceful, prestigious, healthy, high quality of life, ideal way of living” emphasize psychological and physical well-being. Families increasingly prefer the lifestyle offered by gated residential areas located in privileged green places (e.g., near forest, sea, or lake areas, etc.) whose physical and social qualities are considered superior (Özkan Töre and Kozaman Som, 2009). In modern times, the role of landscape design in meeting the lifestyle expectations of their users has reached a level of importance that cannot be ignored. Therefore, the importance of landscape design in creating the spatial correspondence of new lifestyles should be examined ever more closely.

1.2. What Type of Landscape Does the New Lifestyle Demand?

Humans live either within a landscape or alongside it (Bruns et al., 2000). Urban open spaces are important components of urban landscapes and the value

placed on access to such areas is escalating due to the changing physical and social landscapes of modern, urbanized cities (Wood et al., 2017). Urban open spaces have been commonly associated with health and well-being in academic literature and their health benefits, such as encouraging physical activity and enhancing mental health, are expressed by various researchers (Ding and Gebel, 2012; Hunter et al. 2015; Koohsari et al., 2015, 2018; McCormack et al., 2010; Mohd Shahli et al. 2014; Villanueva et al. 2015; Wood et al., 2017; Zhang et al., 2015). The social benefits such as fostering neighborhood social cohesion by providing a venue for people to socialize, interact, and gather (Koohsari et al., 2018; Maas et al., 2017; Villanueva et al. 2015) and contributing positively to neighborhood satisfaction (McCormack et al., 2010; Park and Kim, 2017) are also defined. The physical and environmental benefits such as reducing urban heat effects, enhancing air quality, and ameliorating population density are also important for healthy urban life (Capolongo et al., 2018; Yılmaz et al., 2016). Due to these benefits, the importance of landscape design should be emphasized in sustaining the quality of life in the context of housing estates. Landscape design can be used as a tool for rendering communities more sustainable and contributing to a balanced environment (Gause et al., 2007). In this respect, the importance of studying the effectiveness of landscape design in the creation of sustainable housing estates was detailed (Mohd Shahli et al., 2014). Zhang (2010) underlines the role of residential landscape design and states that buyers in China in the 1990s began to pay greater attention to the landscape and environment of their communities. Both the ratio of green space and the quality and design became important criteria for assessing the desirability of a property (Zhang, 2010). While discussing the specific ideas about living environment and lifestyle developed by the burgeoning urban middle class, Fleischer (2007) states that residents aspire to have access to green space, better air quality, and spaciousness—but also to privacy and exclusivity.

Similarly, Garip and Şener (2012) have determined that physical characteristics of housing estates' open spaces emerge as the most attractive features in terms of user satisfaction in Turkey. Examining the promises offered through landscape design to buyers in Turkey's housing market reveals that artistic activities, sports activities, educational activities, and activities that foster personal hobbies are being highlighted (Şentürk, 2012). Mumcu et al. (2018) determined the basic components of promised landscapes in housing advertisements as physical landscape (e.g., lush, green gardens; being

intertwined with nature; playgrounds, etc.) and social landscape (e.g., a tightly knit community; a quiet, peaceful, and liberated social life; a healthy, active life; modern; luxurious, etc.). Depending on the emphasis of lifestyle in the housing market, physical and social characteristics of residential open spaces are being frequently emphasized in various academic studies. However, the relationship between the concept of lifestyle and landscape architecture is often ignored in these studies. Another consideration absent in the current research is the concept of housing and lifestyle within the context of the health of individuals or the public at large. Koohsari et al. (2015) state that exploring the relationship between public open space features and activity types can provide landscape architects with useful information about prioritizing features in (re)designing public open space. In particular, understanding the tendencies of students about lifestyles and spatial components in residential areas will contribute to discussions on curriculum interventions. In the education of environmental designers, concepts such as social responsibility, environmental awareness, sustainable development, and environmental literacy are of increasing significance (Nikezić and Marković, 2015). Addressing these issues in the context of the design studio, the inclusion of lifestyle, its components, and its relationship with health will contribute to the further development of design education that addresses the requirements of today and the future.

2. Materials and Methods

2.1. Research Approach

In this study, it was aimed to examine landscape architecture students' tendencies regarding lifestyle characteristics and spatial and conceptual components in their designs of residential outdoor products. The contents of the students' designs were compared with the current understanding of lifestyle practices. Differences, deficiencies, and aspects in need of improvement are discussed. The findings of this study are aimed at supporting, informing, and guiding design students, especially in the early phases. As such, students' housing estate open designs were analyzed. For this purpose, the students' homework documents that were completed within a Spatial Behavior course were used as research material. For this assignment, students were asked to explain their design approaches in conceptual, spatial, and functional dimensions. This study was conducted in the Landscape Architecture Department of Karadeniz Technical University. Student projects involved the same site, which was located

in Trabzon, Turkey. The location where the students' projects belong to is a new and rapidly developing housing area within the city that is marketed toward the middle-to-high income bracket. While the area was once dominated by a rural character, it is currently facing problems of high building density, loss of green space, and heavy traffic.

2.2. Procedures

A qualitative approach using content analysis was adopted in this study. According to McCormack et al. (2010), qualitative methods may complement quantitative findings and contribute to better understanding the relationship between environmental attributes of urban open spaces and physical activity patterns afforded by these. Since qualitative findings could be used to improve the design of urban open spaces as well as recreational amenities and programs, the need for more qualitative research is warranted (McCormack et al., 2010). Content analysis is a technique for systematically describing the form and content of a written, spoken, or visual material. Content refers to the specific topic or themes in the material and quantification (expressing data in numbers) of these forms the basis of content analysis (Sommer and Sommer, 2002).

Thirty-two student poster presentations were analyzed in depth. The types of collected data are determined based on perceived quality of life (QOL). Gou et al., (2018) expressed people's relation to their living environments as a key determinant of their QOL. In promoting QOL, well-designed housing has been identified as instrumental in fulfilling health and social care agendas (Gou et al., 2018). Aiello et al. (2010) explained two different components of residential environment quality as the objective characteristics of the neighborhood and the subjective perceptions of these. Similarly, Marans (2012) recognized that QOL has both an objective and subjective component and requires an understanding of both components individually and in relation to one another. In this study, the "objective conditions and subjective outcomes" approach was adopted. Accordingly, the landscape designs proposed by the students are analyzed mainly as objective and subjective characteristics. The data collected from the homework comprise design concepts, objective conditions (e.g., types of spaces or spatial components and types of activities), and subjective outcomes groups. Their explanations were evaluated and categorized by authors who are landscape architects and experienced lecturers in landscape design studios. In the second phase of the analysis, these main

groups were further categorized into subgroups in order to determine their contributing factors (Figure 1).

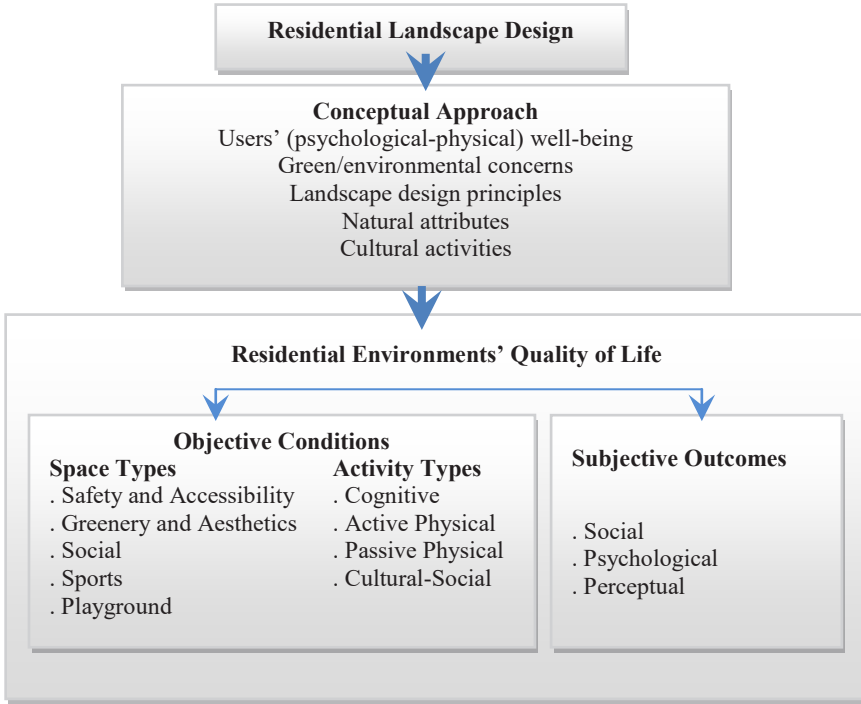


Figure 1. Data groups collected from documents in the study context.

Design concepts were classified into subgroups based on a previous study of conceptual approaches in landscape architecture as users' (psychological-physical) well-being, green/environmental concerns, landscape design principles, natural attributes, and cultural activities (Mumcu and Yılmaz, 2018). A classification of activity types was developed from the leisure activity types used by Nāsi et al. (2012), namely cognitive activities (e.g., reading, writing, painting), active physical activities (e.g., walking, swimming, exercise), passive physical activities (e.g., watching, sitting, resting, sunbathing), and sociocultural activities (e.g., open air cinema, concerts, dancing, parties, meeting with neighbors or friends). Subgroups were determined according to definitions prevalent in the literature. Analysis was performed using SPSS 23 software.

2.3. Definition of Design Area

Table 1: Data groups included in the study.

Students		N
Female		21
Male		11
Total		
Data Groups		N
Gender		32
Conceptual approach		32
Objective conditions	Space types	333
	Activity types	365
Subjective outcomes		100
Total		862

The developer's website publicized the project as follows: "We aim to create a living environment in which you'll live in pleasure" (URL1). The area is located on the periphery of the city center (20 km from the city center). The project area totaled 20,000 m² and included eight high-rise buildings with 128 condominiums. Fourteen thousand square meters (14,000 m²) of the area was reserved for green space. The estate developers declared on their website that the project brought a new perspective to the area with its unique landscape, social facilities, safety services, and social class (URL1). The area was given to students as not yet designed but they were free to make use of the features listed in the advertisements.

3. Results

A total of 862 data points were collected from 32 student projects (Table 1). Objective conditions were prioritized by students.

3.1. Conceptual Approaches

Nineteen conceptual approach types were identified within 32 explanations depending on the similarities in definitions. The most common ones were: return to green, green ecosystem (9.4%); water, water flow (9.4%); socialization, social sustainability (9.4%); tranquility and balance, peace, balance and harmony (9.4%); adventure (6.3%); art (6.3%); dynamic life, active life (6.3%); and movement (6.3%). Apart from these, students also expressed concepts

such as freedom; sustainability, sustainably green; leaf texture, leaf; reflection; linear continuity; connective landscape; rock garden; reflection; light; futurism movement.

Table 2: The classification of conceptual approaches to residential environments.

Conceptual Approaches	N	%
.Users' (psychological-physical) well-being (freedom; socialization; tranquility and balance, peace, balance and harmony; dynamic life, active life; movement, adventure)	11	34,4
.Green/environmental concerns (return to green, green ecosystem; sustainability, sustainable green; natural life, harmony with nature)	8	25,0
.Landscape design principles (colour, linear continuity, connective landscape, rock garden, light)	6	18,8
.Natural attributes (water, water flow; leaf texture, leaf; reflection)	5	15,6
.Cultural activities (Art, futurism movement)	2	6,3
Total	32	100,0

In the second stage, subgrouping of these concepts by the expert group was conducted. Accordingly, conceptual groups are determined as users' (psychological–physical) well-being (34.4%), green/environmental concerns (25.0%), landscape design principles (18.8%), natural attributes (15.6%), and cultural activities (6.3%; Table 2). A crosstab analysis was performed to determine the distribution of conceptual approaches into concept groups ($\chi^2 = 128,000$; 72 df, $p < 0.01$). According to this, students prioritized the health of residents when determining their conceptual approaches. The second group, “green/environmental concerns”, indicates that the health of the environment is also of importance to the students. The concepts in the “users' (psychological–physical) well-being” group are mainly focused on psychological and physical health and discussed issues such as urbanization and the repercussions incurred by urban life. Different approaches to the solutions to these problems were suggested. In the “green/environmental concerns” concept group, a human–nature relationship underpins the definitions; the need for harmony with nature and the need for change are emphasized. These messages, which complete each other in essence, are paralleled with discussions of current environmental issues.

The concepts in the “landscape design principles” group are focused on the basic design principles and elements, spatial components, and features

covered in landscape design; the definitions and strategies related to them are emphasized. The concepts in this group generally describe the spatial features to be reconstructed or replaced with design principles. The concepts in the “natural attributes” group attempt to define the new features of the design areas and the consequential psychological effects based on natural phenomena. Concepts in the “cultural activities” group are based on art and artistic trends and cultural activities.

3.2. Objective Conditions

3.2.1. Spatial Components and Types of Spaces

In the data collection phase, a total of 333 space definitions were identified. After grouping similar answers, 25 types of outdoor spaces were determined. The most frequently mentioned spaces are children’s playgrounds, game hillocks (10.5%); decorative pool, water channels, fountain, show pool, light water show (10.2%); seating, seating steps, under-tree seating area, relaxation area (8.1%); walking path, pedestrian system, roads designed for the disabled, circulation (7.8%); green hillocks, grass areas, vertical garden, fragrant garden, colourful garden (7.2%); cafe, outdoor or semi-indoor eating area (7.8%); swimming pool, child pool (6.0%); hobby garden, winter garden, orchard, vegetable garden, planting area (4.8%); and sports grounds, fitness area, volleyball/football/basketball court, exercise area, jogging track, tennis court, golf course (4.8%). Other spaces include beach, seaside; viewing platform, terrace; security, information unit, gate/controlled entrance; sunbathing area, outdoor studio; outdoor library, reading area ($\chi^2 = 201,309$; 24 df, $p < 0.01$). Classification of these answers into subgroups depended on functional similarities and five groups were determined as safety and accessibility (14.7%), greenery and aesthetics (24.0%), social (39.0%), sports (11.7%), and playground (10.5%).

Table 3: The classification of objective conditions/spatial components in proposed designs.

Spatial Components				
Safety and Accessibility (14,7%)	Greenery and Aesthetics (24,0%)	Social (39,0%)	Sports (11,7%)	Play Ground (10,5%)
<ul style="list-style-type: none"> . Gate / controlled entrance . Security and information unit . Pedestrian system . Traffic road . Roads designed for disabled . Circulation 	<ul style="list-style-type: none"> . Water show . Fountain . Color garden . Fragrance garden . Rock garden . Orchard . Green hillocks . Hobby garden . Vegetable garden . Vertical garden . Winter garden 	<ul style="list-style-type: none"> . Cafe, outdoor or semi-indoor eating area . Seating and resting equipment . Open theater . Beach . Picnic area . Viewing platforms . Barbecue . Outdoor library . Sunbathing . Outdoor studio 	<ul style="list-style-type: none"> . Swimming pool . Courts (Basketball, Volleyball, Tennis, Golf) . Fitness . Jogging Track 	<ul style="list-style-type: none"> . Children play Ground . Game hillocks

In order to determine the contents of each group, crosstab analysis was conducted ($\chi^2 = 1,323,002$; 96 df, $p < 0.01$; Table 3). It was observed that students paid attention mainly to the places that emphasized the social aspects, followed by greenery and aesthetics, then safety and accessibility groups.

3.2.2. Types of Activities

Table 4: The classification of objective conditions/activity types in proposed designs.

Activity types			
Active physical activities (52,3%)	Passive physical activities (23,6%)	Cultural-social activities (12,9%)	Cognitive activities (11,2%)
<ul style="list-style-type: none"> . Walking, hiking . Food and beverage consumption, barbecue . Wall-climbing . Jumping . Sports . Swimming . Playing, children play . Water shows, playing with water, walking in the water, interacting with water . Fishing . Cycling . Jogging .Sailing boat 	<ul style="list-style-type: none"> . Sitting/resting . Lying, sunbathing . Viewing, watching . Watching the sunset, watching the landscape-view . Listening to water flow 	<ul style="list-style-type: none"> . Neighborhood, gathering, party, cohesion, cultural sharing, entertainment, socialization, spending time together . Singing, musical recital, playing guitar . Chatting . photographing . Dancing . Meeting 	<ul style="list-style-type: none"> . Growing plant, growing fruits-vegetables . Security, feeling safe, control . Art and craft-skill activities . Reading . Yoga / meditation

Students defined 365 activities in their design propositions. Depending on similarities, these definitions were grouped into 40 total activity types. The most frequently mentioned activities are sitting/resting (8.8%); walking, hiking (7.4%); neighborhood gathering, party, cohesion, cultural sharing, entertainment, socialization (7.1%); water shows, playing with water, walking in the water, interacting with water (6.6%); playing games, children's play (6.3%); food and beverage consumption (6.3%); viewing, watching (6.3%); lying, sunbathing (5.8%); and swimming (pool), swimming (sea) (5.8%). Other activities included growing plants, growing fruits or vegetables; jumping; singing, musical recital, playing guitar; dancing; fishing; cooking/eating, barbecue, picnic; chatting; photographing; cycling; art and craft-skill activities; reading; watching the sunset, watching the landscape/view; listening to water flow; and yoga, meditation. In the second stage of the analysis, the data were

categorized into subgroups according to activities' cognitive, physical, or social aspects. Therefore, the activity groups prioritized by the students and the content of these groups can be reasonably discussed. Accordingly, active physical activities (52.3%) were prioritized to a significant degree, followed by passive physical activities (23.6%). Sociocultural activities (12.9%) and cognitive activities (11.2%) came after these (Table 4). The statistical results showed that the activities that were emphasized in the students' designs are aimed primarily at enhancing physical activity ($\chi^2 = 1,085,170$; 117 df, $p < 0.01$).

3.3. Subjective Outcomes

A total of 100 definitions were collected. Groupings of similar answers resulted in 22 total types of subjective outcomes. The most frequent definitions were relaxing, feeling peaceful, finding peace, getting away from stress (21%); cohesion, sharing, socialization, interaction, communication, neighborhood, togetherness, sharing life, social bond (13%); therapeutic, healing, recreation, restoring, feeling good, being physically and mentally healthy (8%); mobility, dynamism (6%); integrating with nature, in touch with nature, harmony with nature (6%); and consistency, balance, harmony (6%).

Other subjective outcomes included continuity; vitality, energy; fun; feeling special, personal expression, respect; creativity, imagination; colorful, calm, calmness; cleanliness; mental satisfaction; being away from noise, away from the city; comfortable, high QOL; happiness, aesthetic, inviting; freedom, acting according to own wishes, social equity, and integrating into urban life, amongst others ($\chi^2 = 101,520$; 21 df, $p < 0.01$).

In order to understand the dimensions and distributions of these subjective outcomes, a second grouping was performed by the expert panel. The sentences referring to social interactions were grouped as social whereas sentences referring to psychological health and well-being were grouped as psychological and, finally, sentences referring to perception of various spatial attributes were grouped as perceptual. Accordingly, the subjective outcomes pointing to the psychological aspect of the users were the most frequently emphasized (68%), these were followed by outcomes that pointed to the social aspect (20%) and those pointing to the perceptual aspect (12%; $\chi^2 = 152,105$; 42 df, $p < 0.01$; Table 5).

Table 5: The classification of subjective outcomes in proposed designs.

Subjective Outcomes		
Social (20%)	Psychological (68%)	Perceptual (12%)
<ul style="list-style-type: none"> . Togetherness . Sharing . Communication . Socialization . Vitality . Interaction . Cohesion . Utility . Fun . Feeling special, personal expression, . Respect . Social equity . Integrating into urban life 	<ul style="list-style-type: none"> . Safety . Peace . Relaxing . Well-being . Tranquility . Privacy . Happiness . Comfortable . Pleasure . Escape . Freedom . Harmony with nature . Dynamism . Energy . Therapeutic, recreation, . Being physically-mentally healthy . Mental satisfaction . Calmness 	<ul style="list-style-type: none"> . Naturalness . Beauty . Colorful . Distinctness . Continuity . Cleanness . Aesthetic . Inviting

4. Discussion

One of the most common strategies utilized within housing markets is to maximize the benefits imparted from landscape designs and emphasize the design's important contributions to the lifestyles of its users—particularly to their health. Landscape architects are expected to implement innovative and creative approaches for today's ever-changing lifestyles. In this study, to understand the tendencies of landscape architecture students—future designers of living environments—with respect to prospective lifestyle landscapes is aimed. Various data from students' descriptions of their design for the proposed residential environment led to the undertaking of a multidimensional approach. Using the QOL indicator, students' design approaches, objective conditions of the spaces they proposed, and their subjective outcomes were considered. Students' conceptual approaches to the design of the proposed residential environment were shown to emphasize the health and well-being of the intended

users. In doing so, students often articulated how their designs would positively affect the psychological and physical health of users and how they can transform the negative effects of urban life into positive ones. The fact that open spaces are positively associated with health (Ding and Gebel, 2012; Hunter et al., 2015; Koohsari et al., 2015, 2018; McCormack et al., 2010; Mohd Shahli et al., 2014; Villanueva et al., 2015; Wood et al., 2017; Zhang et al., 2015) supports students' approach as providing a health impact by their design. However, in their conceptual explanations, it was observed that students focused on the relationships between the open space characteristics, the activities, and health in a superficial manner, mainly focusing on psychological problems such as stress or mental fatigue caused by urban life. This revealed that students require a deeper, more scientifically grounded understanding of various subjects such as obesity, cardiovascular health, allergies and respiratory diseases, and healthy development, amongst others. Thus, students should be encouraged to refine their decisions that address health problems while conceptualizing the spatial components and their properties. Students' emphasis on concepts related to environmental concerns was also considered to be a positive tendency. Students' sensitivity to individual and public health and the health of the planet, which are the most important determinants of today's lifestyles, was revealed.

Descriptions of types of spaces and types of activities that students included in their designs were also discussed in this study. McCormack et al. (2010) addressed how amenities such as barbecues, seating, water fountains, picnic tables, and shade-providing devices can encourage the use of open spaces. Koohsari et al. (2015) determined that safety, aesthetics, amenities, maintenance, proximity, spaces with different functions (e.g., a walking and/or cycling route, a wooded area, a water feature, a pleasant view, a bike rack, or a parking lot for cars, etc.) are important attributes for fostering physical activity. Depending on the source, the main groupings of space types were determined as safety and accessibility, greenery and aesthetics, social, sports, and playground. Social spaces, which were the most frequently cited group of space types, mostly consisted of spaces shared with neighbors and family members, supporting socialization or cultural/individual development. Students perceived open spaces as a means of strengthening social ties and communication between users, and research indicates that open spaces, especially neighborhood areas, positively affect and enhance social interaction (Koohsari et al., 2018; McCormack et al., 2010; Park and Kim, 2017; Villanueva et al. 2015; Wood et al., 2017), which aligns with the students' tendencies observed in this study. The importance of

opportunities to socialize in safe and supportive social environments, which is a protective factor for mental well-being, is detailed elsewhere (Wood et al., 2017; McCormack et al., 2010).

Students also referred to the fact that spending time together with friends and family positively influences psychological health. Kwon and Kim (2017) state that, with the emergence of post-materialism within the creative class, a tendency to focus on real values of life and happiness has also begun to emerge. People desire to feel a sense of “being together” and sharing their spaces at home. Therefore, supporting a lifestyle that emphasizes communication and interaction by opening and connecting the spaces more actively is suggested (Kwon and Kim, 2017). Sharpe et al. (2018) state that the traditional public health emphasis on the type and quality of housing has broadened to include concepts such as the neighborhood, community, and specific house location. Such an approach is believed to contribute concurrently to health, well-being, equity, and environmental sustainability (Sharpe et al., 2018). This confirms the need for emphasizing spaces of socialization and sharing in residential outdoor spaces. The emphasis given by landscape architecture students on social open spaces are in accordance with these expectations about modern lifestyles.

Greenery and aesthetics were another group of spaces that students frequently mentioned. Emphasis on green areas and natural features such as plants, water elements, and topography in open spaces generally followed the statements about positive contributions of natural environments to human health. Similarly, Koohsari et al. (2018) determined that those who relocated to a neighborhood with more green space showed significant mental health improvements compared to those who relocated to a neighborhood with comparatively less green space. Sharpe et al. (2018) suggest that achieving more livable neighborhoods should encompass the provision of improved quality of the natural environments and access to “green space” and/or “blue space”, which help to promote human health and well-being. Another one of the students’ emphasis on green and water elements was its aesthetic aspect. Similarly, McCormack et al., (2010) defined aesthetics as an important factor for various users and determined that the presence of trees and bushes, gardens, grass, flowers, natural settings, and water features were positive attributes. Additionally, air quality and the presence of distinctive smells were defined as contributors to aesthetics. In this context, students’ emphasis on the green areas of various amenities such as fragrance gardens, colourful gardens, vertical gardens, and water features of various characteristics must be supported in design studios.

Considering the types of activities proposed by students in their designs, it was determined that physical activities (active and passive) were highly valued. Depending on the specific repercussions of sedentary lifestyles on health outcomes (Howden-Chapman et al., 2017), promoting regular physical activity has become a public health priority worldwide (Koohsari et al., 2013). For a healthy lifestyle, the importance of supporting the use of physical activity programs and physical features of the built environment for increasing physical activity was also declared (Hunter et al., 2015). In accordance with this information, students' tendencies were defined as predominantly positive. However, students can be informed more deeply about the approaches and practices on this issue, such as active design. Making daily physical activity more available and appealing through architecture and urban planning is defined as "Active Design", which is a deliberate strategy to improve health outcomes (Tannis et al., 2019). In addition, the presence of cultural and cognitive activities in the findings was also important. Depending on the lifestyles of our era, people—even if not directly employed in creative fields—typically engage in a wide range of hobbies related to art and culture (Kwon and Kim, 2017). According to Kwon and Kim (2017), such aspects must be taken into consideration in the sustainability of housing cultures, which may provide a foundation for true happiness that can overcome alienation from everyday life.

The emotional experiences the students planned to convey to the users through their designs were discussed in the context of subjective outcomes. Accordingly, students frequently listed experiences and qualities such as relaxing, peace, cohesion, interaction, communication, neighborhood, healing, recreation, physical and spiritual well-being, mobility, integration with nature, and balance and harmony as aims within their designs. These largely overlap with consistently reflected experiences in the definition of lifestyles in housing advertisements in Turkey. A significant difference between the lifestyle offered by students and the actual housing market is that no proposal from students included subjective outcomes such as exclusivity or prestige. Rather, students place more importance on the positive contributions conferred to users' health rather than the favorable image they would garner.

5. Conclusions

Residential open spaces where the activities that characterize lifestyles take place are often discussed in relation to topics such as healthy living, environmental sensitivity, and sustainability. Contrary to the numerous deleterious effects of urbanization, the wide range of benefits proffered to citizens

by residential open spaces, such as the contribution to participation in physical activity and the support of the establishment of social bonds, directly affect the health of individuals and the greater public. Therefore, the design of residential open spaces is gaining importance and attention. In this context, determining the tendencies of design students was undertaken to propose appropriate interventions to the relevant education programs. Students' intention to offer positive contributions to the physical and mental health of users through the open spaces they designed is found to be a positive aspect. However, it was also revealed that they require a deeper understanding of the complex relationships between open spaces and health outcomes. They are also encouraged to be more informed of alternative design approaches and strategies such as active design. These subjects can be addressed both by the guidance of project advisors and/or by a broader range of elective courses from which to choose.

An important limitation of this study is the singular technique employed in the research design that relied on documents about student designs and the data extracted from them. Although this method provided affordances for a multidimensional discussion, issues such as the students' own thoughts on this subject, the reasons behind their tendencies, or how they expected to be supported in design studios are not addressed by this technique. The tendencies identified within the scope of this study may have been influenced by students' advisors or students' personal backgrounds and lifestyles; such potential biases should be addressed in future studies. Another limitation may be the procedure of content analysis itself. It should be known that there is no clear-cut distinction between the groups despite their being determined by a group of experts in the field. The original advantage of this study is its emphasis on understanding and supporting environmental design students' tendencies in this ever-expanding field of research.

References

- Aiello, A., Ardone, R.G., Scopelliti, M. (2010). Neighbourhood planning improvement: Physical attributes, cognitive and affective evaluation and activities in two neighbourhoods in Rome. *Evaluation and Program Planning* 33, 264–275.
- Alyakut, Ö. (2017). The changing homes in postmodern society: Semiological examination of house advertising that promise new life style. *Communication and Theory Research* 44, 244–263. (In Turkish)
- Bruns, D., Ipsen, D., Bohnet, I. (2000). Landscape dynamics in Germany. *Landscape and Urban Planning* 47, 143-158.

Capolongo, S., Rebecchi, A., Dettori, M., Appolloni, L., Azara, A., Maddalena Buffoli, M., Capasso, L., Casuccio, A., Oliveri Conti, G., D'Amico, A., Ferrante, M., Moscato, U., Oberti, I., Paglione, L., Restivo, V., D'Alessandro, D. (2018). Healthy design and urban planning strategies, actions, and policy to achieve salutogenic cities. *International Journal of Environmental Research and Public Health* 15, 2698.

Chaney, D. (1996). *Lifestyles*. Routledge, London, UK.

Ding, D., Gebel, K. (2012). Built environment, physical activity, and obesity: What have we learned from reviewing the literature? *Health & Place* 18, 100–105.

Erdinç, S.Y., Öymen Gür, Ş. (2017). A research on 'rezidans' culture: The case of İstanbul. *Journal of Near Architecture* 1, 68–90. (In Turkish)

Fleischer, F. (2007). "To choose a house means to choose a lifestyle." The consumption of housing and class-structuration in urban China. *City & Society* 19, 287–311.

Garip, S.B., Şener, H. (2012). Analysing environmental satisfaction in gated housing settlements: A case study in İstanbul. *ITU Journal of Faculty of Architecture* 9, 120–133.

Gause, J., Franko, R. A., Heid, J. J., Kellenberg, S., Kingsbury, J., McMahon, E. T., Schweitzer, J. G., Slone, D. K. (2007). *Developing sustainable planned communities*. Urban Land Institute: Washington D.C., USA,

Gençyürek Erdoğan, M. (2014). Construction of lifestyles in tourism advertisements: Semiological method. Master Thesis, Başkent University, Ankara. (In Turkish)

Gou, Z., Xie, X., Lu, Y., Khoshbakht, M. (2018). Quality of life (QoL) survey in Hong Kong: Understanding the importance of housing environment and needs of residents from different housing sectors. *International Journal of Environmental Research and Public Health* 15, 219.

Howden-Chapman, P., Roebbel, N., Chisholm, E. (2017). Setting housing standards to improve global health. *Journal of Environmental Research and Public Health* 14, 1542.

Hunter, R.F., Christian, H., Veitch, J., Astell-Burt, T., Hipp, J.A., Schipperijn, J. (2015). The impact of interventions to promote physical activity in urban green space: A systematic review and recommendations for future research. *Social Science & Medicine* 124, 246–256.

Koohsari, M.J., Badland, H., Giles-Corti, B. (2013). (Re)Designing the built environment to support physical activity: Bringing public health back into urban design and planning. *Cities* 35, 294–298.

Koohsari, M.J., Mavoa, S., Villanueva, K., Sugiyama, T., Badland, H., Kaczynski, A.T., Owen, N., Giles-Corti, B. (2015). Public open space, physical activity, urban design and public health: Concepts, methods and research agenda. *Health & Place* 33, 75–82.

Koohsari, M.J., Badland, H., Mavoa, S., Villanueva, K., Francis, J., Hooper, P., Owen, N., Giles-Corti, B. (2018). Are public open space attributes associated with walking and depression? *Cities* 74, 119–125.

Kwon, H., Kim, S. (2017). Variation in the characteristics of everyday life and meaning of urban housing due to the transition of social structure: Focusing on articles published in lifestyle magazines. *Sustainability* 9, 1298.

Lyons, G., Mokhtarian, P., Dijst, M., Böcker, L. (2018). The dynamics of urban metabolism in the face of digitalization and changing lifestyles: Understanding and influencing our cities. *Resources, Conservation & Recycling* 132, 246–257.

Maas, J., van Dillen, S.M.E., Verheij, R. A., Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & Place* 15, 586–595.

Marans, R.W. (2012). Quality of urban life studies: An overview and implications for environment-behaviour research. *Procedia-Social and Behavioral Sciences* 35, 9–22.

McCormack G.R., Rock, M., Toohy, A. M., Hignell, D. (2010). Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. *Health & Place* 16, 712–726.

Mohd Shahli, F., Mohd Hussain, M.R., Tukiman, I., Zaidin, N. (2014). The importance aspects of landscape design on housing development in urban areas. *APCBEE Procedia* 10, 311–315.

Mumcu, S., Düzenli, T., Tarakci Eren, E. (2018). The role of landscape design in formation of life-styles represented through housing estates. In *Proceedings Book, IX. IBANESS Congress Series*, Edirne, Turkey, September 29-30, 2018, Dimitar Kirilov Dimitrov, Dimitar Nikoloski, Rasim Yilmaz eds., Edirne, Turkey, pp. 761–770. (In Turkish)

Mumcu, S., Yilmaz, S. (2018). Examining sources of inspiration in the conceptual design of landscape architecture. In *Recent Researches in Science and Landscape Management*, Efe, R., Zencirkiran, M., Curebal, İ. (Eds.), Cambridge Scholars Publishing, Newcastle upon Tyne, UK., pp. 30–43.

Näsi, M., Räsänen, P., Sarpila, O. (2012). ICT activity in later life: Internet use and leisure activities amongst senior citizens in Finland. *European Journal of Ageing* 9, 169–176.

Nikezić, A., Marković, D. (2015). Place-based education in the architectural design studio: Agrarian landscape as a resource for sustainable urban lifestyle. *Sustainability* 7, 9711–9733.

Özkan Töre, E., Kozaman Som, S. (2009). Gated communities in the socio-spatial segregation process: The Istanbul case. *Megaron* 4, 121–130. (In Turkish)

Park, Y., Kim, H.W. (2017). The cross-level impact of landscape patterns on housing premiums in micro-neighborhoods. *Urban Forestry & Urban Greening* 24, 80–91.

Saral Güneş, S., Kükreçer Aydın, Ö. (2016). The presentation of luxury lifestyles on decoration magazine advertisements within the frame of consumption culture: Example of home art decoration magazine. *Journal of Yasar University* 11, 220–239. (In Turkish)

Sharpe, R.A., Taylor, T., Fleming, L.E., Morrissey, K., Morris, G., Wigglesworth, R. (2018). Making the case for “whole system” approaches: Integrating public health and housing. *International Journal of Environmental Research and Public Health* 15, 2345.

Sommer, R., Sommer, B. (2002). *A practical Guide to Behavioral Research, Tools and Techniques*, 1st ed., Oxford University Press: New York, USA.

Şentürk, Ü. (2012). A Place that free times institutionalized in the context of consumer society: Malls (AVM). *Pamukkale University Journal of Social Sciences Institute* 13, 63–77. (In Turkish)

Tannis, C., Senerat, A., Garg, M., Peters, D., Rajupet, S., Garland, E. (2019). Improving physical activity among residents of affordable housing: Is active design enough? *International Journal of Environmental Research and Public Health* 16, 151.

Uysal, M., Baran Atalay, F.N. (2017). An analysis of spatial change/transformation of houses as items of consumption over advertisements: The process of housing cooperatives. *Journal of Social and Humanities Sciences Research* 4, 2107–2116. (In Turkish)

Villanueva, K., Badland, H., Hooper, P., Koohsari, M.J., Mavoa, S., Davern, M., Roberts, R., Goldfeld, S., Giles-Corti, B. (2015). Developing indicators of public open space to promote health and wellbeing in communities. *Applied Geography* 57, 112–119.

Wei, X., Huang, S.S., Stodolska, M., Yu, Y. (2015). Leisure time, leisure activities, and happiness in China, *Journal of Leisure Research* 47, 556–576.

Wood, L., Hooper, P., Foster, S., Bull, F. (2017). Public green spaces and positive mental health – investigating the relationship between access, quantity and types of parks and mental wellbeing. *Health & Place* 48, 63–71.

Yılmaz, S., Düzenli, T., Mumcu, S. (2016). Assessing urban green areas in terms of user satisfaction: Case study of Trabzon City. *Journal of Balkan Ecology* 19, 275–290.

Zhang, L. (2010). *In Search of Paradise: Middle-Class Living in a Chinese Metropolis*. Cornell University Press: Ithaca, NY, USA.

Zhang, W., Yang, J., Maa, L., Huang, C. (2015). Factors affecting the use of urban green spaces for physical activities: Views of young urban residents in Beijing. *Forestry & Urban Greening*, 14, 851–857.

Zhou, J.Y., Huang, X. (2016). Aspects of lifestyle change in China: Motivations for self-drive travel—a Chinese domestic market perspective. *Journal of Travel & Tourism Marketing* 33, 912-928.

URL1-Orna Park Residence. Available online: <http://www.ornaparkresidence.com/ozellikler/> (accessed on 20 February 2018).

CHAPTER III

A THEORY OF EVALUATING LANDSCAPE DESIGN: ULRICH'S SUPPORTIVE DESIGN THEORY

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1. Introduction

There are many different definitions and approaches to the concept of design. According to many researchers, design is a problem-solving process, according to some researchers it is a decision-making process, and according to others, it is a trial-and-error process. But in its most basic definition, design is to visualize, shape or create a plan that is animated in the mind by producing a plan or sketch. It is a mental project or scheme in which the steps that prepare a result are revealed (Düzenli et al., 2018; Bayazıt, 1994).

It is planned to benefit from design and design stages in many disciplines and fields of study. In particular, human-nature, human-dwelling, etc., such as architecture, urban and regional planning, map engineering and landscape architecture. Thinking independently of design in professional disciplines involving interactions leads to wrong analysis. Especially in this age, design constitutes the basic stages of many professional groups and the foundations of their main courses in their education. Landscape architecture; It is a discipline that adopts design and design criteria because it contains the elements that make up urban and rural life.



Figure 1. Behance - Aleksandra Lesish (2013)(URL-1)

The content and context of the concept of landscape differ within the framework of the perspective and specialization of the person who deals with the concept. The most accepted definition of landscape is made in the European Landscape Convention (Council of Europe 2000). According to this convention, landscape means “an area, as perceived by humans, whose character is the result of the action and interaction of natural and/or human elements” (Council of Europe 2000).

Landscape designs are now becoming one of the indispensable elements of today. The importance of landscape designs is seen in the areas built or restored in line with both the needs for green areas and the demands for recreational areas. Unplanned urbanization (unplanned construction), cities that have become concrete (cities that have lost their green texture), wrong plantings, etc, The basis of all the problems seen are due to the projects organized with a planning away from the design phenomenon.

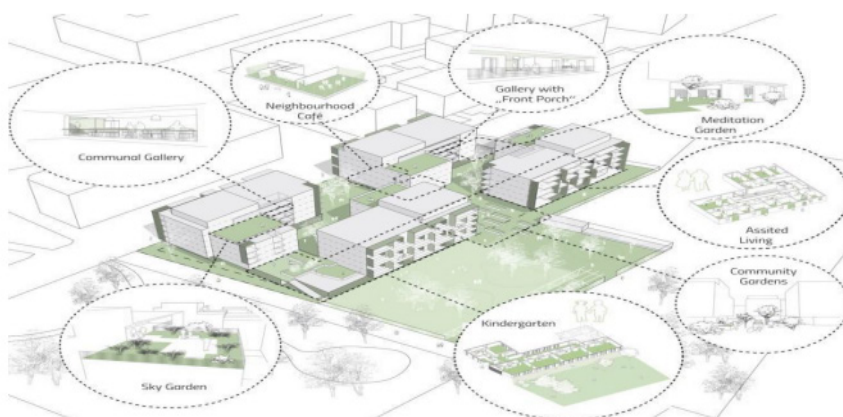


Figure 2. Arch Daily two+plus (2018)(URL-2)

Landscape design; It carries out urban design and urban renewal studies covering some or all of the urban settlements. It designs, implements and maintains the green areas open to the public (parks, squares, recreational areas, pedestrian paths and zones, coastlines, botanical gardens, zoos, playgrounds, playgrounds, sports fields, parking lots, etc.). It carries out plant and structural design, application and maintenance works in mass housing areas and public use environments (university campuses, shopping malls, collective workplaces, etc.). It makes the structural and herbal design of tourism and recreational facilities, entertainment facilities (amusement parks, aquaparks, etc.) and coastal areas recreation facilities, designs, implements and maintains agricultural farms and hobby gardens.

2. Theories for Evaluation of Landscape Design

Many professional disciplines benefit from design in order to find answers to needs and requests. Landscape architecture education is also about decision making, land shaping, spatial arrangement and organizing human activities (Rodiek and Steiner, 1998). For this reason, as in many professional disciplines, theories and theories are supported in the evaluation, design and analysis phase in landscape architecture.

Visual perception, psychological well-being, functionality, aesthetic approaches, human needs, etc. Theorems and theories are formed by considering the values. Within the scope of the study, information processing theory, Gestalt theory, Visual Domination Theory and Possibility theory were examined and Ulrich's evaluations within the scope of Supportive Design Theory were aimed.

2.1. Information Processing Theory

Kaplans assume that the perceptual process involves extracting information from one's environment (Kaplan et al., 1989). This approach includes a further division of understanding and discovery, including the concept of whether information is brought to the scene with a two-dimensional or three-dimensional view (Alpak et al., 2016; Kaplan et al. 1998).

They identified consistency and readability as two, predictive variables that help one understand the environment, while complexity and mystery encourage exploration of the environment as two predictive.

Consistency;

It is the degree to which the integrity of the space is or the level of predictability of other parts of the scene with the repetitive elements and textures

carried by a part of the scene (Kaplan and Kaplan 1989). When the approach in this theory is examined, it is seen that the areas defined as consistent are more regular. In this way, it is assumed that people can more easily comprehend and read the consistently defined areas. Consistency can be increased with some recurring themes and unifying textures. A limited number of contrasting textures are also helpful (Kaplan et al., 1998).

Complexity;

It is the situation that provides the opportunity to get more information when looking at the photograph (Kaplan and Kaplan 1989). Complexity is the variety of elements in the environment. Wide-open apertures, by contrast, are of low complexity. Regardless of the arrangement of the elements used, it can also be described as the diversity of components in the space. More richness or diversity encourages exploration in landscapes (Alpak et al., 2016; Kaplan et al., 1998).

Legibility;

It is the state of being able to know where one is or to find one's way back (Kaplan and Kaplan, 1989). While in legit space, one can imagine finding their way not only on their way to a place, but also on their way back. A prominent area or a single landmark provides more direct navigation. (Kaplan et al., 1998). While examining the concept of legibility, the most distinctive feature is that the space examined leaves a lasting impression and is decisive (Alpak et al., 2016).

Mystery;

When looked at, it is the hope that one can find more things when one goes further in the space in the photograph (Kaplan and Kaplan, 1989). The concept of mystery is the desire of the user to explore the place he is in. The vegetation, which hides some of what is behind it, invites the visitor to take a look (Kaplan et al., 1998). Believing that the user can find something in the space and the desire to progress in the space increases the use and also supports memorability.

2.2. Gestalt Theory

Gestalt Theory influenced architects and environmental designers more than other perception theories and helped to understand the aesthetic perception of the environment (Lang, 1987). Gestalt theory discusses how we perceive objects in our environment and deals with the relationship between a whole composition and its parts. According to Gestal theory, the whole means more

than the elements that make it up. Because one perceives not the elements, but the composition they create. Therefore, the focus of Gestalt Theory; grouping and shape-ground perception (Yılmaz et al., 2018).

According to Gestalt theory, a well-organized form is perceived as a shape according to the background (ground) formed by all natural and artificial elements around it. When the “form” feature is strengthened, aesthetic appreciation and pleasure begin (Lang, 1987). In this context, Gestalt psychologists explain the factors affecting the perception of form (Zusne, 1970; Koffka, 1999) and how to group visual elements to express unity (Reardon, 2004).

- Proximity; Items that are close together are perceived as a group.
- Similarity; If the elements that make up an organization have similar qualities in terms of size, shape, color and texture, they form a group.
- Closeness; Although parts of previously known objects are missing, the mind completes it and perceives it as a whole.
- Common way; In the composition of elements moving in many directions, forms that tend towards the same direction are perceived as a whole.
- Continuity; Items that are similar and move in the same direction tend to group together.

The psychological organization of a visual composition incorporating these principles is defined as “good” (a feature defined by form, not a state evaluated). Good forms include features such as harmony, order, similarity, closeness, and simplicity. Environments containing these traits are considered “regular” and “easily perceived”. These environments contain “unity” (Reis and Lay, 2010) and this is very important for both formal aesthetics and visual perception. Good environment and good form, which are put forward by Gestalt Theory, are also accepted by most designers (Lang, 1987).

2.3. Prospect-Refuge Theory

Appleton (1998) argues that people are motivated to perceive their environment in order to acquire and store environmental information in a way that they can use effectively and quickly when they need to ensure their life chances. Prospect-Refuge Theory evaluates the visual protection provided by the point of view and the width of the view that can be seen from the location.

This theory proposes that a landscape can offer opportunities such as seeing, hiding, escaping, exploring, and acquiring environmental information

symbolically. In this theory, which is well known in terms of environmental aesthetics, aesthetic evaluation is described as a process in which attention is focused on environmental features that are useful in meeting simple biological needs and needs related to survival (Mumcu, 2009).

2.4. Affordance Theory

Gibson (1986), in his study titled “The Ecological Approach to Visual Perception”, examined visual perception from an ecological perspective and presented an approach quite different from the classical perception theories. Two views lie at the heart of Gibson’s Theory of Possibility; That the organism is inseparable with its environment and that the organism directly perceives information in an environment without mental processes alone.

This theory is based on the interdependence between people and their environment, in other words, on the ecological perspective (Heft, 2001). “The opportunities provided by the environment are the beneficial or harmful things it offers to the organism. This word refers to something that refers to both the individual and the environment. It refers to the complementarity of the individual and the environment” (Gibson, 1986).

In other words, affordances are the opportunities or dangers that physical, social and psychological characteristics present for people. However, their perception occurs when the individual’s different characteristics such as physical aspects or abilities, social needs and personal goals overlap with the environmental characteristics of the location (Kyttä, 2004). Because individuals perceive not all the opportunities provided by the environment, but an opportunity that has functional importance and appropriateness for them (Düzenli et al., 2012; Withagen and Michaels, 2005). Moreover an environmental feature can be seen as different possibilities for different functions, depending on the person’s characteristics and needs (Heft, 1997). When evaluated from this point of view, the importance of the diversity of the features of the space components and elements used in urban open spaces emerges. In response to the diversity in the characteristics and needs of outdoor users, the features of open spaces should also provide diversity. Thus, people can evaluate spatial features that are suitable for their characteristics and correspond to their expectations. In summary, people read the possibilities around them in two ways:

1. According to their needs (using spatial components in accordance with the possibilities offered)

2. For their personal characteristics (social and emotional needs, cultural structures, creativity, abilities).

Within the scope of the studies carried out in this direction, the opportunities that urban open spaces provide to people of different ages are evaluated in two aspects: objective opportunities and subjective opportunities. Objective possibilities are the potential possibilities created by the spatial components that the designer brings to the environment for the activities he thinks for the user. Subjective possibilities, on the other hand, are the possibilities that arise in relation to the creativity and skills of people in using the components of space (Düzenli et al., 2019; Düzenli et al., 2012).

3. Ulrich's Supportive Design Theory

The main starting point of Ulrich's supportive design theory is stress management. This theory aims to reduce the stress level in health facilities and to control the stress level in space arrangement and design. When we look at the concept of stress as a definition, it is defined as the reaction of the body against the deterioration of the psychological or physical balance of the individual. In line with this definition, it is observed that stress directly affects the psychological well-being of individuals and their reactions to their environment.

A space is shaped by the social, physical and cultural structure of the individual and is limited by the limit of the individual's active bond with his environment. At this point, Ulrich's Supportive Design Theory emphasizes the importance of the built environment on human health. Ulrich states that architectural parameters are very effective on the health and well-being of the people who use the space, as a result of the research on the relationship between space and human health, especially in health buildings (Ulrich, 1991).

One of the main guiding principles of supportive design theory is the ability of the environment to efficiently promote improved health outcomes by removing stressors in the environment that often have adverse effects on outcomes, such as loud noise (Ulrich, 2000).

According to Ulrich, the design of the space to be designed by correctly identifying the needs of the user shows that stress can also be reduced by environmental factors by reducing stress reactions and increasing well-being for the users, and even can be prevented by providing a positive effect. In this way, well-being can be supported at both the subjective and objective level.

According to Ulrich's Supportive Design Theory, it should contain 3 main components in order to control stress level and support well-being;

1. Sense of Control
2. Social Support
3. Positive Distractions

3.1. Sense of Control

Carver et al (2000) define control as the actual or perceptual ability to know what one is doing, to control one's own situation, and to determine the impact of other people's actions and perceptions of them. Various studies have shown that people who feel they have some control over situations have greater results in their ability to cope with stress than those who feel a lack of control (Lazarus and Folkman, 1984; Schwarzer, 2014; Ulrich, 1984).

Considering today's conditions, every individual encounters more stress due to his social and business life. This has led to an increase in the desire of individuals to control the spaces they are in.

Supportive Design Theory; It shows that people have a strong need for control over the environment and situations, and a corresponding need for self-efficacy. Many studies have found that lack of control is associated with negative outcomes such as depression, passivity, high blood pressure, and decreased immune system function. Uncontrollable situations or conditions are often odious and stressful. As an everyday example, music that can be heard on the wall of a neighbor's apartment is likely to be perceived as stressful noise; however, the same music one chooses to play in one's own apartment at much higher decibel levels is perceived as positive. As this example suggests, a consistent finding in stress research has been that if a person has a sense of control over a potential stressor, the negative effects of the stressor are significantly reduced or even eliminated (Ulrich, 1991).

Stress caused by lack of control can be reduced with psychologically supportive design and design strategies that foster a sense of control. Lack of privacy and designs that do not allow access are among the reasons why individuals do not feel a sense of control in the spaces they use. Each individual wants to create psychologically certain access opportunities and areas where they feel safe in the spaces they enter.

Accessible designs support discovery and learning, while at the same time reducing the stress levels of individuals, they also create opportunities for use.

Designs that provide privacy, on the other hand, make individuals feel more comfortable, psychologically free and more original, while reducing their stress levels and increasing the potential for use of these spaces both individually and collectively.

Even if designers provide space designs that are convenient for access and provide privacy while making space arrangements, they also need to add elements that individuals can control themselves in support of this. He should create designs that allow him to direct certain space components according to his own wishes. And also; Designs should be made that the user can use the climatic data effectively indoors and outdoors, and it should be ensured that the user also takes the climatic data under control.

3.2. Social Support

Even if each individual needs to be alone, there is a state of being a part of a whole by nature. He realizes this situation with his family, friends, close and distant environment. Needs social support for acceptance, approval and self-actualization.

Looking at the literature, social support took its place in the literature in the 1970s. In his article, Cassel (1976) mentions the effect of social environment and social support on the individual's ability to cope with stress and negative situations. Cassel emphasized the importance of psycho-social processes for the continuation of human health. According to Pfingstmann (1987), social support is the help that is ready to use from the people with whom the individual is in contact (spouse, family, friends, neighbor, coworkers, religious official) especially in difficult times when he or she needs support.

Lin (1986), on the other hand, dealt with social support in two dimensions in connection with the theory of social capital; instrumental support for a specific purpose, such as finding a job, lending money, finding a babysitter, semantic support is the sharing of feelings in relationships, discussing problems, discussing different problems and at the same time it is valued in relationships, which House describes as emotional support and self-evaluation support. It includes some support such as seeing.

In his theory, Ulrich states that human beings are social creatures and that being in an active relationship with other people will have a positive effect on the level of stress (Ulrich, 1991).

While being in interaction reduces the stress level of individuals, it also creates spaces that are suitable for social access. The most important point that

designers should pay attention to when designing spaces that promote social support should be the border between social access and privacy. Space arrangements that encourage social contacts but deny privacy will increase the stress level. In this context, Ulrich stated that it is not possible to make spatial arrangements by separating the components of control and social support from each other.

3.3. Positive Distributors

According to Ulrich's theory; The presence of some positive distractions in the use of the space will reduce the stress level of the space user and will enable the user, who is closed for long periods, to use his time more effectively. In this context, it is very important to use positive distractors in the right place and at the right frequency. For example, high levels of distracting factors such as sound, intense light, and multi-colored light may disturb the user. Of course, using these factors less than necessary will cause diseases such as depression. In summary, the lack of positive distractions in the environment makes people more anxious and stressed (Wohlwill 1968; Ulrich, 1991).

At the beginning of the positive distractions are landscape areas that are integrated with the space. In order to strengthen the effect of well-being in the space, the relationship between indoor, semi-open space and open space should be established correctly. This relationship should be continuous in summer and winter, the plant type, reinforcement element, ground element, water surface etc. to be selected in the landscape area. With the landscape components, the user of the space should be kept away from stress. At the same time, climatic data should be used in this way, the controlled intake of daylight into the space and the creation of sunbathing opportunities in the landscape will also be a positive distraction for the user. It is also very important that this activity is carried out without disturbing other users of the place. Designing hobby areas in landscape areas, creating storage units and being selective in the color, texture, form selection and use of artwork in the space will also reduce the stress level of the user. The subject of the artworks used in the space is also effective on the stress level.

4. What Landscape Can Ulrich's Supportive Design Theory Be Used Especially For The Assessment?

Since the main starting point of the supportive design theory is to reduce the stress level, Ulrich used this theory especially for the evaluation of indoor and outdoor design of healthcare facilities. He worked on the idea of how

designs that aim to reduce the stress levels of patients, employees and patient relatives should be shaped.

The article titled Ulrich Health Benefits of Gardens in Hospitals is based on research on the effects of gardens, which are defined as landscape areas around the building. While the discussion topic of the article focuses on the plants found in hospital buildings and other health service environments, on the other hand, advantages such as reducing the cost allocated to health care and increasing staff satisfaction are briefly mentioned. In the article, which includes the features that make the gardens a focal point, the effects of the environment created with plants on human beings and the landscaping examples around the hospital, as well as trying to reduce the stress level and produce healthy living spaces, as well as the economic resources allocated to hospitals and the analysis of the use of these resources on the landscape on the structures. is mentioned. In this article, where Ulrich and Parson (1992) mentioned that the effects of plants and gardens on patients in health care buildings have been beneficial for many years, he mentions that Asian and Western cultures have been carefully prepared to distract people and create a soothing attention.

Stigsdotter's doctoral thesis, which he analyzed under the subject of Landscape Architecture and Health, touches on the increasingly long life of the Swedish people and the threats that arise as a result of this life reaching an increasingly unhealthy level, and the solution methods of the problems that need to be resolved. We see that Stigsdotter's thesis analyzes this thesis based on two bases, while the Swedish government begins to work on the discovery of the problem that directs health resources and the sustainability of these resources.

- 1- Healing Gardens.....For the healing of ill-health
- 2- Urban green space.....Protection and strengthening of health

Medicinal gardens are gardens specifically designed to promote health among a particular group of people. The thesis focuses on the types of healing gardens specially designed for patients. Interest in medicinal gardens is spreading rapidly due to the increase in fatigue reactions and burnout syndromes worldwide and their impact on health.

Urban green spaces have long attracted attention for public health and well-being in history. In Stigsdotter's doctoral thesis, we see these green spaces as a health promoting element in city planning. While Stigsdotter brings these concepts together, the main purpose of Ulrich's use of the Supportive Design Theory is his doctoral thesis on the development of unhealthy environment on

the Swedish people, and in the solution of the unhealthy environment, he touches on the relationship between the landscape factor and health, based on similar problems and solutions with Ulrich's theory. As a result, in the solution-oriented development process of Stigsdotter as healing gardens and urban green spaces, the analysis of the positive effects on spaces and people on the urban scale for the stress relief in the health buildings that Ulrich's theory benefited from is included.

In her article, Clare Cooper Marcus analyzed the stress and potentially unhealthy development of people who spend a certain part of their life in such places, working indoors with or without health care. As a solution to the problem revealed as a result of these data, he characterizes open spaces with examples and interprets their effects on people according to the results of the survey, and includes them in his article. Clare Cooper Marcus, as we will see in Ulrich's Supportive Design Theory, examines with concrete examples that hospital buildings and the negative effects of these structures on people can be solved by the landscape factor and its correct use. We see that this positive response has turned into a science, emphasizing the importance of different perspectives on landscape architecture and the positive effects of plants on people in design.

5. Conclusions

Landscape designs are now one of the indispensable elements of today. The importance of landscape designs made or restored in line with the needs for green areas and the demands for recreational areas is seen. In today's conditions, stress affects our physical and mental health in the first degree. Within the scope of Ulrich's Supportive Design theory, we gain information on stress management, reduction of personal-social stress and how to organize the built environment in a way that supports this. Ulrich has examined this theory in three main contexts. In this review, each of the 3 main components is explained in an interconnected and intertwined manner. According to Ulrich, the design of the space to be designed by correctly identifying the needs of the user shows that stress can also be reduced by environmental factors by reducing stress reactions and increasing well-being for the users and even can be prevented by providing positive. Considering the recent examinations of this theory, which is used especially in the interior and exterior arrangements of health buildings, it is seen that its use in healing gardens has increased and it is increasingly intertwined with landscape design with this approach.

When evaluated to the Information Processing theory and Ulrich's Supportive Design Theory; The concepts of complexity, mystery, readability

and consistency, and sense of control, social support and positive distractions seem to cover the same definitions at certain stages. It is seen that the concept of readability and coherence provides the same content with the sense of social support and control, while the concept of mystery and coherence provides the same content as positive distractions.

When evaluated to Gestalt Theory and Ulrich's Supportive Design Theory; It is seen that the use of the components together helps and supports the 3 main components of the Supportive Design Theory.

When evaluated to Visual Domination and Protection Theory and Ulrich's Supportive Design Theory; It is seen that privacy and sense of control, which are the main functional points of both theories, are essential. Ulrich especially aimed to reduce the stress level in his theory. Since the theory of Visual Domination and Protection is based on dominance and control, it is seen that these two theories have common aspects that affect stress in the first degree.

When evaluated to the Theory of Possibility and Ulrich's Supportive Design Theory; It can be said that these theories are similar in context. Providing access opportunities, creating opportunities for new accesses, thus reducing and controlling the stress level is ensured.

In open spaces, in line with the user profile and the purpose of the space; plant species used, reinforcements, structural-environmental components, limiting elements and light elements, etc. It is thought that if it is planned by applying the Supportive Design Theory, it will have a positive effect on the psychological and physical health of living things and a sustainable space will be created. Considering today's conditions, we can say that; In landscape designs, the use of Ulrich's Supportive Design theory should be increased, and spatial arrangements that create a healthier and positive effect should be made by considering the stress level in urban and rural landscape areas.

References

Appleton, J. (1988). Prospects and refuges revisited. In Jack L. Nasar (Ed.) *Environmental Aesthetics, Theory, research and applications*. Cambridge University Press.

Alpak, E. M., Özkan, D. G., Mumcu, S., Özbilen, A. (2016). Complexity, historicity and coherence: Preference and quality of the changes in the urban scene. *The Anthropologist*, 24(3), 762-777.

Bayazıt, N. (1994). *Introduction to design methods in industrial products and architecture*, Literatür Publishing, Istanbul, Turkey.

Carver, C. S., Harris, S. D., Lehman, J. M., Durel, L. A., Antoni, M. H., Spencer, S. M., Pozo-Kaderman, C. (2000). How important is the perception of personal control? Studies of early stage breast cancer patients. *Personality and Social Psychology Bulletin*, 26(2),139-149.

Cassel, J. (1976). *The Contribution of Social Environment to Host Resistance*, The Johns Hopkins University School of Hygiene and Public Health.

Council of Europe, (2000), European Landscape Convention, <http://www2.tbmm.gov.tr/d22/1/1-0456.pdf>

Düzenli, T., Alpak, E. M., Eren, T. E. (2018). Open Space in the Context of Spatial Organization. *International Journal of Eurasia Social Sciences*, 9(32), 1188-1201.

Düzenli, T., Eren, E.T., Alpak, E.M. (2019). Gençlerin Açık Mekân Kullanımları: Ktü Kanuni Kampüsü Örneği. *Social Sciences*, 14(1), 33-45.

Düzenli, T., Mumcu, S., Yılmaz, S., Özbilen, A. (2012). Analyzing youth's activity patterns in campus open spaces depending on their personal and social needs. *Journal of Adult Development*, 19, 201-214.

Gibson, J.J. (1986). *The ecological approach to visual perception*. London: Lawrence Erlbaum Associates, Inc.

Heft, H. (1997). The Relevance of Gibson's Ecological Approach to Perception for Environment-Behavior Studies. In G. T. Moore, R. W. Marans (Eds.) *Advances in Environment, Behavior, and Design*, Volume 4. Toward the Integration of Theory, Methods, Research, and Utilization. Plenum Press,

Heft, H. (2001). *Ecological psychology in context: James Gibson, Roger Barker and the legacy of William James' empiricism*. Mahwah, NJ: L. Erlbaum.

Kaplan, R., Kaplan S. , Ryan R.L. (1998). *With People in Mind: Design and Management of Everyday Nature*. Washington ABD: Island Press

Kaplan, R., Kaplan S. (1989). *The experience of Nature: a psychological Perspective*. ABD Ann Arbor Michigan: Ulrich's Bookstore

Koffka, K. (1999). *Principles of Gestalt Psychology. (1st ed.)*. London: Routledge Taylor and Francis Group.

Kyttä, M. (2004).The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments. *Journal of Environmental*, 24(2)179-198.

Lang, J. (1987). *Creating Architectural Theory: The Role of the Behavioural Sciences in Environmental Design*. New York: Van Nostrand Reinhold.

Lazarus, R.S., Folkman, S.(1984). *Stress, appraisal, and coping*. Springer publishing company.

Lin N. (1986). *Conceptualizing Social Support*. In N. Lin ve Dean A, Ensel M. Social Support, Life Events and Depression.

Mumcu, S., (2009). Behavior Positions in Open Spaces: Investigation of the Change of Sitting Behavior. Doctoral Thesis K.T.U. Institute of Science, Trabzon.

Pfingstmann, G.B. (1987). Methods of investigation into the social network and social support. İçinde. *Journal of Differential and Diagnostic Psychology*.

Reardon, A.P. (2004). Beyond Intuition: A Perceptual Basis for The Elements and Principles of Design. Master of Science in Interior Design, Michigan University.

Reis, A.T.L., Lay, M.C.D. (2010). Internal and external aesthetics of housing estates. *Environment and Behavior*, 42(2), 271-294.

Rodiek, J.E., Steiner, F.R. (1998). Special Issue:Landscape Architecture Research and Education. *Landscape and Urban Planning*, 42(2-4,7), 73-74.

Schwarzer, R. (2014). *Self-efficacy: Thought control of action*. Taylor and Francis.

Ulrich, R. (1984). View through a window may influence recovery

Ulrich, R. (1991). Effects of Interior Design on Wellness: Theory and Recent Scientific Research. *Journal of Health Care Interior Design: Proceedings from The Annual National Symposium on Health Care Interior Design*. National Symposium on Health Care Interior Design

Ulrich, R.S. (2000). Evidence based environmental design for improving medical outcomes. In *Proceedings of the Healing by Design: Building for Health Care in the 21st Century Conference*, Montreal, Quebec, Canada.

Ulrich, R. S. (2002). Health benefits of gardens in hospitals. *Plants for People International Exhibition Floriade*.

Ulrich, R.S., Parsons, R. (1992). Influences of passive experiences with plants on individual well-being and health. In D. Relf (Ed.), *The role of horticulture in human well-being and social development*.

URL-1/ Görsel, https://www.archdaily.com/940835/sta-zwei-plus-plus-intergenerational-housing-trans-city-tc/5ed5d05ab3576538ab000597-sta-zwei-plus-plus-intergenerational-housing-trans-city-tc-program?next_project=no (Erişim Tarihi: 15.12.2022)

URL-2/Görsel, <https://www.behance.net/gallery/15318561/Exhibition-Space-Concept> (Erişim Tarihi: 15.12.2022)

Withagen, R., Michaels, C.F. (2005). On ecological conceptualizations of perceptual systems and action systems. *Theory and Psychology*, 15(5), 603-620.

Wohlwill, J. (1968). The Physical Environment: A Problem for a Psychology of Stimulation. *Journal of Social Issues*, 22(4), 29-38.

Yılmaz, S., Özgüner, H., Mumcu, S. (2018). An aesthetic approach to planting design in urban parks and greenspaces. *Landscape Research*, 43(7)965-983.

Zusne, L. (1970). *Visual Perception of Form*. New York: Academic Press.

CHAPTER IV

CREATING SCENARIOS IN OPEN SPACE DESIGN

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1. Introduction

Place is produced not only with the final product, but also with the process and expression of the design. Therefore, it is necessary to define place not only with a physical creation process, but also with features such as action and experience (Alpak and Yılmaz, 2022). In other words, place should be revealed by examining the movements of people in these spaces and how they use it (Canter, 1977; Cresswell, 2004; Relph, 1976). According to Tschumi, the events taking place in places; It is the interaction of place and the activities surrounding it, that is, their overlapping with each other. The interesting thing here is not the event, but the creation. An event cannot be created, it is not under control, but a designer can create the necessary conditions for events to occur in the space he designs. What is important for the designer is to identify these events that take place in open spaces and to prepare those conditions (Düzenli and Yılmaz, 2021; Tschumi, 2000).

Identifying and transferring the events that take place in open spaces to the design is closely related to the management of the process (Özkan et al., 2017; Bayramoğlu and Seyhan, 2021; Alpak and Düzenli, 2022). Although each designer's process of starting and developing the design is different (Yılmaz et

al., 2016; Yılmaz et al., 2020), these are the steps that every design should take; (Alpak et al., 2018; Özkan et al., 2017; Özkan et al.; 2018)

1. The programming stage where information is collected

- Defining the problem,
- Determining user needs,
- Making field analysis, revealing opportunities and threats,
- Collection of data such as slope, aspect, cultural landscape values, perceptual factors

2. The design stage where the creative process occurs

- Notion generation
- Concept development
- Scenario creation
- Land use
- Option generation (sketch work)
- Final product design

3. Evaluating stages

- Occupancy Process
- Post Occupancy Evaluation Process

Within the scope of this study, especially the scenario creation in the design stage was emphasized. The scenario creation process includes the process that starts with notion generation, turns this Notion into a concept development process, and continues with the production of scenarios by concretizing the concept (Seyhan and Bayramoğlu, 2023).

The scenarios produced within the scope of the Environmental Design Project III course of the Landscape Architecture Department of Karedeniz Technical University were examined in this context and the evaluation of the relationship between these processes and the final product was the main objective of this study.

2. Design Stage: Scenario Creation

The first stage of design is the thinking stage that starts in the mind (Bayramoğlu et al., 2019). This stage is preparation for design and takes place with notion thinking (Eren, 2019). During the design, there is a message in the

memory of the designer that he wants to convey, primarily for the solution of the problems (Yılmaz et al., 2018). This message starts with an abstract thought.

Then it starts to think about how this abstract thought can be transferred to other people. The place of the concept is in the middle, in the area describing the transition from one stage to the next. The concept informs how the content will be transformed into a form. This stage is also the process where the designer's design language begins to emerge. The concept is the first decision of the design that is not developed but is reflected in the final product (Bilir, 2013). Therefore, we can say that it is the first step of the transition from abstract to concrete (Alpak and Düzenli, 2022).

An abstract idea can be transferred to another in many ways. The concrete object also contains its own abstract information; however, it clearly reveals and reflects it. Concrete information and images are also necessary for the transfer of knowledge in space design. Space is always concrete and carries soft information within it. Even though the designer makes many abstractions in his mind, he should embody this abstraction at some point and start creating the space. There is a concretization at every step from the notion reached because of the abstraction phase to the final product. However, the actual concretization process in the overall design process begins when the designer begins to bring the concept to the final product. At this stage, the complex process of designing in the mind gradually comes to an end. The designer's steps are directed towards solving problems in a more rational, achievable way. Before reaching this stage, the designer should have used his creativity at the highest level and evaluated his alternatives to the end (Bilir, 2013).

Visual expressions are the elements that provide the transition of the act of creation from abstract to concrete in the design process, and they serve as elements that contribute to creativity and developing ideas at every stage of this holistic process. Designers use various visual expression techniques in the process of transforming abstract thought into concrete. Having intermediaries such as section, perspective, three-dimensional (Eren et al., 2018; Eren and Yılmaz, 2022) expressions as well as concept visualization, vision, scenario creation, function diagram, schematic design, draft (Alpak and Düzenli, 2022; Eren, 2022). provides the success of seeing many different layers of information that are not directly connected. Visual expression techniques are not just about presentation; it is above all the conceptual tools of the mind. Since this study focuses on scenario construction in design, scenario production processes are explained in the next step.

2.1. Concretization of the Concept: The Scenario

Before coming to the scenario creation process, the designer first determines the problems of the area to be designed. These problems include revealing the physical problems and good aspects of the area, as well as the lack of effectiveness and use for user needs and expectation. While these problems are being put forward, the mental process also begins to produce a designer solution proposal. The first abstract solution proposal based on this idea is the notion.

The concept, on the other hand, is the first stage in which this idea turns into form and the step of concretization is taken. Although the concept phase gives us an idea about the solution of the design, it may not always give us an idea about the solution of the lines that make up the space. In this respect, it undertakes the task of building a bridge between the abstract and the concrete. At the concept stage, what the problem is, which solution the designer will produce, has been clarified. The graphic expression techniques he uses here sometimes form the starting point of the design as a line. The concept is the first decision of the design that is not developed but is reflected in the final product. Therefore, it is the key point of the act of designing.

Scenario creation, on the other hand, is the stage where the concept is fully concretization, how solutions are produced to problems, and visual data other than verbal or graphical expression are presented. The design is the first stage in which the main decisions are taken to find solutions to the problems obtained because of the analysis, without working on the existing plan. In other words, there is no field land use at this stage. Questions are asked about how the problems related to the level differences, lack of green space, scarcity of activities, security problems can be solved, and the answers obtained are visualized. This visualization is called scenario generation during the design stage. With these scenarios, clues about what the final product will lead us to are obtained. (Alpak and Düzenli, 2022; Kurdoğlu et al., 2019).

3. Material and Method

Karadeniz Technical University, Department of Landscape Architecture, within the scope of Environmental Design Project III course in the 2022-2023 Spring Semester, has been chosen as the “The Union of Architects and Its Environment” study area. The aim of the 2022-2023 Spring Term CTP III Project is to prepare a landscape design project that will meet both the needs

of the cafe users and the culture and art activities (exhibition, conversation, etc.) of the “The Union of Architects and its immediate surroundings” located in Trabzon Ortahisar district center. The space productions expected from the students are to construct the interior activities in a way that reflects the exterior without disturbing the current function of The Union of Architects To create outdoor activities with scenarios to be created for common use areas to meet the recreational and social needs of cafe users and other city users and to produce space solutions for these activity areas. During the 16-week project period, the concepts produced by the students, the concepts they developed and the scenarios they created constituted the material of the study. The relationship of their work with each other and its reflections on the final product are revealed by examining.

4. Results

The project process was carried out with a total of 5 students. Each student individually determined the problems related to the field and developed a conceptual structure. Later, they developed their concepts by pouring it into graphic expression and they created their scenarios by pouring their concept into concrete visuals. Within the scope of this study, a student’s process was examined and the relationship between the result and the product was revealed. In this process, the students also made the synthesis of the study area that establishes the relationship of the city with other areas, the synthesis of green area proposals that spread throughout the city, and the synthesis of pedestrian transportation proposals. In addition, on the design area, they also made the use of the event spaces to be designed to meet the needs of the users and the space where their relationship with each other is constructed. However, these processes were not included in the scope of this study.

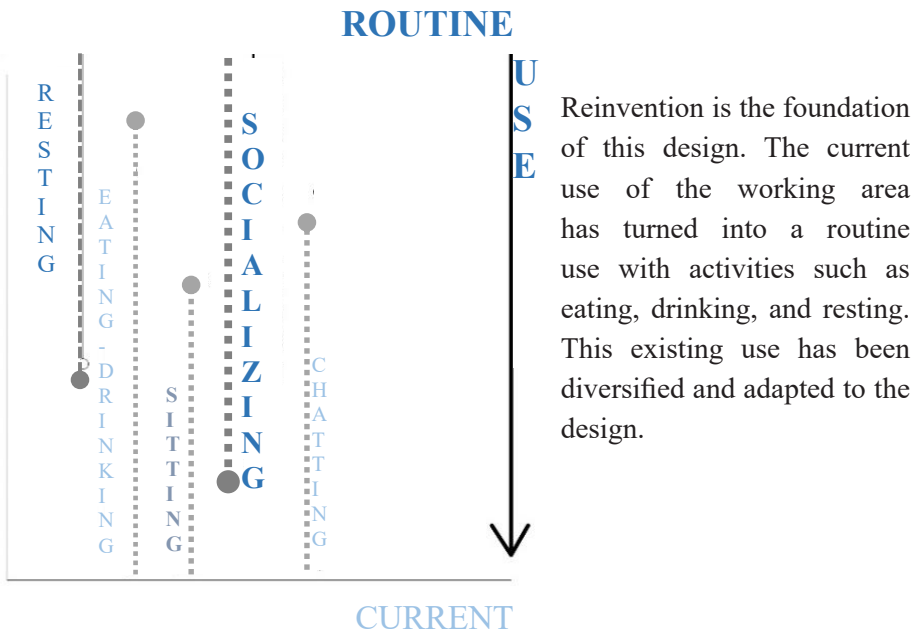
4.1. Notion Generation

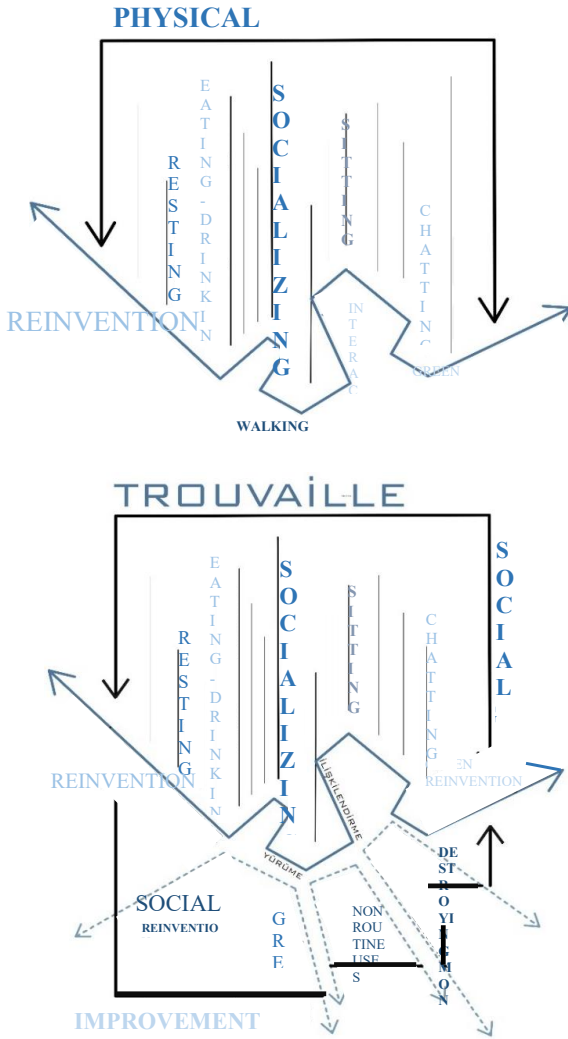
Notion: TROUVAILLE

Address of Reinvention The Union of Architects: It is inevitable that people move away from their daily life and are in search of new ones in their environment. Therefore, the relationship between human and environment needs to be more understandable. The biggest problems of the city where our study area is located are unplanned urbanization, vehicle density, lack of pedestrian transportation and the lack of the distribution of green tissue in the city. Our

study area will not only provide ease of transportation due to its location, but also establish relations with the open spaces in the city center and ensure that the area becomes the center by providing pedestrian access from these places. A green network system will be established between the area we will design and the places to be connected, and people will be able to walk here to achieve a physical reinvention. With this green network, even if people do not set a goal to come to this area, the area will be reinvented with the guidance of this network. Eating and drinking, sitting, socializing, resting, chatting etc. in the area. Although there are always activities, people will reinvention the spring festival in certain periods of the year, which are not always held, summer hello parties, culture and art events, autograph day, new year party etc. these activities will increase the diversity of users and enable people to reinvention the region, and by establishing a relationship with the place, people will also make social Reinvention in this area.

4.2. Concept development





However, the biggest problem of the city is unplanned urbanization and as a result, the green texture is almost destroyed. It is aimed to create a green exploration area that will only support the breathing of the city and that will spread to other areas of use of the city without disturbing its existing, that is, routinized use. This green network system will present a fiction that will strengthen the place and the city physically.

One of the other goals has been to diversify the monotonous routine use, to create a space that will provide a social reinvention to enable users to encounter different and extraordinary activities when they come to the area. It is aimed to construct an area that provides various

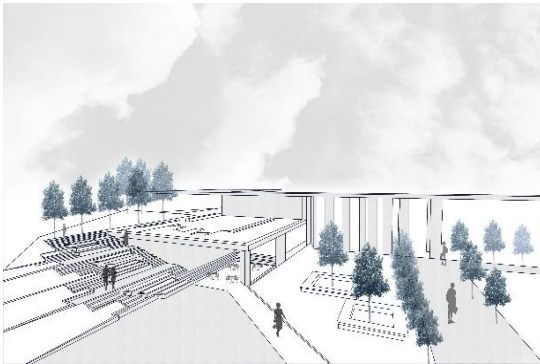
usage opportunities for users with different needs, where the culture and art activities that take place in the interior where summer hello parties are held at certain times of the year are reflected to the outside, exhibitions and autograph sessions are held. It is aimed to find solutions to both problems of the city of Trabzon by providing both physical improvement and reinvention by spreading the green fabric throughout the city, and social improvement and reinvention by increasing the diversity of users and uses.

Figure 1. Concept Development

4.3. Scenario Creating

The goals set in the concept stage were visualized in the scenario stage. Scenario creation is also the stage where the main design decisions taken at the concept stage are put forward by integrating them with the existing conditions of the field. Now, not only verbal solution proposals, but also solution proposals are produced with activity scenarios according to the advantages and disadvantages of the field.

There is an elevation difference of 4 meters in the working area. This elevation difference has been used to separate different cultural and artistic activities and eating-drinking activities from each other. Two elevation difference areas, upper and lower, were created by piling up the elevation difference at certain points. Thus, a more calm and serene environment where art activities take place and a more active environment where socialization activities take place are clearly separated from each other. While there are socialization, culture and art activities on the upper level, there are eating and drinking activity areas where users can sit and chat at the lower level. A large green area, which is used both as a buffer and as an active green area, has been designed on the upper level, which also increases the green texture. A warmer environment has been created by constructing the water element in the area where art activities are held. (Figure 2).



1. *Observation-resting terrace*

The upper level, which was created by taking advantage of the elevation difference in our area, was used as a viewing and resting terrace. The steps connecting the level difference to the lower level are designed as sitting-resting steps.



2. *Seating steps-shelter*

While the steps in the areas where there is an elevation difference are used for rest, the denim shelter above is used. Thus, an outdoor niche will be produced, which is protected from heat in summer and rain in winter.

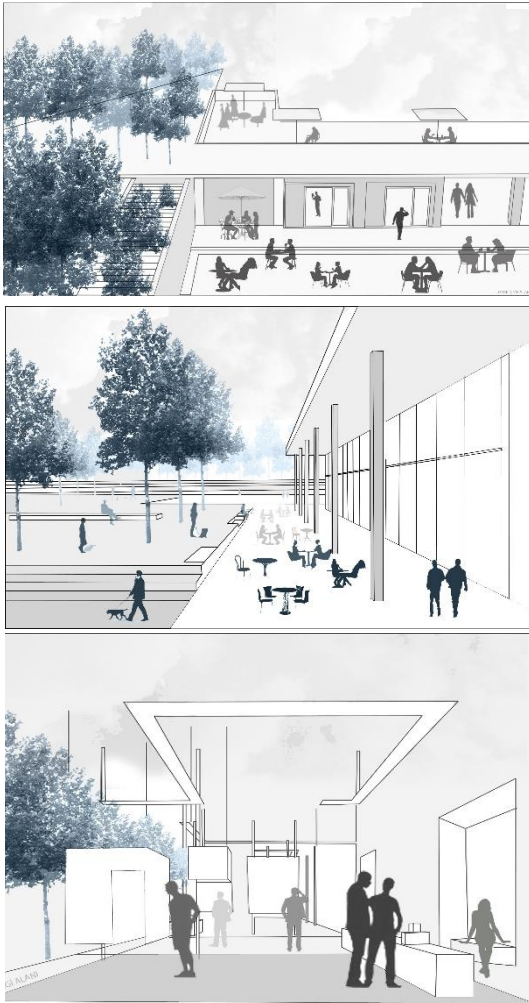


Figure 2. Scenario creating

Notion, concept, and scenario stages are the most important stages of the design process. When these stages that the student has constructed are examined, it is seen that each process follows each other. Both physical and social exploration fiction, which was put forward in the notion stage, was detailed in the concept stage and presented as a solution proposal. The solution proposals, which were put forward graphically and verbally at the notion and concept stage, were visualized in an explanatory and understandable way at the scenario stage. In the final product, clues to which problems the student will solve and how to construct a space are given clearly. This process covered a period of approximately 9 weeks. The next step is to examine whether this process designed by the student supports the final product.

3. Eating-drinking hall

In our area, culture and art activities and observation areas were organized on the upper level, which was created by taking advantage of the elevation difference, and socialization activities such as eating and drinking were arranged on the lower level.

4. Green texture

The green texture was used as both an active and tampon zone by spreading over the area. These areas are designed to sit on the green, lie down, rest, and sometimes be used as a socializing hall used for seasonal festivals such as hello to summer party.

5. Culture-art Hall

In this area, an exhibition area was created to increase the diversity of users and provide social reinvention.

4.4. Scenario and Result Product Relationship

The process of transforming the main design decisions taken for the problems determined as a result of the first 9-week process into space organization is now started. In this process, first of all, sketches are made and options are produced. It is developed by choosing the most suitable one for the notion approach, concept and scenario among these options. As a result, the plan, section, details, and three-dimensional expressions of the finalized design project are obtained. In Figure 3, the result achieved by the student is seen. By examining the details of the project, it has been determined whether it is consistent with the notion-concept and scenario. While doing this, the plan and three-dimensional expression techniques in the student's delivery project were used as material.

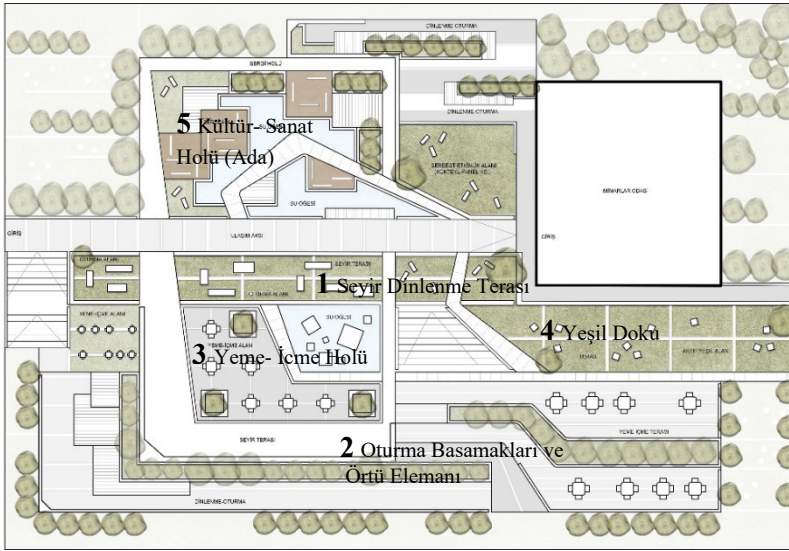


Figure 3. Plan

When the plan is examined, it is seen that the green network system, which was considered at the notion stage, was adapted to the project. However, it is seen that the graphic expression style used in the concept phase also overlaps with the formal approach of the project. As promised in the conceptual and concept phase, the area provides users with a physical exploration by using both active and passive green areas, while offering various social explorations with the smart use of elevation differences. While the upper levels are generally reserved for the building and the activities taking place in the building, the lower

levels are reserved for social activities such as eating, drinking and sitting. At the upper level, activities that differ according to the events taking place in the building can be seen. In addition to various non-stationary activities such as exhibitions, autograph sessions and festivals, activities to be held at all hours of the day such as resting, sitting, and watching on the green area were also included. The water element is used for both separating and relaxing, aesthetic purposes. These designs are supported by three-dimensional visuals. (Figure 4-5-6-7-8). The places of these images on the plan are also shown by numbering.



Figure 4. Space setup and 3D visualization compatible with scenario 1

Before starting the design phase, the idea of using the 4-meter elevation difference at a certain point and dividing the area into two different quotas, upper and lower, was applied to the project. The upper level was used as a cruise resting area as it was designed in the scenario. In doing so, the green texture and water element are integrated into the space. The water element, in addition to contributing to the area in terms of aesthetics, is designed in such a way that users can use it actively, especially children (Figure 4).



Figure 5. Space setup and 3D visualization compatible with scenario 2

As designed in Scenario 2, the steps in the areas where there is a elevation difference are solved as a sitting step while providing transportation. The upper section created by the elevation difference was used as a shelter as in the scenario and it also shows similarities in terms of form. Thus, it is seen that the area was designed with seasonal strategies in mind, and the idea of producing an open space niche protected from the heat in the summer and the rain in the winter was supported. (Figure 5).



Figure 6. Space setup and 3D visualization compatible with scenario 3

In scenario 3, the elevation difference is designed to divide the area into two clearly. The upper part is reserved for artistic activities, watching and resting, while the lower level is reserved for social activities such as eating-drinking, sitting and chatting. Looking at the final project, it is seen that this idea was adapted to the project. Users who want to participate in an artistic event or want to spend a quiet day are separated from each other using a level difference between users who want to be more active and social, have fun and spend time with their friends. In other words, the level difference was used as a tampon zone with the green area, allowing both user groups to use the area without disturbing each other (Figure 6).

In scenario 4, the green texture was spread over the area and used both as an active and tampon zone. These areas are designed to be used as a socialization hall, which is used for sitting, lounging, resting on the green, and sometimes for seasonal festivals such as hello to summer party. While designing the project, it was determined that large green area designs were made. When we look at the three-dimensional visuals, these green areas are sometimes used according to the activities that take place in the building, such as book signings and conversations, while they are used as a relaxing area where more passive activities such as reading a book, sitting by the water, sunbathing are held when there are no activities. Therefore, it harmonizes with the scenario and the thought is adapted to the project and supported by the spatial organization (Figure 7).



Figure 7. Space setup and 3D visualization compatible with scenario 4



Figure 8. Space setup and 3D visualization compatible with scenario 5

In Scenario 5, a culture and art hall was designed to increase the diversity of users in the area and to support cultural and artistic activities such as exhibitions, conversations, book fairs and autograph sessions. In the designed project, it is seen that this hall is integrated with the space organization. In order to increase the participation of the users in such activities, the culture-art hall has been designed as an island. In order to make the area more remarkable and attractive, users were asked to feel like they came to an island while browsing this area. The exhibition areas are positioned around the water and supported by green areas.

5. Conclusion

Design is a system of processes. Managing the design process well depends on establishing the beginning well. If we want an open space design to be used by various users at all hours of the day, that is, if we want to design a successful space, it is necessary to think carefully about the beginning of the process. This is the key point of the design.

For this, it should be aimed primarily to determine the problem well and to ask the right questions instead of answers to do this. Asking the right question is the most important start to find solutions to problems. Finding the right question starts the motion generation process, which is the first stage of design, that is, solving the problem in the mind. This process is one of the most difficult parts of the design. Finding the right problem and producing the right

answer is the most important step to facilitate the design. In any case, it is how the designer approaches the problem that reveals his original side. Because the way he approaches this problem enables him to reveal the concept approach that distinguishes the designer from the others.

Notion and concept development is the most difficult stage for both experts and students in design production. Overcoming this difficulty is through getting to the root of the problems and trying to find solutions to those problems. Notion and concepts created by defining the right problems and the solutions produced will enable us to produce the right scenarios and ultimately produce successful designs. In fact, designers who have a good notion and concept development process can successfully create their scenarios and complete the design process more easily. It is necessary to know that all stages affect each other and that one cannot be completed without the other. Studies show that projects prepared without preliminary preparation are both more difficult to produce and have lower success rates.

In this study, the effects of concept-concept-scenario generation processes of a student project on the final product were examined. Research has shown that all processes affect each other. The right decisions taken are very important in making the right space organization. As a result of the interview with the student, it was answered that structuring the design in this way makes it easier to reach the final product. Notion-concept and scenario generation facilitated both the formation of the formal approach and the determination of how to produce a solution for the physical features such as the slope of the area and elevation differences in advance. At the beginning of this process, the student said that he had a very difficult time in the stages of concept-generation, concept development and scripting them. However, as the process progressed, he said that at the end of 9 weeks, with the support of the lecturer, there was no question mark in his mind about how the project would end and what he should do about the organization of the space. Although the 9-week process was difficult, it was said that the next 7-week process, namely the actual project production phase, was very easy. He informed that he would carry out this process in his future project experiences.

In fact, researchers say that the most difficult stage of design is the concept and concept generation parts. Those who understand and manage this stage well will no longer have problems in producing successful designs.

References

Alpak, E.M., Düzenli, T. (2022). The Design Stages of the Değirmendere Basin: Concept Vision Generation Process, Ed. Kozlu H. H., *Art and Architecture: Theory, Practice and Experience*, Chapter VI, 73-86, Publisher, Livre de Lyon.

Alpak, E.M., Yılmaz, S. (2022). Place Production: Investigation Of Environmental Design-I Studio Process. Ed. Felek S.Ö., *International Research in Architecture, Planning and Design*, Chapter V, 75-88, Publisher: Serüven Publishing.

Alpak, E.M., Özkan, D.G., Düzenli, T. (2018). Systems approach in landscape design: a studio work. *International Journal of Technology and Design Education*, 28:593–611

Bayramoğlu, E., Büyükyurt, U., Yurdakul, M. (2019). Peyzaj Mimarlığı Eğitiminde Proje Tasarım Süreci: Trabzon “Karagöz Meydanı” Çevre Tasarım Projeleri. *Social Sciences (NWSAENS)*, 14(1):15-24.

Bayramoğlu, S., Seyhan, S. (2021). Evaluation of environmental Design projects in terms of scenario activity diversity in Landscape Architecture Education. *International Academic Social Resources Journal*, 6, 25, 751-755.

Bilir, S. (2013). Mekân Tasarımında Kavram Geliştirme Sürecine Analitik Bir Yaklaşım. Yüksek Lisans Tezi, Güzel Sanatlar Enstitüsü İç Mimarlık ve Çevre Tasarımı Ana Sanat Dalı İç Mimarlık Sanat Dalı, Hacettepe Üniversitesi, Ankara.

Canter, D.V., (1977). *The Psychology of Place*. London: Architectural Press

Cresswell, T. (2004). *Place: A short introduction*. Oxford: Blackwell

Düzenli T., Yılmaz, S. (2021). Capturing “Genius Loci” In Seating Furniture. In *Housing Architecture and Design*, page, 447- 468, Eds. Demirarsalan D., Tunalı S.K., Livre de Lyon Publishing.

Eren, E.T., Düzenli, T., Yılmaz, S. (2018). Comparison of the Use of Conventional and Digital Visualization Technologies in Environmental Design Education, *Croatian Journal of Education*, 20(4)2018, 1149-1171

Eren, E.T. (2019). Research on Creative Thinking Skills in Visual Arts. *International Social Sciences Studies Journal*, 5, 53 7451-7461

Eren, E.T. (2022). Urban Design Proposals: The Arhavi Urban Square Case. Ed. Nurten Çelik, *Education Sciences In International*. Eğitim Yayınevi. 119-13.

Eren, E.T., Yılmaz, S. (2022). The student attitudes towards digital and conventional drawing methods in environmental design studios and the impact

of these techniques on academic achievement in the course, *International Journal of Technology and Design Education*, 32:617–644.

Kurdođlu, B., Seyhan, S., Bayramođlu, E. (2019). The evaluation of the national garden concept in environmental design projects with scenarios. *Artvin Coruh University Journal of Forestry Faculty*, 23, 2, 13-24.

Özkan, D.G., Alpak, E.M., Var, M. (2017). Design and construction process in campus open spaces: A case study of Karadeniz Technical University. *Urban Design International*, 22, 236–252.

Özkan D.G., Özcan E., Dedeođlu, S.Ö., Akyol, D. (2018). Landscape Planning in Urban Design Competitions: The Case of Lüleburgaz Tosbađa Stream Recreational Area. Chapter 7- pages 97-107. *Science, Ecology and Engineering Research in the Globalizing World Chapter*, Publisher: St. Kliment Ohridski University Press Sofia.

Relp, E. (1976). *Place and Palacelessness*, Pion Limited, London, s: 79–80.

Seyhan, S., Bayramođlu, E. (2023). Abstracting The Scenarios Of Design Projects In The Landscape Architecture Education Process, International Symposium On Current Developments In Science, Technology And Social Sciences, May 26-27, 2023/ Ankara, Turkiye, 677-683

Tschumi, B. (2000). *Event Cities*. Cambridge, Massachusetts, London: The MIT Press.

Yılmaz, S., Mumcu, S., Düzenli, T., Özbilen, A. (2016). Analyzing the unity concept in design on student works: a case study of architectural design course. *Inonu University Journal of Art and Design*, 6, 1-12.

Yılmaz, S., Düzenli T., Çiđdem A. (2018). Peyzaj Tasarım Eđitiminde Bir Biçim Arama Yöntemi: Dođadan Esinlenme, *Journal of History Culture and Art Research*, 7(2), 376-389.

Yılmaz, S., Düzenli, T., Çiđdem, A. (2020). Residential environmental design with nature inspired forms. *ITU A|Z*, 17, 3, 211-223

CHAPTER V

ENVIRONMENTAL DESIGN EXPERIENCES ON UNIVERSITY CAMPUSES

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1. Introduction

University campuses are complex areas consisting of many different faculty buildings, department buildings related to many different professional disciplines and the remaining open spaces. They can be defined as complexes that contain many functions. A campus is not only a place isolated by buildings, it is much more than that. While campuses are generally used as a concept specific to universities in Turkey, the concept of campus is actually used in areas with different functions abroad. For example, the complexes in which health, rehabilitation or patient care institutions are located are also called campuses. In Turkey, the first thing that comes to mind when it comes to campus is the places where educational structures are located together, universities come to mind. Campus campuses in Turkey are completed with the environment planned for the educational process and open spaces. Campus open spaces are also very important for users, especially young people (students) who spend most of their lives on campus. Campus open spaces are defined according to changing user requirements. For this reason, it is necessary to determine the use of space by young people who are predominantly campus users (Düzenli et al., 2017; Pouya et al., 2019; Vural et al., 2019). In our country, in a very small part of the entrance to universities, students are placed in line with their interests, abilities and wishes, and in the remaining vast majority, they are placed according to the preferences they make in line with the scores they get from the exam. Sometimes students find themselves in a department and environment that they do not know and to which they come unwillingly. However, young

people's use of space in their environment is important for their personality development and is different from the general society. The reason for this is the difference in the environmental preferences of young people. These preferences and differences should be reflected in the campus designs where they spend most of their time (Düzenli et. al, 2019; Kurdoğlu et al., 2019; Okuyucu and Çoban, 2018). For this reason, in this research, students in the environmental design course at Afyonkocatepe University Faculty of Fine Arts, Department of Interior Architecture and Environmental Design were asked to design for the courtyard of their faculty. As a designer candidate, it was left to them how they use this space, what kind of spatial elements and components they want to see and use, what activity areas they want this space to become possible. It is desired to reach the following conclusion from the resulting projects; the similarities and differences in the need activity and space alternatives and design solutions proposed in the selected projects can be a solution to environmental design problems in university campus open spaces, which are young spaces.

Campus open spaces should distract university students from the pressures of preparing for the future and career development, provide mental calmness, socialise, provide physical activity opportunities and be considered as learning environments. Campus landscapes designed in this way will positively affect the quality of education and training. In line with these ideas, the courtyard of AKU Faculty of Fine Arts was designed by the students who are the users of the courtyard. Before starting the design, the spatial, functional and natural landscape data of the existing area were analysed and the positive and negative qualities and user needs of the area were revealed.

2. Material and Method

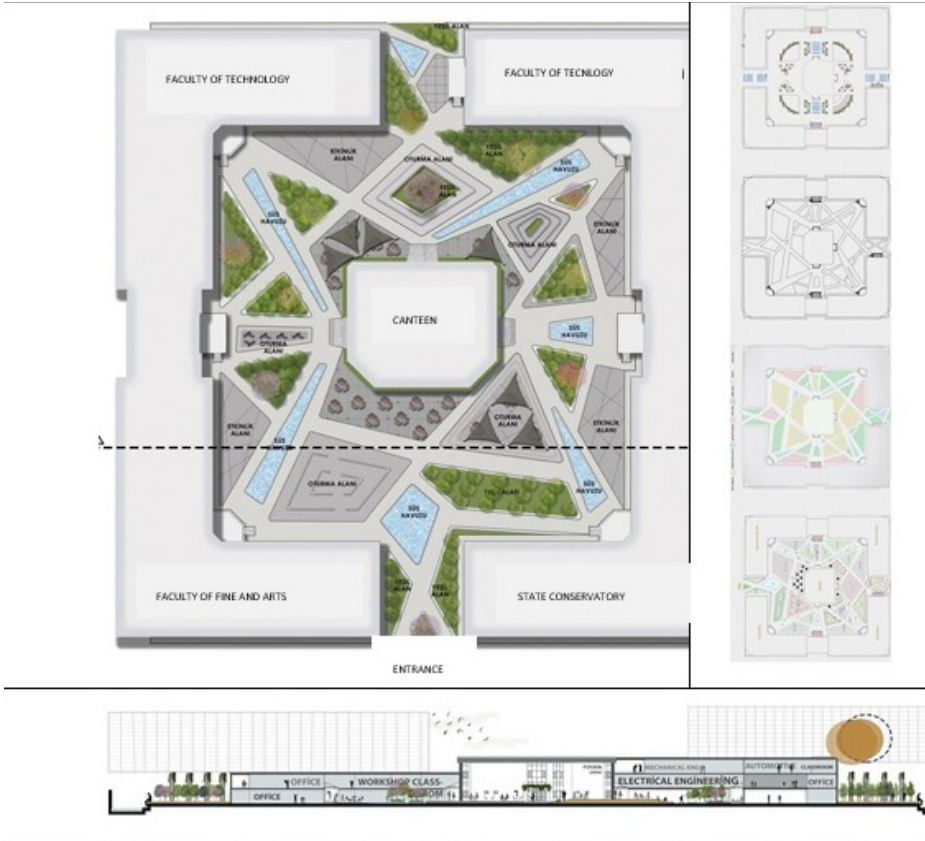
The material of the study consists of the projects selected from the Environmental Design Projects produced within the scope of the Environmental Design Practices 2 course carried out in the 2nd semester of the 3rd grade of Afyon Kocatepe University Department of Interior Architecture Environmental Design.

Environmental Design Practices course is carried out in design studios in the form of (2+1) at AKU, Faculty of Fine Arts, Department of Interior Architecture and Environmental Design. Environmental Design Practices-2 course Project course starts with field survey and field studies and continues with design studies. The term ends with the environmental design project hard floor soft floor plan and presentation sheet. Within the scope of the course, the

course instructor first directs the students to the field studies on the problem determinations related to the study area. A survey and analysis study is prepared for the solution of these problems related to the problems determined by on-site detection studies. Based on this survey and analysis study, solutions for all the problems identified are addressed and solved in the design process. This process covers a long period of 14 weeks. However, considering the scope and nature of the studies to be carried out, it is seen that many students have difficulty in producing an environmental design project that is fully accurate and can respond to all problems. For this reason, students are allowed to prepare projects as group work. In addition, since the relevant period coincided with the 2020-2021 spring semester, university education was carried out by distance education due to the pandemic declaration in this period. Conducting such studio courses remotely is difficult for both students and instructors.

3. Results

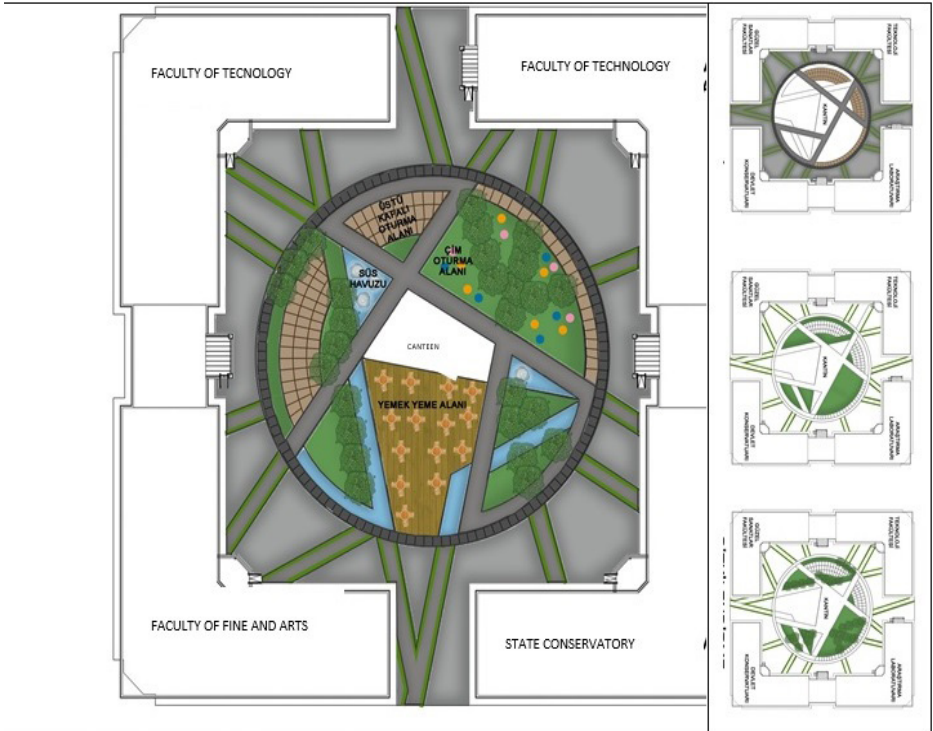
The first project is the result of the joint work of 5 student designers. In this design, while the courtyard boundary and faculty buildings maintained their location and form sizes, the designers changed the form of the cafeteria and dining hall building, which is currently located in the centre of the courtyard, by considering it in the centre again. They designed open and semi-open seating and eating and drinking areas around the cafeteria. When we look at the form arrangement in their designs, the square exterior form is broken by straight lines coming out of the building entrances and progressing asymmetrically in different directions. Thus, an asymmetrical order has emerged. In their designs, they designed activity meadow, mounds, ornamental pools and multi-purpose hard floors (Figure 1).



Designer: Emre Ateş, Safiye Çeliklepe, Şükran Çınar, Esin Çelikbaş, Nisanur Acar

Figure 1. Studies Related to the First Project

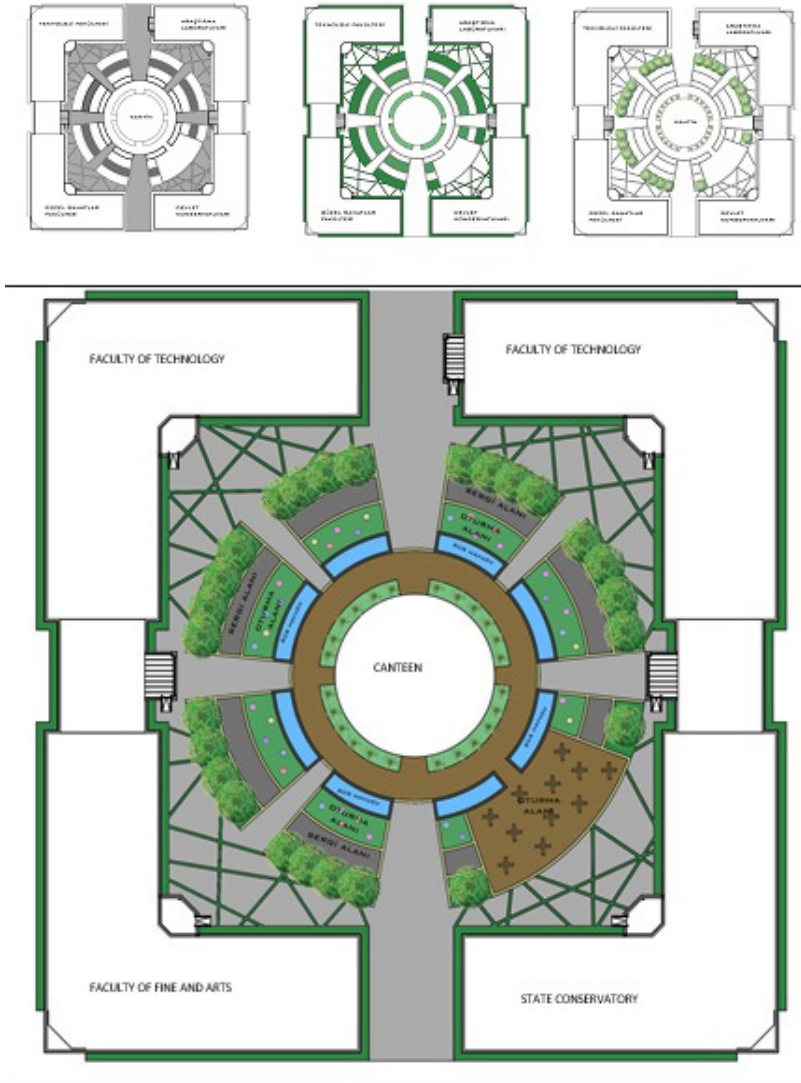
The second project is not a group work. It was prepared individually by a designer. The main skeleton of the design consists of circles and rays. The canteen design was again worked differently as in the previous study. Soft ground seating areas, covered and open lecture theatre seating areas, open-air classrooms, the canteen, which is a social area to provide a sense of security and tranquility, rest, and the surrounding area is isolated from the transport axes with the water element (Figure 2).



Designer: Melis Şişik

Figure 2. Studies Related to the Second Project

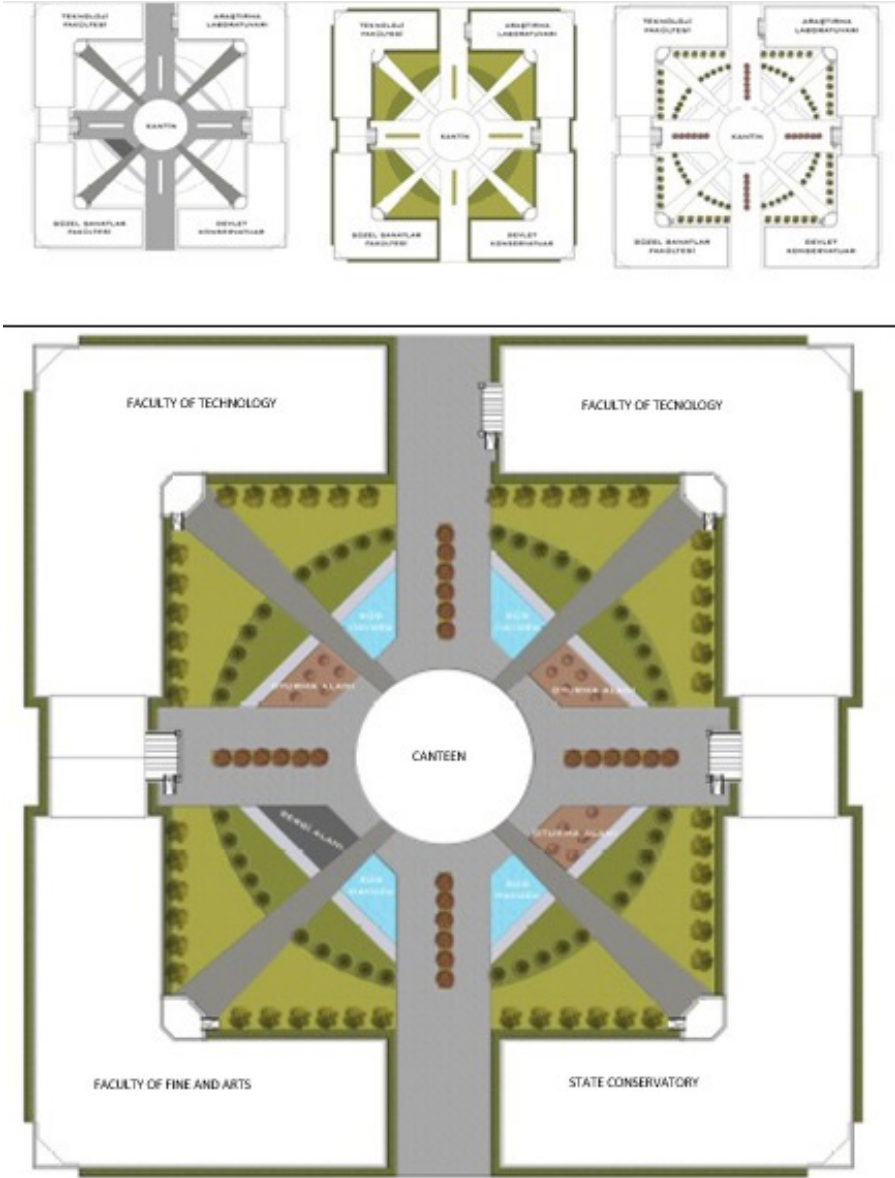
The third project is a group work consisting of two designers. They used one of the circle and radial design compositions in the design form layout. With these two components, unlimited design variations can be created. A circular canteen in the centre and main access axes extending directly from here to the building entrances and water and green areas, hard floors and planting were designed between them. Unlike other projects, they designed an exhibition area (Figure 3).



Designer: Efe Sümbül, Baran Baykara

Figure 3. Studies Related to the third Project

The fourth project is a group work and has very clear design lines. They have tried to create harmony by using contrasting forms within conventional lines. Circle, square and rays are the main elements of the design composition. They tried to develop a new form from these two main geometric forms and their components. Circle and square are beautifully integrated with each other. There is no activity different from other designs in terms of activity types (Figure 4).

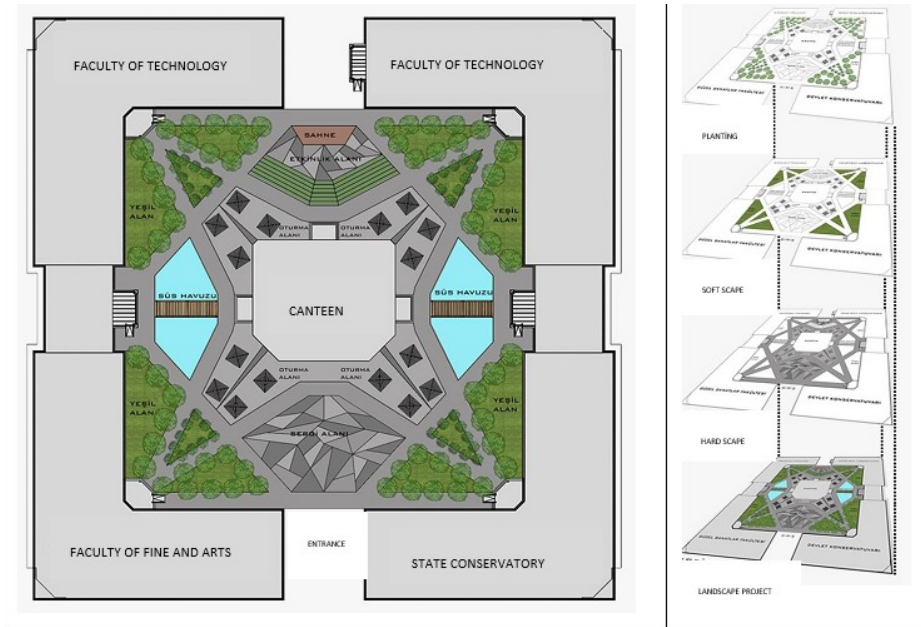


Designer: İhsan Yolalan, Şerife Yıldırım, Semiha H. Sarı, Sümeyye Korkmaz

Figure 4. Studies Related to the Fourth Project

The fifth project is an individual work product. Despite this, it is not lacking anything from group works, on the contrary, it is a more detailed work product.

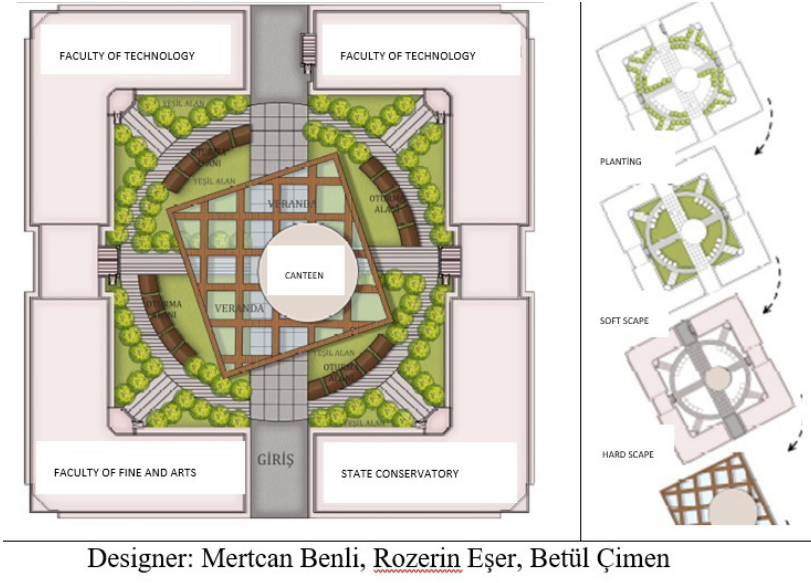
A four-armed star form forms the main skeleton of the design, which emerges from the idea of an open space that equally serves the four main buildings surrounding the working area. It preserved the form of the canteen and dining hall building and organised its surroundings accordingly. He designed open and semi-open eating and drinking areas, ornamental pools and bridges over them. He designed a stage and amphitheatre for open air performances. In addition, the exhibition area, green areas and transport were considered (Figure 5).



Designer: Erdem Torlak

Figure 5. Studies Related to the Fifth Project

In the sixth project, square and circle forms were again used in the main skeleton of the design, but unlike the other design, the design of a very effective wooden cover element was effective in the design of the entire courtyard. In this design, unlike the other projects, the shade element was used more. In the planting design, planting was done on the lines that support the structural landscape project, that is, around the circles and roads (Figure 6).



Designer: Mertcan Benli, Rozerin Eşer, Betül Çimen

Figure 6. Studies Related to the Sixth Project

4. Discussion and Conclusion

In the study carried out by Ertekin and Çorbacı in 2010, a landscape project was prepared and implemented for Karabük University campus after the completion of the studies for its physical infrastructure. With this design, it has the feature of having a modern university campus in a large area. In this project, the rapidly increasing number of academic-administrative staff and students of the university and all their needs were taken into consideration and dynamic and modern equipment and facilities were presented. In order to strengthen academic social and cultural interaction and to save on infrastructure costs, the campus campus was planned compactly on an area of approximately 1006.8 da (Ertekin and Çorbacı, 2010). Another study conducted by Karaşah (2023) examined the courtyard landscape designs produced by students in different concepts within the scope of the course. He stated that the student who designed the campus courtyard designed a space that encourages students to get out of the noisy, dynamic and colorful life of the campus and to research and study in a quiet environment consisting of a combination of green and blue. Similarly, the courtyard of AKU Faculty of Fine Arts was also designed in a compact way by the student designers. In other words, the aim here is to present many functions in a limited area and to create spaces with high level of functionality and livability.

Taşçıoğlu et al., (2019), who carried out a study on square design in campus areas, carried out a square design study for Kilis 7 Aralık University in the Central Campus that can host social activities and student use. In line with the current map of the area, the activity areas were determined, and a preferred arrangement suitable for active use was determined as the primary goal. The square, which was designed to ensure spatial integrity, was tried to be planned to include different activities. In this direction, the central area was formed in a circular form in order to organise social activities in line with the user needs determined in this direction. This centre was taken as the focal point when the system was designed. In the design, due to the circular form of the area and the fact that it is surrounded by buildings, a space fiction divided by radial paths has been acted upon in accordance with it (Taşçıoğlu et al., 2019). In this study, just like many designer candidates, solutions were sought with circular and radial form approaches. As mentioned before, countless design variations can be produced with circular and radial lines. Many designers can benefit from these forms. Similarly, in Gülez et al., 2005, the landscape project of a part of the campus was renewed for Zonguldak Karaelmas University in line with the request of the rectorate, and three proposals with different circulation and spaces were developed in line with the on-site investigation studies and the needs programme. Among these proposals, the most economical design, which includes the uses that should be found in a modern university campus and which will cause the least damage to the natural structure in the area, was selected and implemented (Gülez et al., 2005). Karaşah et al., 2016a and Karaşah et al, 2016b, in their campus landscape design for Artvin Çoruh University campus, the design processes were handled by adopting the understanding of being a campus that can meet the social and psychological needs of its users. Since the area where the landscape design was realised is a prestige point at the entrance of the city, attention was also paid to maintaining the identity of ‘Green Artvin’ (Karaşah et al., 2016a).

Both the semantic dimension, the utilitarian dimension and the formal side of environmental or landscape designs should be handled adequately and strongly. In the examples analysed and the project examples presented in this study, the importance of all of them has been tried to be revealed.

References

Düzenli, T., Eren, E.T., Alpak, E.M. (2019). Gençlerin Açık Mekân Kullanımları: KTÜ Kanuni Kampüsü Örneği. *Social Sciences*, 14(1), 33-45.

Düzenli, T., Mumcu, S., Akyol, D. (2017). Üniversite Kampüsü Açık Mekânlarının Gençler Tarafından Kullanım Amaçlarının Belirlenmesi. *Journal Of International Social Research*, 10(49).

Düzenli, T., Mumcu, S., Özdemir Işık, B. (2016). Gençlerin İhtiyaçlarına Bağlı Olarak Kampüs Açık Mekan Tasarımı. *İnönü Üniversitesi, Sanat Ve Tasarım Dergisi*, ISSN 1309-9876, Cilt/Vol 6 Sayı No 13, 121-130

Ertekin, M., Çorbacı, Ö.L. (2010). Üniversite Kampüslerinde Peyzaj Tasarımı (Karabük Üniversitesi Peyzaj Projesi Örneği). *Kastamonu University Journal of Forestry Faculty*, 10(1), 55-67.

Güleç, S., Çorbacı, Ö.L., Topay, M. (2005). ZKÜ Merkez Kampüsü Isı Merkezi Yolu ve Çevresi Peyzaj Ve Rekreasyon Projesi. *Bartın Orman Fakültesi Dergisi*, 7(7), 24-34.

Karaşah, B., Sarı, D., Yaman, Y.K. (2016a). Bir yerleşke peyzaj tasarımı: Artvin Çoruh Üniversitesi Şehir Yerleşkesi. *Erciyes Üniversitesi Fen Bilimleri Enstitüsü Fen Bilimleri Dergisi*, 32(3), 1-13.

Karaşah, B., Arslan Muhacir, E.S., Sarı, D., Yaman, Y.K. (2016b) Artvin Çoruh Üniversitesi Seyitler Yerleşkesi Peyzaj Tasarımı. *İnönü Üniversitesi Sanat ve Tasarım Dergisi*, 6(13), 109-119.

Karaşah, B. (2023). Yeşil Altyapıların Önemli Bir Parçası Olarak Avlu Peyzaj Tasarım Süreci, *Kent Akademisi Dergisi*, 16(2):763-775

Kurdoğlu, B.Ç., Bayramoğlu, E., Konakoğlu, S.S.K. (2018). Kampüslerde Yaya ve Bisiklet Yollarına Uygun Sürdürülebilir Donatı Tasarım Kriterleri. *Uluslararası Bilimsel Araştırmalar Dergisi (Ibad)*, 3(2), 493-502.

Okuyucu, Ş.E., Çoban, G. (2018). Evaluating The Social Domains Within The Campus Of Afyon Kocatepe University With The Pragmatic Dimension Of The Semiotic Method. *Online Journal of Art & Design*, 6(5).

Pouya, S., Yılmaz, B., Oğuz, A. (2019). Üniversite kampüs meydanlarında peyzaj tasarımı (İnönü Üniversitesi Kampüsü, Mediko Meydanı peyzaj tasarım projesi örneği). *Akademik Ziraat Dergisi*, 8(2), 251-264.

Taşçıoğlu, S., Günaydın, A. S., Yücekaya, M. (2019). Kampüs Alanlarında Meydan Tasarımı: Kilis 7 Aralık Üniversitesi Örneği. *Bartın Orman Fakültesi Dergisi*, 21(2), 246-256.

Vural, H., Meral, A., Doğan, S.Ş. (2019). Üniversite Kampüs Peyzaj Planlaması Üzerine Kullanıcı Değerlendirmesi: Bingöl Üniversitesi Örneği. *Türk Tarım Ve Doğa Bilimleri Dergisi*, 6(1), 106-117.

Yılmaz, S. (2015). Bir Kampüs Açık Mekânın Çevresel Tasarımı: Süleyman Demirel Üniversitesi Orman Fakültesi Binası. *Kastamonu University Journal of Forestry Faculty*, 15(2), 297-307.

CHAPTER VI

SOCIAL EQUALITY IN URBAN PARKS AS PUBLIC SPACES

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1. Introduction

The spaces where people carry out their activities in line with their needs, position and define themselves in the society and open to the outside are public open spaces (Alpak et al., 2018). Public spaces are perceived as equally accessible to all people who wish to use them, provided that they abide by the code of conduct. For this reason, public spaces that provide integrity in the city; As outdoor spaces that are open to people's free access (Alpak et al.,2020), they are spaces where people live their beliefs, share their thoughts and trade commercially or simply rest and have fun (Gehl, 2010).

Public space; it is the area where individuals see and are seen by others while dealing with public affairs (Gehl, 2010). Arendt (1977) associates this field with "public freedom". It states that the existence of such a freedom depends on the existence of the public sphere. It sees these areas as areas where people express themselves freely. The large number of people using these spaces reveals the value given to public spaces, and this is due to the wide variety of functions they provide (Hernandez-Garcia, 2013). Understanding the functions of public spaces not only enables better management of existing urban spaces, but also helps to improve their effectiveness by improving

the design of new urban spaces. These functions can be explained under the following main headings:

- Ecological functions and Environmental: noise reduction, climatic improvement, providing a habitat for wild plants and animals, impact on the hydrological cycle.
- Structural and aesthetic functions: Defining and associating the urban texture, improving the legibility of the city, creating a sense of place and raising the image of the city.
- Social and social functions: Providing places and opportunities for recreation, facilitating social contact and communication, developing the spirit of being a community, accessing and experiencing nature, influencing people's physical and psychological health.

Public spaces are public interaction spaces where citizens can come together and exchange ideas. For this reason, public spaces are spaces where citizens reach the meaning of their lives by shaping their social identities and daily activities (Alpak et al., 2023; Alpak et al., 2018). In this context, the vitality of public spaces shows that the society is equal, prosperous and democratic. This idea; It can be supported by the definition stating that the public sphere is an open, freely accessible and democratic environment. Functional public areas are places where the user can enjoy, socialize and be happy. Such places form the essence of being urban and the basis of public life. Thus, public spaces that care about people and focus on feeding their souls are produced. This public space production; It ensures social equality and justice, increasing the efficiency of using public resources, and increasing the happiness of people. As a result, when creating spaces for people, the existing industrial logic can be replaced by humanistic logic (Xiao et al., 2017).

2. Equality in the Public Space

2.1. Equality

The concept of equality; It appears in different fields with different meanings. In the moral sense, the human being has equal rights only as a human being; In political terms, the election of administrators according to the principle of equal vote defines equality. Legal equality is the equal treatment of all people before the law. Sociologically, equality means not to be discriminated

against in terms of political and social rights among people, regardless of their mental and physical differences. Although equality can mean many different things, in general, equality is understanding and addressing the various barriers that prevent different groups in society from having equal opportunities. It is to ensure that the rights and privileges are the same for everyone (Ayhan and Avukat, 2009).

Throughout history, people have made efforts to ensure that their economic, social and political rights are equal. In this context, many theories have been put forward. These theories focus on and advocate that men and women should be equal in all aspects of society. Individuals who grow up in communities that adopt equality as the basic principle attach importance to equality throughout their lives. The possibility of these individuals to respect human rights and dignity is an important principle that will move societies forward.

Equality means that all individuals have the same opportunities and rights to develop their talents and skills and achieve their goals. This means that people's preferences in a society can differ. However, some people may have different skills and abilities that make them more successful than others in their planned careers. Some may also have significant privilege with their status or wealth. However, equality must be absolute in people's access to basic needs such as health care, housing, education and security. Otherwise, this situation creates an unequal and unjust society (Callinicos, 2000).

While determining the inequality or equality that exists in society, various ideologies and thinkers emphasized the three main dimensions of equality as economic, gender and social (Durant and Rosenbloom, 2017; Ayhan and Avukat, 2009; Callinicos, 2000; Byrne, 2012; Cranz, 1982).

Gender equality: everyone has equal rights in life, regardless of gender. A social environment should be created in which individuals can fully and freely develop their abilities. The elimination of all political and social obstacles that will harm this environment is gender equality.

Social equality: social equality means impartiality, fairness and justice for all people in social policy. It also acknowledges and considers system-related inequalities to ensure that everyone in a community has access to the same opportunities and outcomes. It strives to eliminate the causes of inequalities. Social equality; fair management of all institutions that serve the public directly or under contract; fair distribution of public services and implementation of public policy; means a commitment to promoting justice and equality in the formation of public policy (Johnson and Svava, 2015).

Economic equality: The existence of economic inequality in a society is expressed by the existence of significant differences in wealth, property or income between individuals or classes. But the degree of economic inequality is determined by measuring the difference between the poorest and richest groups. Another method is to determine the ratio of the number of individuals living below the poverty line to the population. Of course, absolute equality of wealth or income has probably never existed in a society. Most democracies strive to achieve economic equality among the individuals who make up the society. This gives people equal opportunity. Otherwise, if certain classes of people in a society have considerable wealth and the power that comes with it for generations, societies will split if certain people remain poor for generations. Such class differences over time can cause resentment and violence in society.

2.2. Social Equality in The Public Space

In cities, public spaces, which are defined as common areas open to all members of society, are important as areas where people gain the awareness of being a society, create their impressions of the city and communicate with other people. The way people perceive and use public spaces in the context of meeting their basic needs directly affects the quality of public life in the city. Social equality emphasizes equal opportunities for access to public services for all residents. It places more emphasis on equality between different social groups to meet the needs of special groups and minorities, especially those with limited mobility (children, the elderly, the disabled), low socio-economic status (Du and Zhang, 2020). Therefore, equal access to these areas is very important within the scope of social equality.

Social equality in the public space; it is defined in a tripartite framework of social equality that includes distribution, recognition and procedural equality (Ma, 2020; Kabisch and Haase, 2014; Özbek and Umarov, 2010; Schlosberg, 2007; Schlosberg, 2004).

Equality of distribution: focuses on the fair distribution of public spaces and related resources for all social groups. It provides the user with equitable access to environmental amenities, services, infrastructure and economic opportunities.

Equality of recognition: refers to the equal recognition and respect of different social status and different identities.

Procedural equality: refers to the fairness of decisions regarding the distribution of activities. procedural equality; It defines efforts to increase public

participation in urban development, city management, and fair participation in the decision-making processes of underrepresented marginalized groups. Thus, a fair integration of all groups affected by the changes into the planning and decision process of a public space is ensured.

The purpose of studying social equality in the public sphere is as follows (Derose et al., 2015):

- Examining the validity of claims that heavily used areas promote social equality,
- To identify the potential of the dimensions of public spaces to facilitate social equality; and
- To determine the effects of ease of access to public spaces on social equality.

Mixed-use public spaces promote social equality. Thus, they can meet the needs of users of different gender, social status and ethnicity. It is important that public spaces enable individuals to participate equally in daily activities and be accessible to all. It shows that these qualities of public spaces can promote social equality. Because a properly functioning public sphere creates opportunities to strengthen community ties and establish social connections (Alpak et al., 2018). The public sphere supports and enhances social equality when equitable access is provided to all members of a community, regardless of physical abilities, gender, ethnicity, age, social status or income level. Equal use of public space paves the way for different socioeconomic groups to mix and interact, and can foster tolerance and cognition of diversity. Thus, public spaces meet the needs and rights of all people, especially poor people or people who are otherwise discriminated against, and enable the realization of social equality.

It is a prerequisite for a public space to be usable in order to provide social equality to its users, and spaces with the following features are usable spaces for individuals (Fourie et al., 2015):

- Presence of meeting and sitting places
- Flexibility and possibility of self-absorption
- Various interaction possibilities
- Presence of various opportunities for local arts, events, green spaces, insufficient security and comfort
- Presence of well-designed edges

- Accessibility for people of all ages and physical abilities
- No fences, walls or signs that impair visual integrity
- Reflecting local culture and values

Public spaces that are not designed to be usable negatively affect the vitality and well-being of their users. Effective strategies are needed in the design, maintenance and development of public spaces to ensure that these spaces contribute to the socialization and diversity of functions of the individual. Quality and functioning public spaces have the ability to promote equality between individuals (Fourie et al., 2015).

3. Social Equality in Urban Parks

One of the important components of public spaces is urban parks. Parks provide various ecological, economic and social benefits to the city and are considered as an important component that increases the quality of life of urban residents (Feng et al., 2019). Many studies have investigated the ecological effects (Cohen et al., 2014), health benefits (Akpınar et al., 2016; Ernstson 2012; Chiesura 2004) and accessibility (Feng et al., 2019; Kabisch and Haase, 2014) of urban parks. city parks; they create spaces for the existence of nature in the city as a public space. Especially during the COVID-19 pandemic, parks became more important as a restorative environment in reducing mental stress, developing positive emotions and increasing psychological well-being. For this reason, having city parks as places that can be reached by walking can provide many benefits:

- Urban parks provide opportunities for active and passive activity that will provide opportunities for social interaction (Düzenli et al., 2019; Kuo et al., 1998).
- Urban parks also provide psychological benefits, including reductions in the negativities of daily life (Chiesura, 2004).
- Urban parks create a safe space for the elderly, easy accessibility, opportunities for physical activities, interesting natural features, and a public space that supports social interaction (Özkan et al., 2015; Guo et al., 2019).
- Easy access to urban parks positively affects children's intellectual and emotional development (Kellert, 2005).
- Urban parks increase the economic value of the surrounding properties (Garvin and Brands, 2011).

- In addition to positively affecting the livability of the city (Garvin and Brands, 2011), urban parks also undertake the task of creating a democratic environment for their inhabitants (Lynch, 1980).

Urban parks provide people with opportunities for recreational activities and play an important role in promoting physical activity and social interaction between different social groups. Thus, urban parks bring citizens closer together (Feng et al., 2019;). Therefore, the accessibility of urban parks; gains importance in the context of social equality and environmental justice (Wolch et al., 2014). Because urban parks create public spaces with natural features for social interactions and create spaces for the development of social equality (Feng et al., 2019). For this reason, the proportional spatial distribution of urban parks in the city creates equal public opportunities for people of different social status and ethnicity.

Urban parks can provide an open and neutral territory, an important quality of public space: urban parks can serve as venues for demonstrations; They are places of conflict and negotiation as places where individual and group identities are expressed. In this context, urban parks provide an important support to urban life by responding to the needs and rights of the populations of individuals with different qualities.

The wide-ranging potentials of urban parks; has made access to urban parks important for citizens. Therefore, accessibility becomes an important parameter to measure the use of parks and equality between various social groups. In other words, it can give a good idea to determine the effects of access to public spaces, urban parks, on social equity. Access to public space and the inclusion of groups of different perspectives, racial and cultural backgrounds are important in contemporary societies (Wu et al., 2023).

Academics studying park management and design; they express their concerns that urban parks will not meet future needs (Byrne, 2012; Cranz, 1982). With the increasing diversity of urban populations in the 21st century, these issues become more important as new groups share urban space. Because together, it becomes difficult for the green areas in the city to meet the needs of the increasing population and the distribution ratio of the green areas in the city is deteriorating. Therefore, equal access to green spaces for urban residents decreases (Wu et al.,2023; Jung, 2023; Du and Zhang, 2020; Derosé et al.,2015; Kabisch and Haase, 2014).

Studies on equality in urban parks; It can be summarized as quantitative equality, spatial equality and social equality (Du and Zhang, 2020; Kabisch and Haase, 2014).

- Quantitative equality; It emphasizes the equitable distribution of public resources on a geographical scale. It emphasizes equal access to green spaces for all people.

- Spatial equality; It focuses on the green space needs of people and the spatial distribution of green spaces. The urban green system was evaluated with indices such as the rate of green space and the amount of green space per capita. Researches on the spatial arrangement of the parks were handled in the spatial equation stage.

- Social equality; It focuses on equal access to green spaces for all people, regardless of gender, race or socioeconomic class. In this context, the time or distance of people to green areas is measured in order to evaluate the equality of park distribution according to the accessibility index. Accessibility affects the frequency with which residents use the park area, so accessibility can be used to directly or indirectly measure the service efficiency of the park green space.

4. Conclusions

The lack of equity in the design and management of urban parks is reflected in issues of social equity and access to urban facilities, particularly in relation to minorities and older populations. Inequalities in access to a quality urban park have been identified by all groups of society as an environmental justice issue. In the era of globalization, urban areas are flooded with people from many countries, and cities are becoming more diverse in terms of race, ethnicity, income, gender and age. An increasingly urbanized world means large numbers of people encountering urban public spaces such as parks. In the future, urban parks that support the myriad roles of public space will become even more important in creating sustainable, just and equitable neighborhoods and cities (Wu et al., 2023; Jung, 2023; Mehta and Mahato, 2021; Du and Zhang, 2020; Kabisch and Haase, 2014). Otherwise, marginalized neighborhoods may result; They can be chosen as residential areas by groups of higher socioeconomic status, who can pay higher rents due to their increased attractiveness and environmental conditions due to their parking capacities. This situation can further increase inequalities between neighborhoods. The ties between people can be broken, interaction can be reduced.

In this context, the evolution of parks and their changing social needs and their effects on park design have become very important. A study on the design of an urban park with equal access can guide future designers and managers.

References

Akpınar, A., Barbosa-Leiker, C., Brooks, K.R. (2016). Does green space matter? Exploring relationships between green space type and health indicators. *Urban Forestry & Urban Greening*, 20, 407-418.

Alpak, E. M., Düzenli, T., Tarakçı Eren, E. (2023). Does Place Identity Support Sustainability of Community at the Urban Parks. *Online Journal of Art and Design*, 11(1), 243-263.

Alpak, E. M., Düzenli, T., Mumcu, S. (2020). Raising awareness of seating furniture design in landscape architecture education: physical, activity-use and meaning dimensions. *International Journal of Technology and Design Education*, 30(3), 587-611.

Alpak, E.M., Düzenli, T., Yılmaz, S. (2018). Quality of Public Open Space and Effects on Social Interaction. *Journal of History Culture and Art Research*, 7(2), 624-638.

Ayhan, A., Avukat, S.(2009). Eşitlik ilkesi ve tarihçesi. *Hukuk Gündemi*, 45-51.

Byrne, J. (2012). When green is White: The cultural politics of race, nature and social exclusion in a Los Angeles urban national park. *Geoforum*, 43(3), 595-611.

Callinicos, A. (2000). Equality. *Contemporary Political Theory: A Reader*, 36-44.

Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and urban planning*, 68(1), 129-138.

Cohen, P., Potchter, O., Schnell, I. (2014). The impact of an urban park on air pollution and noise levels in the Mediterranean city of Tel-Aviv, Israel. *Environmental Pollution*, 195, 73-83.

Cranz, G. (1982). *The politics of park design: A history of urban parks in America* (p. 61). Cambridge, MA: MIT press.

Derose, K.P., Han, B., Williamson, S., Cohen, D.A., RAND Corporation. (2015). Racial-ethnic variation in park use and physical activity in the City of Los Angeles. *Journal of Urban Health*, 92, 1011-1023.

Du, M., Zhang, X. (2020). Urban greening: A new paradox of economic or social sustainability?. *Land Use Policy*, 92, 104487.

Durant, R.F., Rosenbloom, D.H. (2017). The hollowing of American public administration. *The American Review of Public Administration*, 47(7), 719-736.

Düzenli, T., Alpak, E.M., Yilmaz, S. (2019). The correlation between urban open space occupation differences among generations x, y, and z and occupant well-being. *Applied Ecology & Environmental Research*, 17(2).

Ernstson, H. (2012). The Social Production of Ecosystem Services: A Framework for Studying Environmental Justice and Ecological Complexity in Urbanized Landscapes. *Landscape and Urban Planning* 109 (1): 7–17.

Feng, S., Chen, L., Sun, R., Feng, Z., Li, J., Khan, M. S., Jing, Y. (2019). The distribution and accessibility of urban parks in Beijing, China: Implications of social equity. *International journal of environmental research and public health*, 16(24), 4894.

Fourie, C., Schuppert, F., Wallimann-Helmer, I. (Eds.). (2015). *Social equality: On what it means to be equals*. Oxford University Press.

Garvin, A., R. M. Brands. 2011. *Public Parks: The Key to Livable Communities*. 1st ed. New York: W.W. Norton.

Gehl, J. (2010). *Cities for People*. Island press., Washington.

Guo, S., Song, C., Pei, T., Liu, Y., Ma, T., Du, Y., Chen, J. (2019). Accessibility to Urban Parks for Elderly Residents: Perspectives from Mobile Phone Data. *Landscape and Urban Planning* 191: 103642.

Hernández-García, J. (2013). *Public space in informal settlements: The Barrios of Bogotá*. Cambridge Scholars Publishing.

Johnson, N.J., Svava, J.H. (2015). *Justice for all: Promoting social equity in public administration*. Routledge.

Jung, E. (2023). Green spaces for whom? A latent profile analysis of park-rich or-deprived neighborhoods in New York City. *Landscape and Urban Planning*, 237, 104806.

Kabisch, N., Haase, D. (2014). Green justice or just green? Provision of urban green spaces in Berlin, Germany. *Landscape and urban planning*, 122, 129-139.

Kellert, S.R. (2005). *Building for Life: Designing and Understanding the Human-Nature Connection*. Washington, DC: Island Press.

Kuo, F.E., Sullivan, W.C., Coley, R.L., Brunson, L. (1998). Fertile Ground for Community: Inner-city Neighborhood Common Spaces. *American Journal of Community Psychology* 26 (6): 823–851.

Lynch, K. (1980). *A Theory of Good City Form*. Cambridge, Massachusetts: MIT Press.

Ma, F. (2020). Spatial equity analysis of urban green space based on spatial design network analysis (sDNA): A case study of central Jinan, China. *Sustainable cities and society*, 60, 102256.

Mehta, V., Mahato, B. (2021). Designing urban parks for inclusion, equity, and diversity. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 14(4), 457-489.

Özbek, F. M., Umarov, A. (2010). Prosedürel adalet, dağıtımsal adalet ve değersel bağılılık ilişkisi: bir yapısal eşitlik modeli uygulaması. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*.

Özkan, D. G., Alpak, E. M., Yılmaz, S., Düzenli, T., Özbilen, A. (2015). Post occupancy evaluation and user satisfaction in urban open space. *Fresenius Environmental Bulletin*, 24(5), 1659-1672.

Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental politics*, 13(3), 517-540.

Schlosberg, D. (2007). *Defining Environmental Justice: Theories, Movements, and Nature*. Oxford, UK: Oxford University Press.

Wolch, J.R., Byrne, J., Newell, J.P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and urban planning*, 125, 234-244.

Wu, W., Tan, W., Wang, R., Chen, W.Y. (2023). From quantity to quality: Effects of urban greenness on life satisfaction and social inequality. *Landscape and Urban Planning*, 238, 104843.

Xiao, Y., Wang, Z., Li, Z., Tang, Z. (2017). An assessment of urban park access in Shanghai—Implications for the social equity in urban China. *Landscape and urban planning*, 157, 383-393.

CHAPTER VII

RURAL RECREATION AND SUSTAINABILITY IN THE EASTERN BLACK SEA REGION OF TURKEY

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1. Introduction

Noise, visual and air pollution in urban areas push urbanites to spend time in natural areas outside the city. The European Commission defines rural areas as economic, natural and cultural areas and argues that they cannot be evaluated with one-dimensional criteria such as population density, agriculture and natural resources (European Commission, 1999). There has been an increasing demand for rural areas due to the need of urbanites to get away from the monotonous and depressing life of the city and to get closer to nature and open air (Kurum, 1992). With their geographical structures, rural areas are preferred by people for their clean air, rich vegetation, silence and greenery, as well as being the natural places that best define the natural environment for people (Erdoğan, 1999). These regions are multifaceted places that are important for the protection of cultural pattern and natural values, including human communities living in social environments where the economy is mostly based on agricultural production, face-to-face relations are predominant, division of labor and specialization are not developed (Özhancı and Yılmaz, 2017; Güneş et al., 2018).

Life and economic activities in rural areas are directly proportional to the use of natural resources (Soykan, 2000). Activities for leisure time activities that support social life in rural areas are important for reverse migration from urban to rural areas. In particular, it will enable the population trying to live in underemployment conditions and low income levels to find better living conditions in the countryside, and will also have a positive impact on agricultural production. In this context, it is necessary to improve social life in rural areas as an important element in ensuring sustainable development (Muğan Ertuğral, 2023).

In these regions where natural features are important, the importance of the local landscape, which also incorporates cultural features, is quite high. The social, economic and political restructuring of many countries has led to the reshaping of rural areas (Woods, 2005; Labrianidis, 2006).

As in urban areas, the increase in human population in rural areas has led to an increase in technological developments and mechanization in rural areas. This increase has also brought environmental problems in natural areas. This rapid growth in the industry also increases the desire of people to participate in activities integrated with nature and recreational activities (Karaküçük and Gürbüz, 2007). However, rapid increases in user potential from time to time cause the natural balance to deteriorate and natural life to be endangered.

Considering the characteristics of rural areas, it is seen that rural activities originate from natural life. In this respect, leisure activities have gained function according to the natural structure of the rural area, which does not require high-cost investment. At the same time, environmentally friendly activities are important in sustainable development and nature-environment relations. Accordingly, this situation is even more important in terms of the protection of environmental values and the development of environmental awareness (Muğan Ertuğral, 2023).

1.1. Rural Recreation from Geographical, Socio-Cultural and Economic Perspective

Separating or separating rural and urban areas is not as easy as one might think (Politecnico di Milano, 1999; Çelik and Üzümçü, 2018). This concern is even higher in areas with high cultural value. Cultural heritage, natural resources and environmental management practices are at the forefront of rural community thinking. The viability of long-term operations means that they should provide socio-economic benefits to all stakeholders. Environmental impacts should

also be considered in areas where rural recreation is concentrated. Tourism and recreation activities can have a negative impact on the natural environment. Considering that land and other natural resources are limited, it is imperative that cultural values are managed efficiently. This should be done with the participation of rural communities and ethical partnerships (GDRC, 2013).

Natural environments are recreational areas that provide renewal and stress relief. These areas, which enable an individual to socialize and increase the concentration in daily life, can provide economic gain for another individual. This interaction will also reveal the recognition of the cultural values of that region (Karaşah, 2017). Outdoor recreation, travel and tourism contribute significantly to the growth and diversity of the rural economy. In addition to increasing local income and employment, it also increases the share of income and employment among economic sectors on an economic scale (Cordell and Super, 2000).

From a rural culture perspective, ethically preserving a region's natural heritage should be a key objective. This means that the socio-cultural authenticity and history of the host community should not be interfered with, and diversity, cultural heritage and traditional values should be preserved (Greaves and Skinner, 2010). It will be beneficial for the region to utilize all natural, cultural and historical artifacts and resources that contain touristic attraction and attraction elements in accordance with the sustainable tourism approach (Muğan Ertuğral, 2023).

In a study conducted in France in 2000, it was stated that although 53% of the locals spent their holidays in rural areas, 19% of them used rural areas for long-term holidays and 34% for short-term weekend holidays (Espace Rural Et Foret, 2000). Activities in rural areas are mostly daily or weekend activities. The main reason for this is the low quality of accommodation, food and beverage and service quality in the facilities used for recreation and tourism. The profile, preferences and expectations of tourists coming to the region are very important for the management and marketing of rural recreation. As the quality of the facility will increase the duration of the stay, the tourist profile will increase the quality of the facilities.

2. Sustainability and Rural Recreation

Rural areas offer a visitor from an urban area the opportunity to experience stress relief and reconnect with mother nature. Environmental protection and other 'green' issues are driving the need for sustainable rural community tourism

(Nicoladies, 2020). Six basic principles of sustainability, namely utilization, development, design, conservation, marketing and rural economy, are effective in eliminating negative impacts in rural areas (Diktaş Bulut and Daşdemir, 2022). While sustainability is considered from economic, social and environmental perspectives, it also includes business dimensions such as risk management, transparency, strategy and culture. Carter and Rodgers, (2008), argue that sustainability consists of three components: the natural environment, society and economic performance. Carter and Rodgers' work was later developed and modified to include transparency, strategy and culture in this clustering. They created the sustainable supply chain management model in Figure 1.

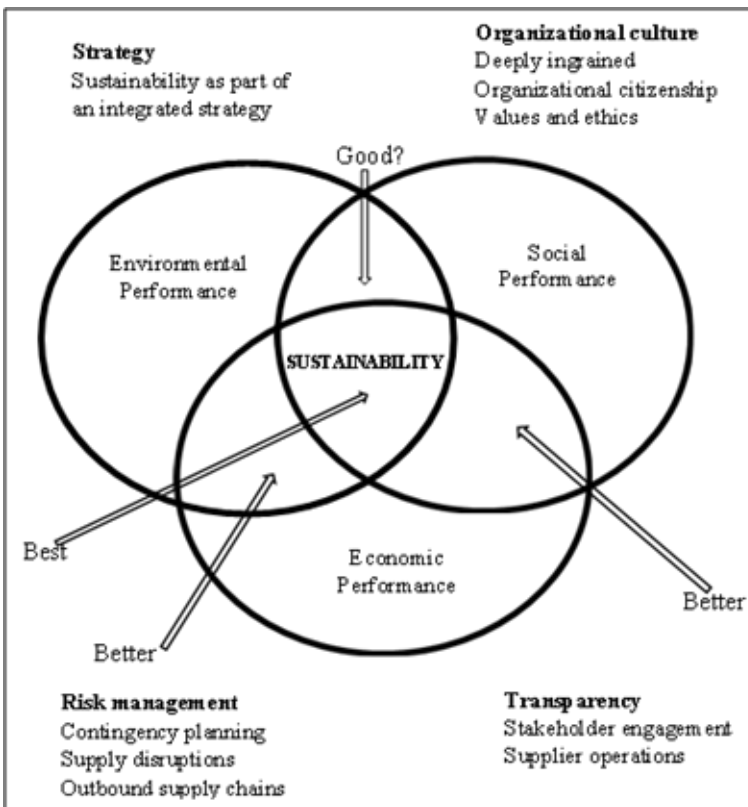


Figure 1. Carter & Rodgers Sustainable Supply Chain Management Model

The social dimension of sustainability is understood in two ways. One is the processes that build societal health and well-being now and in the future, and the other is the social institutions that facilitate environmental and economic sustainability now and in the future (Hainberg, 2010). Priority areas

for sustainability should be identified at different levels. These areas should be environmental, economic and social. Among these areas, it is necessary to first develop a sustainability approach at the regional level in the environmental sense and to follow this approach in a way that all individuals can present it as a goal. In economic terms, the regional area should develop a sustainable, innovative and high-employment effective economy, and in social terms, it should develop a fair society and sustainability approach that supports social inclusion, sustainable communities and personal wealth (Aydemir, 2020).

For recreationists or tourists, rural areas and unspoiled mountains and plateaus have a different meaning. Since these areas are very rich in ecological values, a conservationist approach should be taken at the forefront of planning in order to prevent deterioration due to future use (Pirselimoglu, 2007). The distinction between rural and urban is becoming increasingly blurred, with rural areas increasingly becoming part of the modern leisure industry, with mass tourism on the one hand and small-scale recreational areas on the other (Vaz et al., 2006). Achieving sustainable economic development is directly related to rural development. Sezgin and Karaman, (2008) stated that the principles of sustainability can be achieved through the integration of social responsibility and tourism with the wishes of local people within the framework of tourism's environmental development capacity. In particular, sustainable rural development can be realized with a holistic approach that takes into account and integrates all economic, social and environmental aspects (Muğan Ertuğral, 2023). Opening rural areas for use and advertising the region through social media and introducing it to the world increases the number of visitors throughout the year. Holiday packages offered by food and beverage, accommodation venues and tour companies for tourism purposes increase the employment of local people (Pak, 1999).

3. Rural Recreation in the Eastern Black Sea Region

As one of Turkey's regions with unique natural beauty, the Eastern Black Sea offers unique opportunities not only for sea and beach vacations, but also for rural recreation. This region, which is preferred by those seeking peace and discovery in the lap of nature, is a corner of paradise, especially for Arab tourists, with its plateaus, forests, lakes and natural life. The Eastern Black Sea region has many popular spots for rural recreation. Plateau destinations such as Zigana, Ayder, Uzungöl and Sis Mountain offer visitors the opportunity to spend time in

a tranquil setting in touch with nature. In addition, natural protected areas such as Altındere National Park and Kaçkar Mountains National Park attract nature lovers. The natural beauties and activities in these regions appeal to visitors of all ages and interests.

From this point of view, when planning nature-integrated activities, it is necessary to identify how to delimit potential areas that can meet the individual, short-term tourism needs of urban dwellers by defining the behavioral typologies of visitors. The Eastern Black Sea Region harbors natural beauties such as mountains, forests, lakes and seas. This diversity covers different aspects and activities of rural recreation. The geographical features of the region allow for outdoor activities such as nature walks, mountain bike tours and camping. The region is rich not only in natural beauty but also in historical and cultural heritage. This heritage allows researchers to study the traditions, lifestyle and cultural activities of local people. These cultural dimensions of rural recreation are also an important area of research.

3.1. Middle East Country Visitor Profile

Turkey's cultural, historical and geographical proximity to the Arab world, combined with its tourism potential and dynamic economy, urban population structure and widespread SME network, have given it greater advantages over neighboring countries, especially those that are competitive in terms of tourism (Mengü, 2012). When the international tourism activities for Trabzon province in the Eastern Black Sea Region are analyzed, the intensity of tourists coming from Arab countries draws attention. The climatic characteristics of Middle Eastern countries and the longing for greenery have led them to prefer countries with mild climates, abundant greenery and Muslim countries more in their holiday travels abroad (Figure 2). The most important reason for visitors to choose these countries is that accommodation and food and beverage venues are planned in accordance with the Islamic religion (Cesur and Çeken, 2021). The effects of religious beliefs on holiday travelers have led to the concept of halal tourism in recent years. What is important in this tourism is that there are businesses with places where visitors can easily perform their worship in accordance with the Islamic religion (Mohsin et al., 2016, Sandıkçı et al., 2017; Kasap et al., 2019). Halal food consumption is very important among Muslims. Consuming non-halal food raises the concern that their worship will not be accepted and that they will sin. In this respect, halal foods should be included for visitors from Middle Eastern countries, especially in restaurants and cafes (Şimşek et al.,

2019). Trabzon's rich forest resources and historical and cultural values stand out as an attraction center for recreational tourism. Especially in these regions, which attract the attention of foreign tourists from Arab countries, intensive use of forest recreation areas is observed (Diktaş Bulut and Daşdemir, 2022).

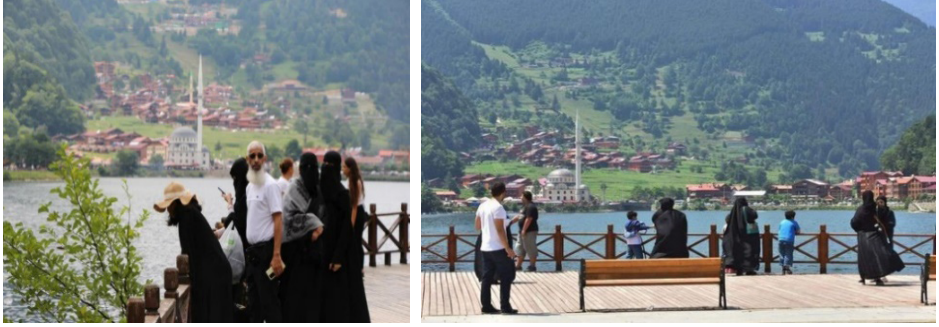


Figure 2. Arab tourists visiting Uzungol and its surroundings
(URL-1/ URL-2)

The plateaus and mountains, where the atüre is green and forested, the air is mild and surrounded by natural lakes, are completely different places for visitors from desert countries. In order to be able to visit these places, which they describe as paradise every year, many Arab investors have bought land in Trabzon city and its districts and built their own residences. In the last 5 years, there are many families from Middle Eastern countries who have obtained a residence permit and established their businesses within the borders of Trabzon province.

3.2. Visitor Profile from Other Countries

Except for Middle Eastern countries, Trabzon receives many domestic and foreign tourists from abroad, especially from European countries, especially Germany, and neighboring countries such as Russia, Ukraine, Georgia and Azerbaijan in the summer months. The Russian-Ukrainian war in recent years has led to an increase in the number of Russian and Ukrainian tourists arriving in 2023. Some of these tourists reside in the region by obtaining a residence permit. Cruise ship tourism between Russia and Turkey also increases the number of visitors to Trabzon, which is a port area (Figure 3).



Figure 3. Astoria Grande (Russian Cruise Ship) URL-3

It is seen that the cruise ship, which started its voyages again in 2022 after a five-year break and 16 voyages are planned for 2023, will both increase the diversity in the tourist profile and bring a different perspective to tourism. European tourists stated that they mostly prefer Trabzon to see the city's 5 thousand years of historical past and cultural artifacts. While the natural beauties, greenery, forests and air of the city are more important for the visitors from Middle Eastern countries, for the visitors from Europe, the fact that the city is a starting point of their historical process and culture, their ancestors lived and fought on these lands, and they want to see the traces of the past allows them to prefer Trabzon for holiday purposes as faith tourism.

3.3. Importance of Rural Recreation for Trabzon City

Trabzon is a city of historical and natural beauty located in the Black Sea Region of Turkey. It is a destination rich in recreation and tourism. The fact that Trabzon is a city famous for its natural beauties, green mountains, lakes and blue sea are the reasons why visitors who want to be in touch with nature prefer this city. In addition, its historical and cultural heritage makes this city even more valuable. Mosques, churches, museums and other historical buildings attract more visitors to the city. These buildings in the city are mostly hidden in the

structural texture. The cultural and historical buildings in the rural areas belong to the Old Rome Byzantine period and are generally located in rocky areas away from the city as protected areas and in hard-to-reach places. Table 1 shows the most preferred nature-integrated recreation areas for the city of Trabzon.

Table 1: Historical and cultural sites within natural areas in Trabzon

1	Sümela Monastery	Located in the Maçka district of Trabzon, this monastery is an ancient Greek Orthodox monastery and church carved into the slope of the mountain. It attracts attention with its natural beauty and historical importance.
2	Boztepe	Located just above the city center, this hill is an observation point with a panoramic view. It is at the top of the hill with views of the city and the sea, and is integrated with woodland and parkland.
3	Kızlar Monastery	Panagia Theoskepastos Monastery is one of the important buildings belonging to the rich history of Trabzon and the Byzantine period. It was built on the slope of Boztepe on the rocks overlooking the city.
4	Vazelon Monastery	It is a Greek monastery located in a natural area in the Maçka district of Trabzon.
5	Kuştul Monastery	It is a monastery located within the borders of Şimşirli-Kuştul Village of Esiroğlu Town of Esiroğlu District of Maçka District of Trabzon Province; which is important in terms of tourism.
6	Uzungöl	It is one of the most famous natural beauties in Çaykara district of Trabzon. It is famous for its lush forests and lake view.
7	Sera lake	It is a landslide set lake located within the borders of Akçaabat district of Trabzon, which is an important natural beauty.

The most important structure among the historical monuments is the Sumela Monastery (Figure 4). This monastery is one of the first and important structures of the Orthodox sect of Christianity in Anatolia and has religious importance. In this context, it increases the importance of religious tourism for this region. In addition, the fact that the structure was built on steep cliffs and has survived to the present day without collapsing allows both nature tourism in terms of its location and history and cultural tourism in terms of its structure (Zaman, 2005).



Figure 4. Sumela Monastery (Ministry of Culture and Tourism URL- 4).

The biggest reason why Trabzon attracts tourists from different nations is that this city, which has been the capital of different civilizations, has an important place in terms of history and its green areas allow rural tourism in terms of recreation and tourism, increasing participation in alternative activities. In Trabzon plateaus, many recreational activities can be done in nature. These include group activities, individual activities, adrenaline and adventure-based activities (Zipline, Paragliding), water-based activities (Rafting, Canoeing) and nature-based activities (Mountaineering, Trekking). Since Turkish cuisine is similar to Arabic cuisine, it can offer a delicious experience especially for Arab tourists. Seafood and local dishes attract the attention of tourists in this sense. Buying local clothes and local food can also be listed as a social activity for visitors. Especially local food and beverages such as hazelnuts and tea and souvenirs such as local shawl keşan and local instrument kemençe are the center of attention of visitors.

In the case of Trabzon, a multidisciplinary approach should be followed in future studies on sustainability. Researchers from different disciplines such as geography, environmental sciences, tourism management, recreation, botany, sociology and economics should carry out multifaceted and comprehensive studies in this field. It would not be right for the city of Trabzon to take sustainable approaches through a single discipline. Many different factors such as the formation of the city, its sea, greenery, hosting different civilizations in the historical process, climate, local culture and geographical location, plateaus

and football are the reasons why this city is preferred. When these factors are evaluated together, the recreational sustainability of the city will increase. One of the countries that best realizes the concept of recreational sustainability is Switzerland. However, in Europe, technology and transportation are planned to minimize the destruction of nature in rural areas. In this context, sustainability will function more smoothly in regions where the infrastructure and transportation network are planned correctly and accurately. This city is a candidate to reach the level of European cities when planning decisions taken jointly in advance and proposals for environmental protection in the long term are put into practice.

3. Results

In the case of Trabzon, a multidisciplinary approach should be followed in future studies on sustainability. Researchers from different disciplines such as geography, environmental sciences, tourism management, recreation, botany, sociology and economics should carry out multifaceted and comprehensive studies in this field. It would not be right for the city of Trabzon to take sustainable approaches through a single discipline. Many different factors such as the formation of the city, its sea, greenery, hosting different civilizations in the historical process, climate, local culture and geographical location, plateaus and football are the reasons why this city is preferred. When these factors are evaluated together, the recreational sustainability of the city will increase. One of the countries that best realizes the concept of recreational sustainability is Switzerland. However, in Europe, technology and transportation are planned to minimize the destruction of nature in rural areas. In this context, sustainability will function more smoothly in regions where the infrastructure and transportation network are planned correctly and accurately. This city is a candidate to reach the level of European cities when planning decisions taken jointly in advance and proposals for environmental protection in the long term are put into practice.

References

European Commission, (1999). ESDP-European Spatial Development Perspective: Towards Balanced and Sustainable Development of the territory of the European Union, Report, European Commission, Brussels.

Aydemir, O., (2020). Sustainability-Sustainable Development and Life Quality, *A+ArchDesign*, 6 (1) ,45-60.

Bielska, A., Borkowski, A.S., Czarnecka, A., Delnicki, M., Kwiatkowska-Malina, J., Piotrkowska, M. (2023). The Designation of Recreational and Tourist Areas in the Sustainable Management of Rural and Suburban Areas, *Geomatics And Environmental Engineering*, 17(3), 5-27.

Carter, C., Rogers, D. (2008). A framework of sustainable supply chain management: moving toward new theory, *International Journal of Physical Distribution Logistics Management*, 38(5), 360-387.

Cesur, E., Çeken, H. (2021). The role of the tourist profile in the tourism perception of the local people of Trabzon: Arab tourist profile, *UTK 2021 Turizm Özel Sayısı Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 24, 46(1), 1313-1331.

Cordell, H.K., Super, G.R. (2000). Trends in americans Outdoor Recreation, *Trends in Outdoor Recreation, Leisure and Tourism*, edited by. W.C. Gartner and D.W. Lime, CABI Publishing, chapter 12, 133-144.

Çelik, A., Üzümcü, T.P. (2018). Yerel Halkın Kırsal Rekreatyon ve Turizm Faaliyetlerine Olan Yaklaşımları: Misi Köyü Örneği, *Uluslararası Turizm, İşletme, Ekonomi Dergisi*, 2(1), 46-56.

Diktaş Bulut, N., Daşdemir, İ. (2022). Consumer profile and recreational demand structure of Arab tourists using forest recreation areas of Trabzon province, *Turkish Journal of Forestry*, 23 (2), 116-127.

Erdinç, G. (1999). Kentsel ve Kırsal Rekreatyon, *Tarım ve Köy İşleri Dergisi*, 129, 30-32.

Espace Rural Et Foret. (2000). Pratiques et attentes des Français en agritourisme'. Farcy, H.de, Gunzbourg P.de. 1967. *Tourisme et Milieu Rural*, Paris.

Global Development Research Center, GDRC, (2023). Charter for sustainable tourism. [accessed 2023 Augst 21].<http://www.gdrc.org/uem/eco-tour/charter.html>.

Greaves, N., Skinner, H. (2010). The importance of destination image analysis to UK rural tourism, *Marketing Intelligence & Planning*, 28(4), 486-507.

Güneş, S.G., Dülger, A.S., (2018). Kırsal Rekreatyonda Eğitici Aktivitelerin Tarımın Sürdürülebilirliği Açısından Önemi: Ankara-Güdül Tahtacı Förencik Örneği, *Tarihin Peşinde -Uluslararası Tarih ve Sosyal Araştırmalar Dergisi*, 20, 477-503.

Heinberg, R., Lerch, D. (2010). The Post Carbon Reader: Managing the 21st Century's Sustainability Crises, Watershed Media, 544.

Karaküçük, S., Gürbüz, B. (2007). Kent (li)leşme, Baran Ofset, 1st Edition, Ankara.

Karaşah B., (2017). Determination of Users' Preferences toward Urban and Rural Recreation Areas 'Case of Artvin City', *Journal of Bartın Faculty of Forestry*, 19(1), 58-69.

Kasap, M., Yıldırım E., Akbulut C. (2019). Trabzon Bölgesini Ziyaret Eden Yabancı Müslüman Turistlerin Helal Turizme Bakış, 2. International Halal Tourism Congress, 4-6 April 2019, Alanya, Turkey.

Kurum, E. (1992). Beynam Muhafaza Ormanı ve Yakın Çevresinin Ankara Kenti Rekreatyon Sistemi Açısından Koruma-Kullanım ve Planlama İlkelerinin Saptanması Üzerine Bir Araştırma. PhD Thesis, Ankara University Institute of Science and Technolo, Ankara, 133 s.

Labrianidis, L. (2006). Human Capital as the Critical Factor for the Development of Europe's Rural Peripheral Areas in Eds. Teresa de Noronha Vaz, Eleanor J. Morgan and Peter Nijkamp, *The New European Rurality: Strategies for Small Firms*, Ashgate, England.

Mengü, C. (2012). The Situation of and Expectations from Tourism Relations between Turkey and Arab World, *Ortadoğu Analiz*, 4(42), 102-112.

Mohsin. A, Ramli, N, Alkhulayfi, B. (2016). Halal tourism: Emerging opportunities, *Tourism Management Perspectives*, 19(B), 137-143.

Muğan Ertuğral, S. (2023). Kırsal Kalkınma Bakımından Boş Zaman Değerlendirmenin Önemi, *International Journal of Disciplines Economics & Administrative Sciences Studies*, 9(49),1122-1130.

Muğan Ertuğral, S., Kuran, İ., Tekeli, H. N. (2022). Dijitalleşmenin Turizm Sektörüne Yansımaları ve Bölgesel Kalkınmaya Etkisi, *Uluslararası Türk Dünyası Turizm Araştırmaları Dergisi*, 7(2), 14-25.

Nicoladies, A. (2020). Sustainable Ethical Tourism (SET) and Rural Community Involvement, *African Journal of Hospitality, Tourism and Leisure*, 9 (1), ISSN: 2223-814X.

Özhancı, E., Yılmaz, H. (2017). Köy Ölçeğinde Yerel Değerler ve Kırsal Alan Kimliği Analizi: Bayburt Örneği, *Uluslararası Toplum Araştırmaları Dergisi*, 13(7), 927-965.

Pak, M., (1999). Halkla İlişkiler Açısından Rekreatyonel Hizmet Üretimi Amaçlı Orman İşletmeciliği, *Tarım ve Köy İşleri Dergisi*, 129, 33-35.

Pirselimoğlu, Z. (2007). Ekolojik Temelli Rekreatyon ve Turizm Planlama İlkelerinin Araştırılması: Trabzon İli Çalköyü Yayla Yerleşimi Örneği. Yüksek

Lisans Tezi, Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Trabzon, 139 s.

Politecnico di Milano, (1999). A Typology of Rural Areas in Europe, PdM, Milan.

Sandıkçı, M., Çağlar A, Güzel, C. (2017). Otellerde Konaklayan Turistlerin Helâl Hizmet Veren (Muhafazakâr) Otel Algıları Üzerine Bir Araştırma, 1. International Halal Tourism Congress, 07-09 April 2017, Alanya, Türkiye, 561-574.

Sezgin, M., Karaman, A. (2008). Sustainable Tourism Management And Marketing Within The Framework Of Touristic Destination. *Selcuk University Institute of Social Sciences Journal*, 19, 429-438.

Soykan, F. (2000). Kırsal Turizm ve Avrupa’da Kazanılan Deneyim, *Anatolia Turizm Arastirmaları Dergisi*, 11, 21-33.

Şimşek, A., Çetinkaya, N., Yıldız S. (2019). Turizm Lisans Öğrencilerinin Helal Gıdaya Yönelik Tutum ve Davranışları, 2. International Halal Tourism Congress, 4-6 April 2019, Alanya, Turkey.

URL-1. www.gunebakis.com.tr/haber/15592133/trabzona-gelen-araplar-bakin-neler-yapiyor

URL-2. www.ensonhaber.com/yasam/uzungolde-arap-turist-yogunlugu-hava-guzel-manzara-cok-guzel

URL-3. www.turizmprojedergisi.com/haber-detay/astoria-grande-gemisi-rus-turistleri-turkiye-ye-getirecek/1165

URL-4. www.kulturportali.gov.tr/turkiye/trabzon/gezilecekyer/meryem-ana-sumela-manastiri

Vaz, T.N., Morgan J.E., Nijkamp P. (2006). The new European rurality: strategies for small firms, Ashgate, England.

Woods, M., (2005). *Rural Geography*. Sage, London.

Zaman, M. (2005). Türkiye’nin Önemli İnanç Turizm Merkezlerinden Biri: Sümela (Meryemana) Manastırı, *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 6(2), 1-24.

CHAPTER VIII

RESOURCE VALUE DETERMINATION PROCESS AND CURRENT STRATEGIES IN RECREATIONAL OUTDOOR SPORTS AREAS

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1. Introduction

People are interested in many outdoor sports areas regardless of the type of recreation areas from past to present and the number of businesses serving in these areas is increasing day by day. This increase makes the internal and external volumes of companies, human resources management, economic and sociological effects more important and makes it difficult to control the management volume. In recent years, people's interest in recreation areas and the increase in economic expenditures have increased the volume of resource value that constitutes these areas, and these increases have led to the need for professional management of resource value analyses. The term resource can be defined in many different ways according to the sector in which it is used. Recreational resource values can be exemplified as all stakeholders in recreation

areas such as environmental visual values, recreational activities, cultural values, special interest tourism areas, natural and human facilities, sociological infrastructure, etc. that make up recreation areas. In terms of businesses, resource values are the tangible and intangible resources that businesses use to develop strategies (Barney, 2001). The characteristics of the resources are the same in all sectors and should be selected only by professionals who are professionally competent to be evaluated in their own context and to develop strategies according to their own context (Fahy, 2000). The development of the right strategies is of great importance nowadays because of its power to improve the quality of the company and its services. Resource value analyses are currently used to support the sustainable management and planning of natural and man-made recreation areas. These analyses are carried out to protect environmental resources, ensure the long-term availability of recreation areas and improve the health and well-being of communities. They are also used to assess economic benefits and ensure the most efficient use of resources. Therefore, resource value analyses have become an important tool for the sustainable and efficient management of recreation areas. In the development of recreational outdoor sports areas in the world, the use of various resource value analyses has been a valuable tool to respond to the expectations of people/customers and to ensure that society makes the best use of these areas. When people prefer recreational outdoor sports, they aim to achieve health and fitness goals, connect with nature, seek adventure and adrenaline, build social bonds and develop skills, self-actualise, and meet their psychological and physical needs. In order to respond to these demands, local governments and recreational area operators take steps such as developing appropriate infrastructure, education and awareness-raising activities, environmental protection measures, organising events and organisations, providing security and emergency preparedness. They also support the long-term sustainability of outdoor sports by specialising in sustainability and planning. In this way, local governments play an important role in maximising the social and environmental benefits of outdoor sports. In the planning and development processes of recreational outdoor sports areas, the following issues are mainly considered and this section, which will provide the most up-to-date processes and strategies for these assessments, is planned to provide readers with basic information about the resource value analysis of recreational outdoor sports areas, basic information about the sustainable use of these areas, some types of analyses required for the society to benefit from these areas in the best way, and critical information to enable operators to plan

strategic moves that will increase their development and market competition, regardless of the area. The strategic analyses presented in this chapter provide readers with the opportunity to understand, plan and manage the ecological, political, economic and social significance of recreation areas. Moreover, it provides guidance on the design, management and planning of recreational outdoor sports areas in a holistic manner and offers the opportunity to understand the environmental impacts of these areas and to use strategies to minimise and manage negative impacts. Thus, readers of this chapter, whether in the role of operator, customer or investor in recreational outdoor sports areas, have the opportunity to better understand and enjoy the value of recreational areas by having access to information that promotes harmony with nature and supports sustainable realisation of all types of activities they will spend in recreational outdoor sports areas. The most basic resource value assessment methods will be described below, followed by information on the most comprehensive assessment strategies and analysis tools. Nature Assessment (Ecological Assessment): This method involves examining the natural environment of recreation areas and assessing biodiversity. The identification of ecosystems, habitats and endemic species is the basis of this method. This information is used for the conservation and sustainable management of the area.

1. Economic Valuation: This method aims to determine the economic value of recreation areas. For example, the economic contribution of tourism revenues, outdoor sports equipment and services can be measured by these analyses. This information supports the efficient use of resources and the development of the tourism industry.

2. Social Surveys and Reviews: This method is used to determine the satisfaction, needs and demands of people using recreation areas. Survey-based research and the collection of opinions of local communities are part of this method. This information guides the design and management of the area.

3. Transportation and Access Analysis: This method assesses how recreation areas are accessed and the ease of access to these areas. Accessibility factors can affect how often people use these areas. Analyses are made on the road network, transport options and access points.

4. Visitor Counting and Monitoring: This method, which is used to monitor the number of visitors and their behaviour in recreation areas, aims to determine how intensively the areas are used. This counting and monitoring is important for the sustainability and safety of the intensity in the area. These basic methods

are used to understand, protect and manage the resource values and utilisation of recreation areas. The methods are often combined to form a more comprehensive resource value analysis. Considering the breadth and diversity of recreation areas, it is recognised that they contribute directly to local development as well as to the economy and promotion of the country. This awareness gives an idea to experts in the field to make resource value analyses with more comprehensive strategies. In some developing countries such as Turkey, unlike European countries, recreational areas are managed and supervised under the responsibility of different administrative structures, it is known that there are legislative gaps and it is known that different recreational areas are not managed holistically with a common model between institutions (Bektaş, 2010). The lack of a holistic management approach in these areas causes challenging effects on the development and supervision of recreational outdoor sports areas. No environment is alone and includes organisations in different areas that are stakeholders. Every organization operates within the conditions that surround it and it is inevitable to be affected by these environmental conditions. These effects affect the process within the organizations and play a major role in providing options on how the organizations will proceed (Güçlü, 2003). Operators, investors, guides, local administrations and local people should be aware of the opportunities, threats, resource value power, competition and risk factors that are affected by the external environment of the organisations and develop sustainable development and management approaches with governance logic (Glueck, 1980). When analysing the external environment of enterprises, it is necessary to know the following definitions (Albanese, 1998). The real external environment is the environment outside the internal environment of the enterprises, which should always keep its connection with this environment up to date for the development of the enterprises and the achievement of applicable successful goals. The perceived external environment is evaluated from the managers' point of view. The most important point to be considered is to ensure that the external environment is perceived exactly correctly, otherwise a strategic gap will occur and the available resource values will not be used efficiently. Decision area and implementation environment, this part refers to the area where management's preferences, objectives and strategic job descriptions are located. Unfortunately, the fact that businesses, investors or local administrations are aware of all of the resource values of the region and develop strategies by taking the competitive environment into planning is a situation that is lacking in recreation areas. In terms of the identity of businesses, managers need to plan the decision area and implementation environment effectively.

Table 1: External Environment Analysis

General/Far Environment Analysis							
Political Environment	Legal Environment	Economic Environment	Sociocultural Environment	Demographic Environment	Technological Environment	International Environment	Natural Environment
-State and government regimes -Election results -Power-opposition relations -Balance of power -Political stability or instability -Political prestige -Degree of effectiveness of relations with official authorities -Methods of claiming rights -The tendency of various organs of the state to intervene in business life -Privatization and nationalization trends	-Trade Law -Law of Obligations -Commodity Law -Enforcement and Bankruptcy Law -Tax Law -Work Law	-Inflation -National income -Production factor costs -Balance of foreign payments -Monetary and fiscal policies -Conjuncture circuits	-Value judgments -Lifestyles -Attitudes -Behavior patterns -Perspective on events -Cultural habits	-The structure of the population -Features of the population -Population trends	-R&D activities in the sector -Emergence of new technologies	-Most favored nation status -Possibilities of war -Inter-country mergers and divergences (Political) -Free trade zones -Customs union agreements -Common market agreements -Economic cooperation -Globalization trends -Embargoes and quotas	-Climate changes -Structure of the land
Sector/Business Environment Analysis							
Analyzing the Main Market		Competition Environment			Main Competitor Analysis		
-Market structure -Borders of the market -Speed of market development or life stage of the market		-Threat of potential competitors -The threat of substitute products -Bargaining power of suppliers -Bargaining power of customers -Intensity of competition between competitors			-Future objectives of the main competitor -Assumptions created by the main competitor -Current strategies of the main competitor -The capabilities of the main opponent		

Source: Ülgen ve Mirze, (2020), Dinçer, (2003).

When the external environment variables are examined, using advanced analyses and strategy examples in terms of determining and managing resource values provides managers with the opportunity to evaluate resources in the most accurate way and evaluate them in market competition as a result of conscious and consistent choices (Barney, 1991).

2. Current Strategies in the Resource Value Determination Process

The use of resource values in strategic management generally refers to a series of decision and action processes that include determining the purpose and objectives of enterprises, analysing the relations between the enterprise and its environment, reorganising the activities necessary to achieve these objectives and distributing the resources to be used effectively in the long term (Dinçer, 2003). Strategic management includes the research, examination, evaluation and selection processes required for the design of strategies; the implementation of these planned strategies by taking the necessary measures to make them applicable within the enterprise; and the steps related to the supervision of the activities carried out afterwards (Thompson and Strickland, 2003). This process assumes an important role in terms of the development of the business/customer relationship in order to recognise the strong weaknesses and competitive advantage of the source values. From this point of view, strategic management refers to a management discipline that includes understanding the external environment and competitive conditions of the enterprise, designing detailed strategies for different products and market components, focusing on critical areas and identifying alternatives and resources, transforming strategies into feasible programmes in functional units, ensuring coordination in the process of achieving basic objectives and establishing appropriate planning, guidance and control systems for effective management of strategies (Ülgen and Mirze, 2020).

2.1. SWOT

SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats) is an effective method used to identify the internal strengths and weaknesses of a business, as well as to identify opportunities and threats arising from external environmental factors. This analysis plays a critical role in the strategic planning of the business. For example, using customer social media posts for SWOT analysis allows the business to improve its strategies by taking customer feedback into account. Moreover, customer posts about product prices can be an important source for the business to review its pricing policy. Feedback on issues such as product quality, variety, delivery processes and stock management helps the business to identify its internal strengths and weaknesses. SWOT analysis outdoor recreation areas allows them to consider the external environment of the business. For example, external factors such as the activities of competitors,

economic conditions, consumer demands and technological developments shape the opportunities and threats of the business. Analysing these factors helps the business to adapt its strategies accordingly to these external factors. As a result, SWOT Analysis helps businesses to create and develop their strategic plans by evaluating their internal and external environments in detail. This analysis enables businesses to seize opportunities by further emphasising their strengths and to develop defences against threats by improving their weaknesses. Thus, fast-growing and multifunctional recreation area businesses that serve different demands have the opportunity to become more competitive and sustainable. SWOT analysis enables to identify the internal strengths and weaknesses of recreation areas and at the same time to evaluate external environmental opportunities and threats. This analysis strengthens the strategic planning of recreation areas because it helps operators to better understand their existing resources and capabilities and environmental conditions. Once internal strengths are identified, strategies can be developed on how these strengths can capitalise on opportunities and how weaknesses can be improved. Likewise, being aware of external threats is important for developing defence strategies against these threats. As a result, SWOT analysis creates a strategic roadmap to ensure the sustainable development and competitive advantages of recreation areas and provides operators with the opportunity to direct and manage recreation resources in the most effective way.

We can explain the importance of SWOT Analysis and how it is used by considering recreation areas in European countries:

Example: Banff National Park – Canada

Strengths:

- It has magnificent natural beauties (mountains, lakes, forests).
- Excellent infrastructure for various extreme sports (mountaineering, camping, skiing).
- Attractive tourist flows throughout the year.
- Attaches importance to environmental protection measures.

Weaknesses:

- Risk of environmental degradation due to the high number of tourists.
- Access to visitors is sometimes difficult.
- Some areas are closed in winter.

Opportunities:

- Increasing demand for nature and outdoor tourism.
- Promotional opportunities to attract more tourists.
- Opportunity to create an environmentally friendly image with the transition to alternative energy sources.

Threats:

- Risk of climate change and natural disasters affecting the park.
- Attractiveness of competing destinations.
- The risk of tourists being insensitive to sustainability measures in the park.

Table 2: Swot Analysis Example

Source: (Saçan ve Eren, 2022).

2.2. VRIO

Vrio Analysis is a strategic management tool used to assess the resources and capabilities of a business. This analysis is used to understand the competitive advantages of the business and to assess its sustainability. Vrio Analysis is based on four basic categories:

1. Value: This category assesses whether the resources or capabilities of the business create customer value. Valuable resources benefit the business in ways such as providing better products or services to customers, providing a competitive advantage in pricing, or increasing customer satisfaction.

2. Rarity: This category assesses whether the resources or capabilities of the business have characteristics that are rarely possessed by competitors. If a resource or capability is widely available, it is not rare according to this analysis and its potential to provide competitive advantage is reduced.

3. Imitability: Whether the resources or capabilities of the enterprise can be easily imitated by competitors is examined under this category. If a resource or capability can be easily copied, it becomes difficult for the enterprise to create a sustainable competitive advantage.

4. Organisational Support: The last category assesses whether the resources or capabilities of the business are effectively supported and managed within the organisation. If resources or capabilities are not well managed or utilised, potential competitive advantages may be lost.

The true value of a resource or capability is recognised when it is effective in unlocking opportunities within a firm's environment (Barney, 1991). Valuable resources enhance a firm's performance and provide a competitive advantage in the industry (Priem and Butler, 2001). Therefore, the fundamental question we should ask when assessing the contribution of a resource or capability to the firm is "Is this resource or capability valuable to the firm in terms of competitive advantage?". If a resource or capability is valuable for the firm, then, as in Porter's SWOT model, it will be a source of strength for the firm. However, if the same resource or capability does not have the potential to create a competitive advantage for a firm, then it can be considered a threat. However, the value of a resource or capability will vary according to the sector in which it is located. While a resource may be a source of strength for a firm in one sector, the same resource may be perceived as a threat in another sector (Barney, 1991). These assessments should be made separately for each firm resource. In line with

these responses, a firm can gain competitive disadvantage, competitive equality, temporary competitive advantage, unused competitive advantage and long-term (sustainable) competitive advantage. Therefore, businesses should carefully assess their resources and capabilities and use this framework to understand their potential to gain competitive advantage (Geylani, 2019).

Vrio Analysis helps businesses to understand which resources can provide competitive advantage and how they can contribute to the strategic goals of the business by evaluating their resources and capabilities according to these four criteria. In this way, businesses can better shape their strategies to gain a competitive advantage and sustain their long-term success.

The importance of Vrio Analysis in the development of recreation areas is related to the fact that it provides a valuable tool for managing these areas in a sustainable and competitive way. Here is the importance of Vrio Analysis in the development of recreational areas:

Identification of Resources: Recreation areas have natural resources, facilities, staff capabilities and management practices. Vrio Analysis enables to identify and evaluate these resources. Determining which resources are truly valuable and can provide competitive advantage is a critical step in the development of recreation areas.

Understanding Competitive Advantage: Recreation areas can operate in different competitive areas, such as tourist attractions, natural parks or sports facilities. Vrio Analysis helps to understand how a competitive advantage can be achieved in these areas. Recreation areas can be more competitive if resources or capabilities are rare, valuable and inimitable compared to competitors.

Strategy Development: The Vrio Analysis guides the process of developing recreation areas' strategies. Identifying which resources are strengths and in which areas development is needed clarifies focal points when creating a strategy. For example, if the natural beauties of a recreation area are rare and valuable, nature tourism strategies can be developed.

Sustainability and Cohesion: Vrio Analysis also helps to assess the environmental and social sustainability of recreation areas. Effective use of natural resources, harmony with local communities and environmental protection measures are important components of the strategies developed based on the results of this analysis.

Performance Monitoring and Improvement: The Vrio Analysis provides a framework for monitoring and improving the performance of recreation areas. Using this analysis to determine which resources consistently provide

a competitive advantage and which need re-evaluation encourages continuous improvement.

In conclusion, the Vrio Analysis helps to develop recreation areas in a sustainable and competitive way. This analysis enables recreation areas to better understand the resources and capabilities they have and to create value for tourists and local communities by making the best use of these resources.

Table 3: Vrio Analysis Example

Is valuable?	Is rare?	Is difficult to imitate?	Is organization organized around?	What is the result?
NO				COMPETITIVE DISADVANTAGE
YES	NO			COMPETITIVE EQUALITY / PARITY
YES	YES	NO		TEMPORARY COMPETITIVE ADVANTAGE
YES	YES	YES	NO	UNUSED COMPETITIVE ADVANTAGE
YES	YES	YES	YES	LONG-TERM COMPETITIVE ADVANTAGE

Source: (Barney,1991).

2.3. PESTEL

PESTEL analysis is an important strategic tool that assesses how businesses or products are affected by external environmental factors. This analysis aims to examine the interaction of the business with political, economic, social, technological, environmental and legal factors. Analysing these factors plays a critical role in product planning, business development and strategic planning processes.

Political factors determine how businesses can be affected by policies and regulations in the countries in which they operate. Economic factors assess the impact of national and international economic developments on businesses. Social factors address the demographic characteristics and trends of society, while technological factors examine the reflections of technological developments on businesses. Environmental factors address the impact of environmental conditions and climate changes on businesses, while legal factors cover the legal regulations governing the activities of businesses.

This analysis helps businesses to understand their external environment and adjust their strategic planning accordingly. Especially in a competitive market, a proper analysis of these factors helps businesses to gain competitive advantage and achieve sustainable success.

Table 4: Example of Pestel Analysis

P	E	S	T	E	L
<ul style="list-style-type: none"> - Government policy - Political stability - Corruption - Tax policy - Labor law - Trade restrictions 	<ul style="list-style-type: none"> - Economic growth - Exchange rate - Interest rate - Inflation rates - Disposable income - Unemployment rate 	<ul style="list-style-type: none"> - Population growth rate - Age distribution - Career attitudes - Safety emphasis - Health consciousness - Lifestyle attitudes - Cultural barriers 	<ul style="list-style-type: none"> - Technology incentives - Level of innovation - Automation - R&D activity - Technological change - Technological awareness 	<ul style="list-style-type: none"> - Weather - Climate - Environmental policies - Climate change - Pressures from NGO's 	<ul style="list-style-type: none"> - Discrimination laws - Antitrust laws - Employment laws - Consumer protection laws - Copyright and patent laws - Health and safety laws

2.4. BENCHMARKING

Benchmarking refers to the process of measuring an organisation's own performance by comparing it with the best companies in the same sector or in another sector (Stevenson, 2002). This method is a scientific approach that enables businesses to understand the developments, new practices and changes occurring in their external environment and to adapt this information to their own organisations. Benchmarking is a managerial tool that enables businesses to make a comparative analysis with other organisations or units in their internal or external environment in order to improve their own practices by accepting the necessity to follow innovations and developments in order to remain competitive in increasingly competitive conditions (Erdem, 2006). The origins of benchmarking practices date back to ancient times and there are many examples. For example, Henry Ford, the founder of Ford, optimised production with a moving belt system to improve production processes. He got this idea while visiting a slaughterhouse in Chicago in 1912. In the slaughterhouse, he saw butchers working in co-operation by cutting the carcasses in a certain order and adapted this idea to automobile production. Ford made production more efficient by using a moving belt system (Capital ve Guide 38, 1997). Similarly, in the 1950s, Eiji Toyoda, the founder of Toyota, was sent to the United States of America to examine major automobile manufacturers such as General Motors and Ford. During these visits, Toyoda analysed not only the automobile industry but also the supply chain management in supermarkets. Toyoda, who was

impressed by the fast and demand-orientated refilling of shelves in supermarkets in case of empty shelves, returned to Japan and laid the foundations of the system known as “just-in-time” or just-in-time production and zero-stock operation. Benchmarking is an important tool that inspires such success stories and encourages the development of businesses.

Benchmarking studies are considered an important tool for continuous improvement and success, and the American Productivity and Quality Centre (APQC) recommends some principles of behaviour to ensure that such studies are conducted more effectively and ethically (Benchmarking Home, 2002):

1. The Principle of Conformity with Law: When in doubt about the legality of any activity, businesses should consult their own legal advisers. In addition, activities in restraint of trade should be avoided, and unlawful practices such as sharing the market or customers by agreement, price fixing agreements or bribery should be avoided.

2. Principle of Exchange: Benchmarking partners should be willing to share the information requested in the same way. Expectations regarding the exchange of information should be clearly understood and honest behaviour should be adopted to avoid misunderstandings and protect common interests.

3. Confidentiality Principle: Information obtained from the benchmarking partner should be kept confidential and should not be passed on to third parties without authorisation. The participation of businesses should be kept confidential and disclosures should not be made without permission.

4. Principle of Use: The information obtained through benchmarking studies should be used only for the specified purposes.

5. Relationship Principle: Businesses should respect the cultures of benchmarking partners and comply with the methods determined. Care should be taken not to use the names of benchmarking partners and the business without permission.

6. Preparation Principle: Before starting benchmarking activities, necessary preparations should be made to increase effectiveness and efficiency.

7. Completion Principle: Businesses should fulfil the commitments made to benchmarking partners on time and the work should be completed to the satisfaction of both parties.

8. Principle of Action and Understanding: Benchmarking partners should understand how they prefer to be treated, these preferences should be respected and the information obtained should be used in line with the expectations of the partners (Benchmarking Home, 2002).

2.5. QUALITY FUNCTION DISTRIBUTION (QFD)

Quality Function Deployment (QFD) is a system for translating customer requirements into appropriate specifications at each stage of the development of a concept, defining the functions that will perform this process, designing the delivery process and finally creating the marketing campaign to inform potential customers (Fortuna, 1998).

Quality Function Deployment is based on a concept called Requirements Interface Matrix (RIM) developed by Ramo Wooldridge Corporation in the 1950s. The RIM was used to provide a logical process for how an organisation produces services based on customer needs. The RIM was later extended by the Japanese when they developed QFD (Johanson and Timpka, 1996).

QFD is derived from the Japanese terms “Hin Shitsu, Ki No, Ten Kai”. Each of these terms has more than one meaning. “Hin Shitsu,” can refer to attributes, characteristics, or traits. “Ki No,” can represent functions or mechanisms. “Ten Kai” can refer to expansion, evolution, expansion or development. QFD is used as an adopted terminology to bring these multiple meanings together. The initials of QFD represent meanings as follows (Ho, 2000):

Q: The quality of your output, how well it meets and satisfies customer requirements.

F: Function is what defines the size, shape or characteristic of the product or service, i.e. what you make or produce.

D: How you do it, delivery, describes how the process adapts to customer needs and wants.

The main purpose of QFD is to ensure that the voice of the customer (VOC) is fully understood and included throughout the design and development process of a product or service. VOC consists of how a process should perform as defined by the customer. QFD helps an organisation understand how well it satisfies its existing customers and what future customer needs and wants will be for new products or services.

QFD (Quality Function Deployment) has a built-in competitive analysis process that focuses on what kind of improvements an organisation needs to make to not only meet customer demands but also to gain competitive advantage. Recreational outdoor sports areas may have many competitors, both local and international, for their services and programmes. This may lead to the adoption of a “captive customer” approach in the product or service development process. The captive customer approach refers to situations where the needs of internal and external customers can never be fully satisfied. These customers usually

For this process, the quality house sections should be thoroughly understood and the voice of the customer should be evaluated by experts and necessary development work should be done.

3. Result

The identification and management of the resource values of recreational outdoor sports areas is of great importance for protecting the natural environment, enhancing the well-being of communities, generating economic benefits and ensuring long-term sustainability. These assessment processes are important tools to ensure the effective use and protection of these areas. When selecting these tools, different methods of analysis should be used, not only those developed for recreation areas, but also those used by multidisciplinary fields to identify resources and develop management strategies. This is very important in order to recognize resources more comprehensively, overlook customer expectations and control crisis management.

The increasing popularity of recreational outdoor sports has increased the complexity of the planning and management processes of these areas. Therefore, a combination of multifaceted approaches such as nature valuation, economic valuation, social surveys, transportation and accessibility analysis, visitor counting and monitoring contribute to the effective management of these areas.

The sustainability of recreational areas requires an important balance between protecting natural resources, meeting the needs of society and achieving economic benefits. Therefore, local governments, operators and planners should actively use resource value analyses to better protect and develop recreational outdoor sports areas.

In conclusion, a scientific assessment of the resource values of recreational outdoor sports areas is critical for the long-term sustainability of these areas and for improving the quality of life of the community. In the future, these assessments will need to be further developed and more efforts will need to be made to meet the needs of society along with the conservation of natural resources. These efforts will help us maximize the positive contributions of recreational outdoor sports in terms of health, well-being and environmental sustainability.

References

- Albanese, R. (1988). *Management*, Ohio: South Western Publishing.
- Barney, J. (1991). Firm resources and sustained competitive Advantage. *Journal of Management*, 17 (1): 99-120.
- Barney, J.B. (2001). Is the resource-based “view” a useful perspective for strategic management research? Yes. *The Academy of Management Review*, 26 (1): 41-56.
- Barney, J.B. (1991). firm resources and sustained competitive advantage. *Journal of Management* 17: 99-120
- Bechmarking Home (2002), “Benchmarking code of conduct”, <https://www.bpir.com/benchmarking-code-of-conduct/>, (Erişim Tarihi: 02.09.2023).
- Bektaş, F. (2010). Kaçkar Havzası trekking parkurlarının spor turizmi bakımından değerlendirilmesi. Doktora Tezi, Gazi Üniversitesi, Ankara.
- Capital ve Arthur Andersen Guide 38 (1997), *iş dünyasının yeni gözdesi benchmarking*, Hürriyet Ofset Matbaacılık, İstanbul.
- Dinçer, Ö. (2003). *Stratejik yönetim ve işletme politikası*, Beta Yayınevi, İstanbul.
- Erdem, B. (2006). İşletmelerde yeni bir yönetim yaklaşımı: kıyaslama benchmarking yazınsal bir inceleme. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 9(15),65-94.
- Fahy, J. (2000). The resource-based view of the firm: some stumbling blocks on the road to understanding sustainable competitive advantage. *Journal of European Industrial Training*, 24 (2/3/4): 94 (article-html).
- Fortuna, R.M., (1988). Beyond quality: Taking SPC Upstream. *Quality Progress*, 21(6), 23–28.
- Geylani, Ö. (2019). İnşaat firmaları için kaynak tabanlı bir değerlendirme ve stratejik bir kaynak olarak Bım. Doktora Tezi, İstanbul Teknik Üniversitesi, İstanbul.
- Güçlü, N. (2003). Stratejik Yönetim. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, 23(2), 61-85.
- Glueck, William F. (1980). *Business policy and strategic management*, New York: Mc-Graw Hill.
- Ho, F.K.Y., (2000). An application of QFD in satellite operation training. MSc Thesis, City University of Hong Kong, HongKong
- Johansson, M., Timpka, T., (1996). Quality functions for requirements engineering in system development methods. *Medical Informatics* 21 (2), 133–145.

Priem, R., Butler, J. (2001). Is the resource-based view a useful perspective for strategic management research? *Academy of Management Review*, 26(1), 22–40.

Saçan, B., Eren, T. (2022). Dijital pazarlama strateji seçimi: SWOT analizi ve çok ölçütlü karar verme yöntemleri . *Politeknik Dergisi* , 25 (4) , 1411-1421 . DOI: 10.2339/politeknik.883023.

Stevenson, W. J. (2002). *Operations Management*. McGraw-Hill/Irwin, 2002. ISBN: 0071121293, 9780071121293.

Thompson, A. A., Strickland, A.J. (2003). *Strategic management: concepts and cases*.13th ed., New Delhi: Tata McGraw-Hill Publishing Company Limited.

Ülgen, H., Mirze, S.K. (2020). *İşletmelerde Stratejik Yönetim*, Beta Basım Yayım.

Ülgen, H., Kadri M. (2004), *İşletmelerde Stratejik Yönetim*, Literatür Yayınevi, İstanbul.

CHAPTER IX

THE USE OF COMMONLY USED PLANTS IN TERMS OF ETHNOBOTANICAL PROPERTIES IN NATURAL LANDSCAPING: THE CASE OF BLACK SEA REGION, TURKEY

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1. Introduction

Ethnobotany is an interdisciplinary science that is a combination of anthropology and botany (Prance, 1991). The term ethnobotany was first used in 1985 by the American botanist Dr John William Hershberger to describe his research, which he described during a conference as the study of plants produced by primitive and indigenous peoples (Ahmad et al., 2006; Rahman et al., 2019). Hershberger published the term in 1896 and proposed ethnobotany as a field concerned with the cultural situation of tribes who use plants for food, shelter, medicine, clothing, hunting, ornamentation, fencing, firewood, timber, food, agricultural tools, building materials and religious ceremonies (Rahman et al., 2019). The knowledge about plants that people have passed on from generation to generation is recorded in ethnobotanical studies. With the increasing attractiveness of cities with the industrial revolution, migration from rural to urban areas and then from urban to metropolitan areas to improve the quality of life results in the loss of orally transmitted information

about plants. This situation has highlighted the importance of ethnobotanical research and the need to record humanity's knowledge of plants (Kendir and Güvenç, 2010; Atsay and Çakır, 2022).

Turkey occupies an important position in terms of plant geography due to its topography and climatic differences (Başköse et al., 2012). Over the years, this extraordinary plant diversity has fostered cultures and traditions closely linked to the use of plants, resulting in a vast and diverse ethnobotanical heritage. Numerous research studies, both national and international, provide insight into the importance of the plant species used in the local socio-cultural context and demonstrate a strong link between biological conservation and the preservation of local cultural heritage (Leto et al., 2012). Alternative uses of native plant species increase diversity and lead to vegetative mobility. The use of the natural vegetation of the region makes the vegetation design aesthetically and functionally effective and enables effective planting design through the use of impressive and different forms together (Seyidoğlu, 2009).

In addition to the ecological, economic and aesthetic benefits of using natural plants in landscape applications, success will be higher by achieving landscape applications that are compatible with ecology (Tuttu et al., 2019). In order to create a plant composition, it is important to know the structural and visual characteristics of plants. The colour, line and texture characteristics of plants should be evaluated and arranged in the best way and should be suitable for the ecology and structural characteristics of the area to be applied (Ayaşlıgil 2005; Düzenli et al., 2018; Yener and Akdeniz, 2020). While some plants are preferred only for their functional properties, others are preferred for their aesthetic properties. Some plants are used for both functional and aesthetic purposes (Özer et al., 2009). Many factors such as colour, shape, texture, flowering time and flowering periods should also be taken into consideration in design (Yener and Akdeniz, 2020).

In line with the literature studies, it is seen that it is important to expand the studies on the use of natural plants in landscape design in order to achieve more ecological and economic benefits in landscape applications. The aim of this study is to investigate the possibilities of using ethnobotanical plants, which have different uses in our culture from the past to the present, in landscape design.

2. Material

The Black Sea region is in the north of Turkey. It takes its name from the Black Sea in the north. The region stretches from the Georgian border in the east

to the Sakarya Plain in the west and east of Bilecik. Covering 18% of Turkey's territory, the region is the third largest in terms of area. It is the longest region from east to west. The elevations of the mountains along the Black Sea are around 2000 metres in the west. Elevations drop to 1000 metres in the central Black Sea and rise to 4000 metres in the east. Due to the difference in elevation, there are significant climatic differences between the coastal and inland areas, and consequently changes in the types of crops grown.

In the region, depending on the climate, there are various dark colored, humus-rich washed soils. It is the region with the highest rainfall in Turkey. Mountains prevent the humid air of the coastal region from passing inland. There are significant climate differences between the coastal and inland parts of the region. As you move from the coast to the interior, both the rate of precipitation decreases and the temperatures drop due to continentality. In places with continental climate, summers are hot, winters are cold and snowy.

The slopes of the mountains facing the sea in the region are covered with dense forests as they receive abundant rainfall. As you move inland, cold-resistant tree species and steppes form the vegetation cover. As you rise along the slope from the coast, it is seen that the vegetation cover changes due to the decrease in temperature. Broad-leaved trees are seen in the area up to 800 meters from the coast, mixed-leaved trees between 800 and 1500 meters, coniferous trees in the area up to 1500-2000 meters, and mountain meadows after 2000 meters. Forest areas are large (Anonymous, 2023a). According to TUBIVES (Anonymous, 2023b) database, 4125 plants are found naturally in the region.

The study material consists of the studies on plants with ethnobotanical use in the Black Sea Region between 2010 and 2023. Article studies on the subject were identified from ISI Web of Knowledge and TR Index database. Likewise, thesis studies on the subject in the National Thesis Center and on the internet within the specified date range were identified. Those whose full texts could not be accessed were not included in the study. In the region of 18 provinces, 41 studies examining the ethnobotanical characteristics of plants in only 14 provinces were identified (Table 1). Of the 41 studies, 15 were province-based, one was region-based (Trabzon, Çorum, Karabük, Amasya), and one examined Trabzon - Rize provinces together. Of the 41 studies, 3 were PhD theses, 18 were master's theses and 20 were research articles.

Table 1: List of publications used in the study, sorted by year

Type of study	Province	Reference
Research Article	Amasya	Cansaran and Kaya, 2010
Master's Thesis	Tokat	Yüzbaşıoğlu, 2010
Master's Thesis	Trabzon	Uzun Yılmaz, 2011
Master's Thesis	Trabzon	Kural, 2012
Research Article	Trabzon - Rize	Sağiroğlu et al., 2012
Master's Thesis	Samsun	Karcı, 2013
Master's Thesis	Rize	Saraç, 2013
Research Article	Trabzon	Akbulut and Bayramoğlu, 2014
Research Article	Rize	Gül, 2014
Master's Thesis	Gümüşhane	Karakurt, 2014
Master's Thesis	Kastamonu	Ayan, 2015
PhD Thesis	Rize	Baykal, 2015
Research Article	Giresun	Polat et al., 2015
Master's Thesis	Karabük	Dikilitaş, 2016
Master's Thesis	Ordu	Badem, 2017
Research Article	Rize	Baykal and Atamov, 2017
Research Article	Bartın	Ekici, 2017
Research Article	Artvin	Eminağaoğlu et al., 2017
Research Article	Samsun	Karcı et al., 2017
PhD Thesis	Kastamonu	Tuttu, 2017
Research Article	Karadeniz	Yeşilyurt et al., 2017
Research Article	Ordu	Aydın and Yeşil, 2018
PhD Thesis	Tokat	Ulcay, 2018
Research Article	Ordu	Özbucak and Ergen Akçin, 2019
Research Article	Artvin	Bozkurt et al., 2019
Master's Thesis	Artvin	Çıfci, 2019
Research Article	Düzce	Gürbüz et al., 2019
Master's Thesis	Ordu	Karaevli, 2019
Research Article	Gümüşhane	Karaköse et al., 2019
Master's Thesis	Rize	Köse, 2019
Master's Thesis	Tokat	Özdemir, 2019
Research Article	Düzce	Erdinç Usta and Altundağ, 2020
Master's Thesis	Düzce	Köysal, 2020
Master's Thesis	Düzce	Özvatan, 2020
Research Article	Düzce	Özvatan et al., 2020
Research Article	Tokat	Yüzbaşıoğlu et al., 2020
Master's Thesis	Gümüşhane	Zengin, 2020
Master's Thesis	Bolu	Arslan, 2021
Research Article	Rize	Çorbacı and Ekren, 2021
Master's Thesis	Düzce	Erdinç Usta, 2021
Research Article	Trabzon	Gürdal and Öztürk, 2022

3. Method

The database management system TURBOVEG (Hennekens and Schaminée 2001), which is used in plant sociological research, was used to analyse and evaluate the lists of plant species identified in ethnobotanical studies in the Black Sea region. The species identified in each study were transferred to the TURBOVEG software and the database “Species Used for Ethnobotanical Purposes in the Black Sea Region” was created. Within the framework of the study, the “Flora of Turkey and East Eagean Islands” (Davis, 1965-1985; Davis et al., 1988; Güner et al., 2000) was used as a reference for species and family information. The Euro+Med Plantbase Project and The Plant List databases were used for current plant names and spelling of family names.

As a result of the analyses, the 25 most common taxa in the region were analysed in two stages: ethnobotanical characteristics and possibilities of use in landscape design. In the first stage, the studies in which the ethnobotanical uses of the 25 taxa were determined were scanned and the information obtained was systematically transferred to the chart created in Excel environment. In the second stage, a comprehensive table of the physical and ecological characteristics of these plants such as structure, life span, flower colour, leaf texture, habitats, flower colour, flower colour, leaf texture and physical and ecological characteristics of these plants was prepared by using “Flora of Turkey and East Eagean Islands” (Davis, 1965-1985; Davis et al, 1988; Güner et al., 2000), “Flowers of Europe” (Polunin, 1969), TUBIVES database (Anonymous, 2023b) and “Plants of Turkey” (Anonymous, 2023c). As a result of the data obtained, suggestions were made on the areas of use and possibilities in landscaping, taking into account the ethnobotanical and structural characteristics of the plants.

4. Results

As a result of the literature review of the studies conducted in the Black Sea region, it was determined that 1297 plant taxa have ethnobotanical uses in the region. Within the scope of the study, the 25 most common plant taxa were examined in terms of their ethnobotanical uses and the possibilities of use in landscape design (Figure 1). The data obtained were explained with tables and supported with graphs.

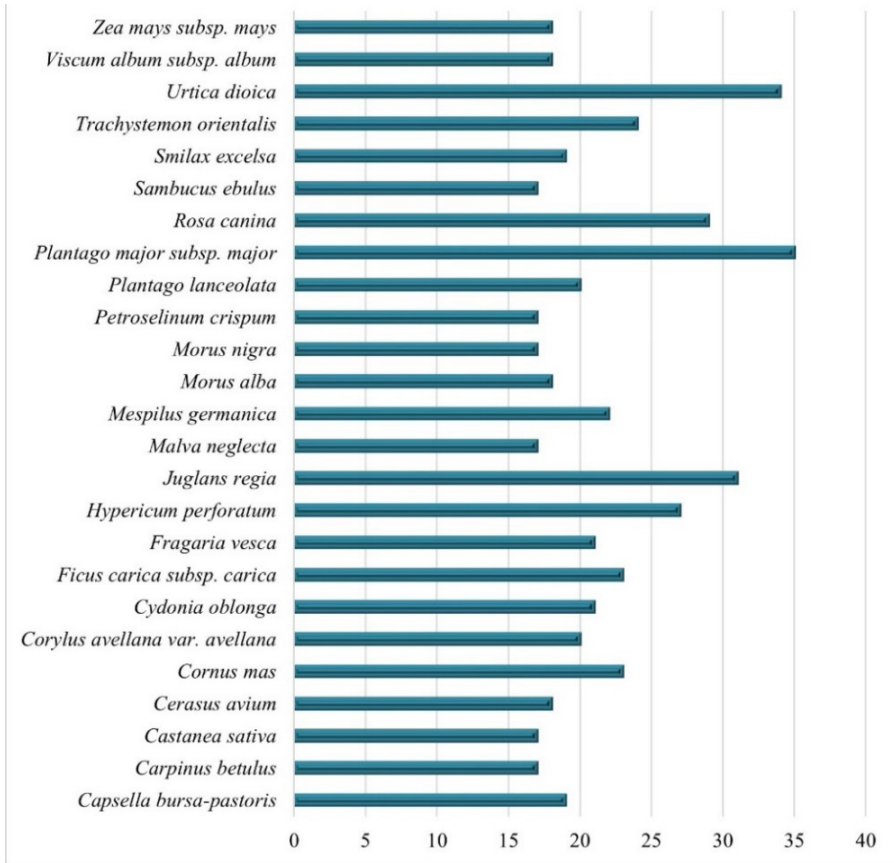


Figure 1. The 25 most common plant taxa

4.1 Analysis of Ethnobotanical Use

The analysis of the ethnobotanical use of plants revealed 12 different uses (Figure 2). In the analysis made under general headings, the most common use is for medical and food purposes with 25 plant taxa. 13 plant taxa are used in the production of tools and equipment such as household utensils, hand tools, brooms, baskets and toys. 8 plant taxa are used in industry for the production of paint, furniture, timber, building materials, 7 plant taxa are used as fuel, 6 plant taxa are used for cosmetic purposes, 6 plant taxa are used as animal feed, 4 plant taxa are used in animal treatment, 4 plant taxa are used in beekeeping, 2 plant taxa are used in pest control, 1 plant taxon is used as ornamental plants, 1 plant taxon is used as toys in children's games. The areas of use of plant taxa according to their species are detailed in Table 2.

Rosaceae	<i>Hypericum perforatum</i>	+	+					+	+										+	
Moraceae	<i>Juglans regia</i>	+	+	+	+			+	+										+	
Moraceae	<i>Malva neglecta</i>	+	+																	
Plantaginaceae	<i>Mespilus germanica</i>	+	+						+											
Plantaginaceae	<i>Morus alba</i>	+	+			+													+	
Rosaceae	<i>Morus nigra</i>	+	+																+	
Liliaceae	<i>Petroselinum crispum</i>	+	+																	
Boraginaceae	<i>Plantago lanceolata</i>	+	+					+												
Urticaceae	<i>Plantago major</i> subsp. <i>major</i>	+	+																	
Loranthaceae	<i>Rosa canina</i>	+	+																+	
Poaceae	<i>Sambucus ebulus</i>	+	+			+	+												+	
Apiaceae	<i>Smilax excelsa</i>	+	+																	
Caprifoliaceae	<i>Trachystemon orientalis</i>	+	+						+											+
Corylaceae	<i>Urtica dioica</i>	+	+					+											+	
Fagaceae	<i>Viscum album</i> subsp. <i>album</i>	+	+			+	+													
Rosaceae	<i>Zea mays</i> subsp. <i>mays</i>	+	+					+											+	

4.2. Planting Design Analysis

When the families to which the 25 plant taxa belonged were analyzed, 17 families were identified (Figure 3). The most common family in the region is Rosaceae with 5 taxa. Other common families among the common species are Moraceae with 3 taxa, Corylaceae with 2 taxa and Plantaginaceae with 2 taxa.

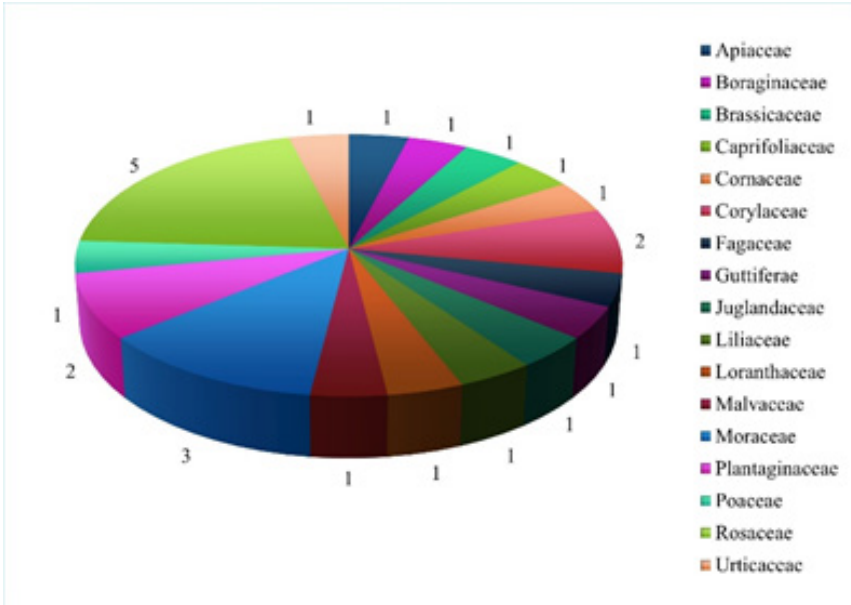


Figure 3. Family distribution

Of the 25 plants examined, 21 were perennial, 1 was biennial and 3 were annual (Figure 4). When the plant structures are analyzed, it is seen that 11 taxa are herbaceous, 7 taxa are shrubs and 7 taxa are trees (Figure 5).

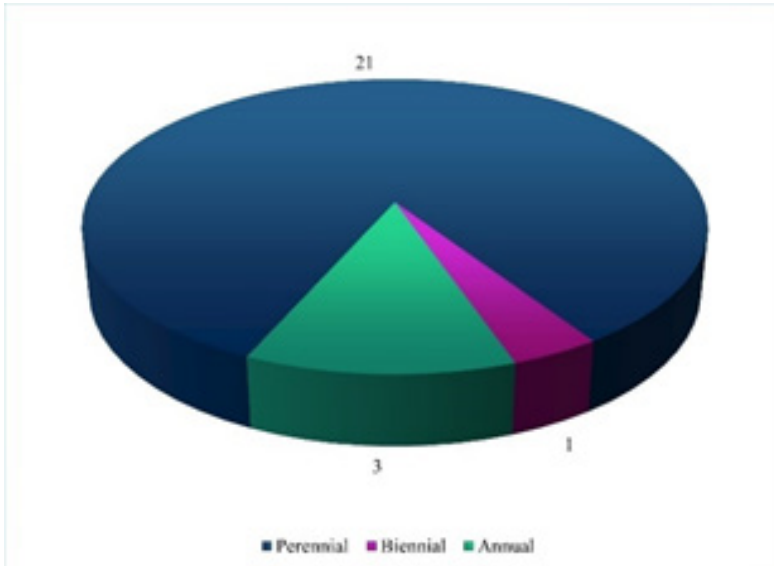


Figure 4. Plant life

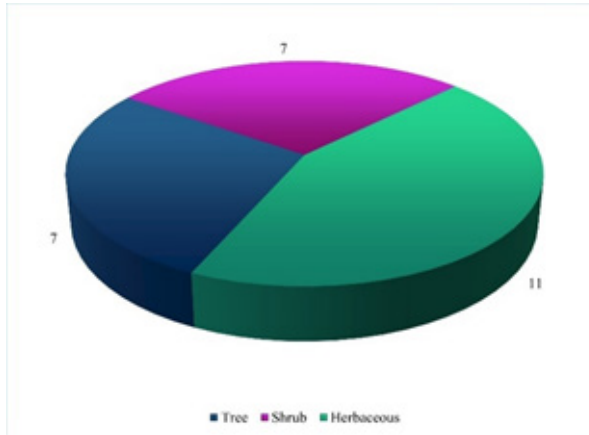


Figure 5. Plant structure

When we examined the phytogeographic distribution of the plants in the study area, which is located at the intersection of the European-Siberian and Irano-Turanian floristic regions phytogeographically, it was determined that 16 taxa belong to the unknown, 6 taxa belong to the European-Siberian, 1 taxon to the Hirkan-Black Sea, 1 taxon to the Black Sea, and 1 taxon to the Mediterranean region (Figure 6).

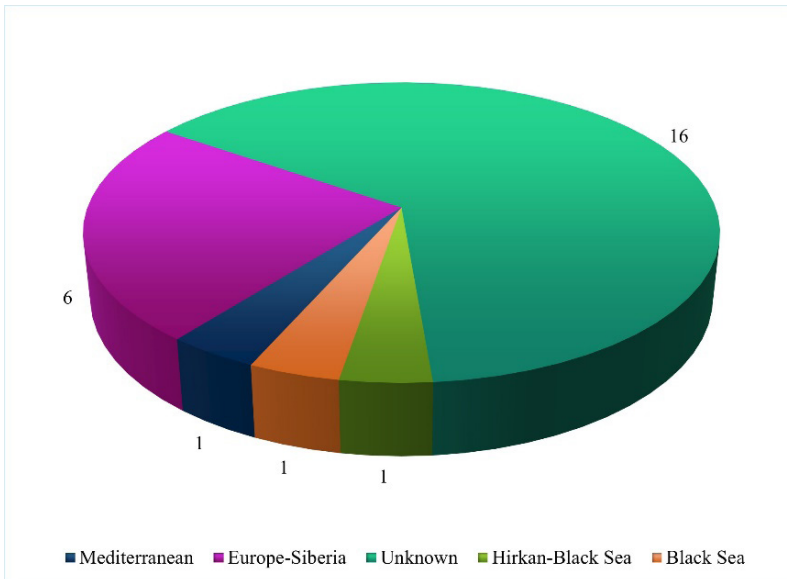


Figure 6. Phytogeographic region distribution

When 25 plant taxa were examined in terms of flower color, 15 different color groups emerged (Figure 7). In the region, it was determined that there are the most white flowering plants with 9 taxa, followed by yellow flowering plants with 3 taxa.

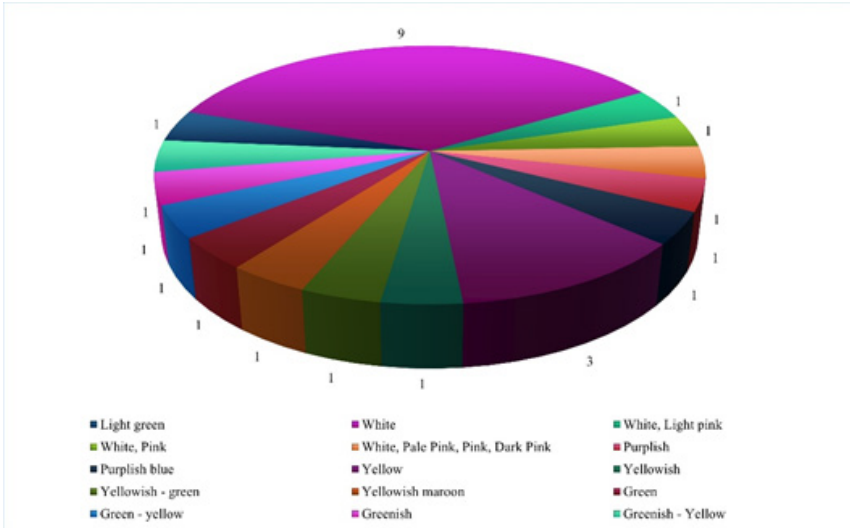


Figure 7. Flower coloring

The main flowering period of the plants is between March and September. Most plants flower between May and August, depending on seasonal temperatures (Figure 8). According to the literature, *Capsella bursa-pastoris* flowers 12 months of the year. Therefore, the longest flowering period is observed in *Capsella bursa-pastoris*. This is followed by *Ficus carica* subsp. *carica* and *Plantago lanceolata* with 7 months (Figure 9).

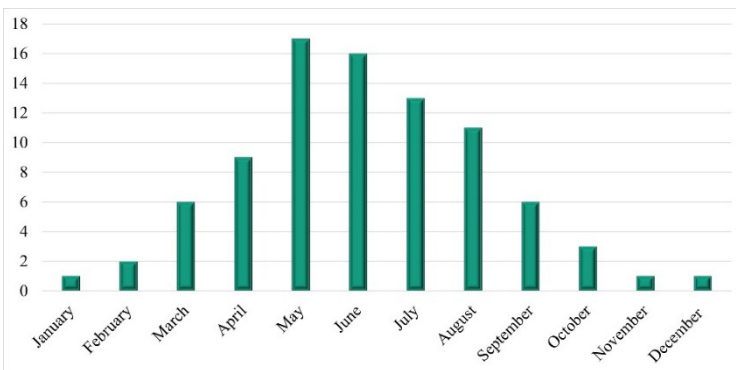


Figure 8. Flowering period

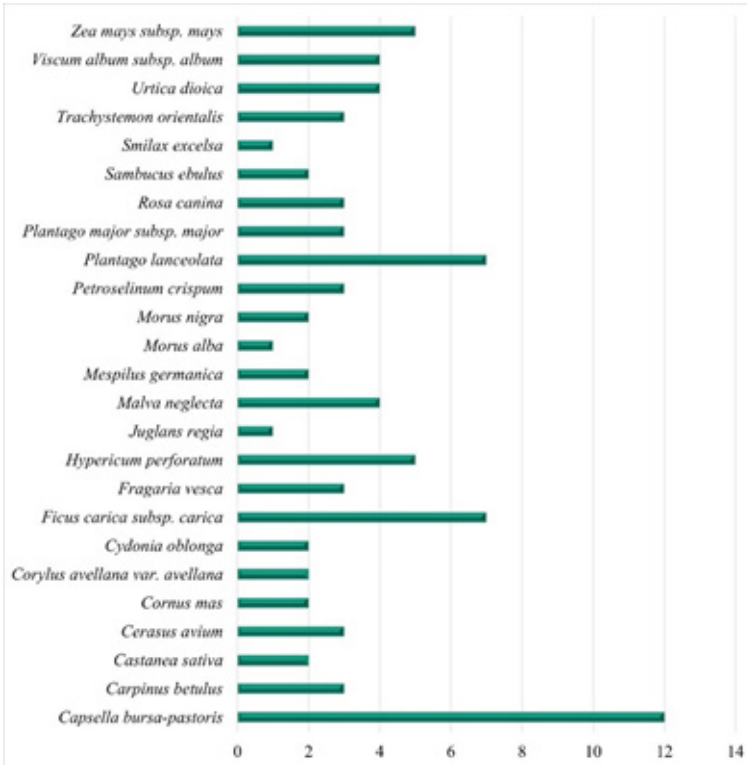


Figure 9. Flowering time

When the examined plants were analyzed according to leaf textures, it was determined that 7 taxa were fine textured, 9 taxa were medium textured and 9 taxa were coarse textured (Figure 10).

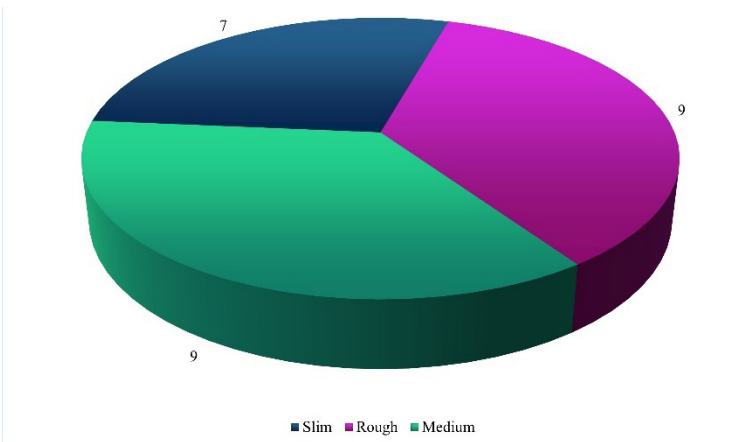


Figure 10. Leaf texture

According to the structure of the plants, it was determined that they can be used in mass, solitary and solitary-mass use depending on their location in the plant composition (Figure 11).

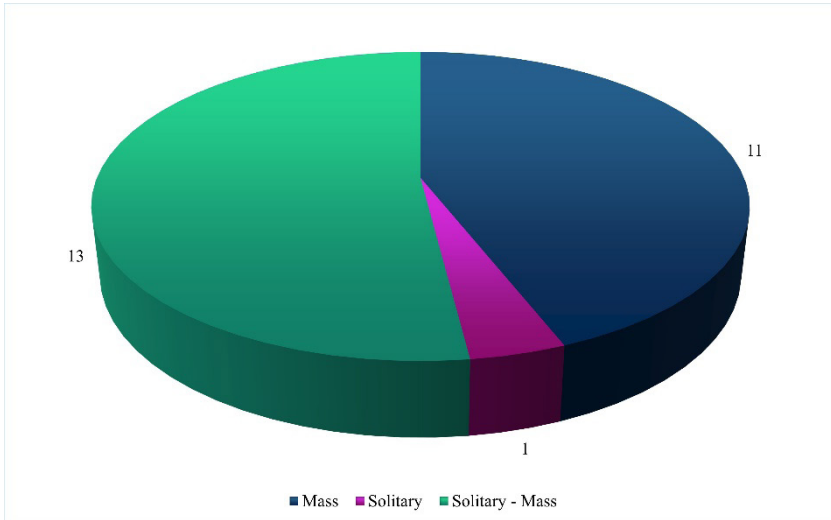


Figure 11. Use in landscaping

5. Conclusion

As a result of the literature researches and analyzes, the physical, aesthetic and ecological characteristics of 25 plant taxa, which are widely used in the field of ethnobotanical use, which will be effective when used in landscape designs, were discussed. The possibilities of using the plants in the landscape depending on their design features and ecological requirements are detailed in Table 3. When the habitat characteristics, aesthetic and physical characteristics of the plants were evaluated in parallel with the ethnobotanical usage possibilities, it was determined that 25 taxa could find a place in 14 different usage areas. These areas are plant composition, orchard, vegetable garden, flower partner, hedge, rock garden, roadside plantings, erosion control, shade, screening, border element, butterfly garden, bee garden, ivy.

Table 3: The Usage Opportunities of 25 Most Common Plant Taxa in Black Sea Region in Landscape Designs

Plant name	Plant structure	Plant height (cm)	Natural habitat of the plant	For landscaping use	Usage areas/ functions in landscape
<i>Capsella bursa-pastoris</i>	Herbaceous	50	Cultivated area, empty field	Mass	Plant composition
<i>Carpinus betulus</i>	Tree	2500	Broadleaved (<i>Quercus-Fagus</i>) or mixed (<i>Abies-Picea-Fagus</i>) forests, pure association	Solitary - Mass	For shading, screening or as a bordering element
<i>Castanea sativa</i>	Tree	3500	Well-watered, deciduous and mixed forests (<i>Quercus-Fagus</i> or <i>Picea-Fagus</i>)	Solitary - Mass	Screening, border element, orchard, plant composition, bee garden
<i>Cerasus avium</i>	Tree	3000	Mixed forest	Solitary - Mass	Screening, border element, orchard, plant composition, bee garden
<i>Cornus mas</i>	Shrub	800	Broad-leaved forests, scrubland	Solitary - Mass	Screening, border element, orchard, plant composition, bee garden
<i>Corylus avellana</i> var. <i>avellana</i>	Shrub	400-600	Deciduous broad-leaved forests (<i>Quercus-Carpinus-Fagus</i>) or mixed forests	Solitary - Mass	Orchard, border element
<i>Cydonia oblonga</i>	Shrub	800	Forests and scrubland	Solitary - Mass	Orchard
<i>Ficus carica</i> subsp. <i>carica</i>	Tree	1000	Open areas, mixed forests, stony slopes, valleys, rock hollows	Solitary - Mass	Orchard
<i>Fragaria vesca</i>	Herbaceous	10-30	Moist places, especially forests	Mass	Orchard, plant composition
<i>Hypericum perforatum</i>	Herbaceous	10-110	Dry habitats in mesophytic regions	Mass	Rock gardens, plant composition
<i>Juglans regia</i>	Tree	3000	<i>Quercus</i> or mixed deciduous forest, calcareous rocky slopes, alluvial soils	Solitary - Mass	Plant composition, orchard
<i>Malva neglecta</i>	Herbaceous	60	Steppe, fields, roadsides, wastelands	Mass	Vegetable garden, rock garden

<i>Mespilus germanica</i>	Shrub	200-300	Grows in many parts of the country, least abundant in North Anatolia, sparse forests, rocks and maquis	Solitary - Mass	Plant composition, orchard
<i>Morus alba</i>	Tree	1500	Cultivad	Solitary - Mass	For shade, screening, orchard
<i>Morus nigra</i>	Tree	1000	Cultivad	Solitary - Mass	For shade, screening, orchard
<i>Petroselinum crispum</i>	Herbaceous	50-80	Fields, vineyards, cultivated or escaped from culture	Mass	Vegetable garden
<i>Plantago lanceolata</i>	Herbaceous	7-90	Seashores, sandy beaches, meadows, marshy places, maquis, river banks, etc.	Mass	Rock gardens, butterfly gardens
<i>Plantago major</i> subsp. <i>major</i>	Herbaceous	10-50	Stream and river banks, ditches, path edges, cultivated land, pastures and wastelands	Mass	Rock gardens, butterfly gardens
<i>Rosa canina</i>	Shrub	100-300	Coasts, rocky slopes, scrub, hedgerows, forests and clearings, mainly limestones	Solitary - Mass	Hedges, rock gardens, roadside plantings, erosion control, plant composition
<i>Sambucus ebulus</i>	Herbaceous	200	Deciduous forests, roadsides, coasts	Mass	Plant composition, orchard, vegetable garden
<i>Smilax excelsa</i>	Shrub	200	Maquis, scrubland, forests	Solitary	Ivy
<i>Trachystemon orientalis</i>	Herbaceous	20-40	<i>Fagus</i> forest, shady river banks, moist bays	Mass	Flower bed, vegetable garden
<i>Urtica dioica</i>	Herbaceous	30-150	Forests, shady valleys and rocks, water edges	Mass	Butterfly garden
<i>Viscum album</i> subsp. <i>album</i>	Shrub	80	Various dicotyledonous trees	Solitary - Mass	Plant composition
<i>Zea mays</i> subsp. <i>mays</i>	Herbaceous	400	Cultivad, in abandoned fields	Mass	Vegetable garden

Some of the woody plants in Table 3 (*Carpinus betulus*, *Castanea sativa*, *Cerasus avium*, *Cornus mas*) are occasionally used in landscaping due to their autumn coloration, structure or aesthetic features. However, due to the invasive

properties of *Viscum album* subsp. *album* and *Capsella bursa-pastoris*, their careful and controlled use in landscaping is recommended.

In today's world where energy efficient landscape designs are in question, the ecological, physical and aesthetic characteristics of the plant species preferred in planting designs, as well as the possibility of different uses, are important in terms of the sustainability of the designs and interaction with the user. In addition, the fact that the preferred species are natural plant species is a choice that has positive effects on both the protection and continuity of plant species and economically.

The ease of adaptation of native plant species to the ecological conditions of the region where they are located can contribute to the repair or reduction of vegetation degradation (Tuttu et al., 2019). The benefits of using native plants in landscapes are listed as being resistant to extreme climatic conditions, providing food and shelter for wildlife in urban areas, contributing to soil fertility and reducing erosion, and low maintenance costs due to low fertilizer and irrigation needs (Özhatay, 2009). They are both ecologically important and effective in creating thematic gardens (butterfly, bee garden, etc.) and compositions. The preference of plants with ethnobotanical uses in these areas is also important in terms of transferring the various benefits of plants to future generations and serving the ecosystem in this process. According to Jones and Hoversten (2004), a successful ethnobotanical garden can tell a compelling story about the relationship between people, plants and the natural world in a particular place at a particular time within a broader cultural context. They therefore advise landscape architects to pay attention to certain issues during the programming and design process of such a site. These include which people interpret the space, what aspect of their culture it reflects, how they use it, which plants they prefer to use, how they use them and what they do with them. This framework can give us the tools to expand our collective vision of what an ethnobotanical garden can be. With this framework, landscape architects can approach ethnobotanical gardens from the broader context of a people's relationship with the world.

References

Ahmad, S., Ali, A., Beg, H., Dasti, A. A. (2006). Of Booni Valley, District Chitral Pakistan, *Journal of Weed Science Research*, 12(3): 183.

Akbulut, S., Bayramoglu, M.M. (2014). Reflections of socio-economic and demographic structure of urban and rural on the use of medicinal and

aromatic plants: the sample of Trabzon Province, *Studies on Ethno-Medicine*, 8(1): 89-100.

Anonymous, (2023a). <https://www.cografya.gen.tr/egitim/bolgeler/karadeniz.htm>. (Accessed Date: 21.06.2023).

Anonymous, (2023b). TÜBİVES, <http://194.27.225.161/yasin/tubives/index.php?sayfa=220> (Accessed Date: 07.07.2023).

Anonymous, (2023c). Türkiye'nin Bitkileri, web adresi: <https://turkiyebitkileri.com/tr/> (Accessed Date: 20.07.2023).

Arslan, K. (2021). Yeniçağa (Bolu) Yöresinin Geleneksel Halk İlacı Olarak Kullanılan Bitkileri. Yüksek Lisans Tezi, Marmara Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul.

Atsay, Ç., Çakır, E.A. (2022). Geleneksel arıcılık faaliyetleri kapsamında Türkiye'de yapılmış etnobotanik çalışmaların değerlendirilmesi, *Düzce Üniversitesi Bilim ve Teknoloji Dergisi*, 10(1): 109-116.

Ayan, Ö. (2015). Kastamonu Yöresinde Etnobotanik Açından Yenilebilen Bazı Bitki Taksonlarının Gıda Patojeni Olan Mikroorganizmaları Üzerine Antimikrobiyal Etkileri. Yüksek Lisans Tezi, Kastamonu Üniversitesi Fen Bilimleri Enstitüsü, Kastamonu.

Ayaşlıgil, Y. (2005). Bitki Kullanımı (Basılmamış Ders Notu). İstanbul Üniversitesi Orman Fakültesi, Peyzaj Mimarlığı Bölümü, İstanbul.

Aydın, A., Yeşil, Y. (2018). İkizce Ordu-Türkiye ilçesinde etnobotanik bir ön çalışma, *Bağbahçe Bilim Dergisi*, 5(3): 25-43.

Badem, M. (2017). Akkuş (Ordu) ve Köylerinde Bulunan Bitkilerin Etnobotanik ve Etnomedikal Özelliklerinin Belirlenmesi ve Halk İlacı Olarak Kullanılan Türlerin Biyolojik Aktivitelerin Değerlendirilmesi. Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi Sağlık Bilimleri Enstitüsü, Trabzon.

Başköse, İ., Paksoy, M.Y., Savran, A. (2012). The Flora of Nigde University campus area and Akkaya Dam Lake Environments (Nigde/Turkey), *Biological Diversity and Conservation*, 5(3): 82-97.

Baykal, H. (2015). Başhemşin (Çamlıhemşin/Rize)'in Florası, Fitososyolojisi ve Etnobotanik Özellikleri. Doktora Tezi, Recep Tayyip Erdoğan Üniversitesi Fen Bilimleri Enstitüsü, Rize.

Baykal, H. Atamov, V. (2017). Ethnobotanical documentation of plants of başhemşin valley, Kaçkar mountains national park, Rize, Turkey, *Bangladesh Journal of Botany*, 46(2): 767-773.

Bozkurt, E.A., Özkan, C.Z., Saraç, U.D. (2019). The floristic structure of the Artvin-Soğanlı Village (Turkey) and the traditional usage of these plant taxa in this region, *Biological Diversity and Conservation*, 12(2): 109-118.

Cansaran, A., Kaya, Ö.F. (2010). Contributions of the ethnobotanical investigation carried out in Amasya district of Turkey (Amasya-Center, Bağlarüstü, Boğaköy and Vermiş villages; Yassıçal and Ziyaret towns), *Biyolojik Çeşitlilik ve Koruma*, 3 (2): 97-116.

Çıfci, K. (2019). Artvin'in Merkez Köylerindeki Bazı Bitkilerin Yöresel Kullanımları. Yüksek Lisans Tezi, Artvin Çoruh Üniversitesi Fen Bilimleri Enstitüsü, Artvin.

Çorbacı, O.L., Ekren, E. (2021). Kentsel açık yeşil alanlarda kullanılan tıbbi ve aromatik bitkilerin değerlendirilmesi: Rize kenti örneği, *Düzce Üniversitesi Orman Fakültesi Ormancılık Dergisi*, 17(1): 159 - 172.

Davis, P. (1965-1985). *Flora of Turkey and East Aegean Islands*. Edinburg: Vol:1-9 University Press.

Davis, P., Mill, R.R., Tan, K. (1988). *Flora of Turkey and the East Aegean Islands (Supplement)*. Edinburgh: Volume 10, University Press.

Dikilitaş, B. (2016). Ovacık (Karabük) ve Çevresinin Flora ve Etnobotanik Özellikleri. Yüksek Lisans Tezi, Celal Bayar Üniversitesi, Manisa.

Düzenli, T., Tarakçı, E., Baltacı, H., Aktürk, E. (2018). Bitkisel peyzaj tasarımında renk tercihleri.: KTÜ Kanuni Kampüsü Örneği, *Uluslararası Sosyal Araştırmalar Dergisi*, 11(55).

Ekici, B. (2017). Some geophyte plants determined in Bartın/Turkey, *Biological Diversity and Conservation*, 10(1): 49-54.

Eminağaoğlu, Ö., Göktürk, T., Akyıldırım Beğen, H. (2017). Traditional uses of medicinal plants and animals of Hatila Valley National Park, Artvin, *Biological Diversity and Conservation*, 10(3): 33-42.

Erdinç Usta, B. (2021). Samandere Vadisi (Düzce) ve Çevresinin Etnobotanik Özellikleri. Yüksek Lisans, Düzce Üniversitesi Fen Bilimleri Enstitüsü, Düzce.

Erdinç Usta, B., Altundağ, E. (2020). A Study on the traditional usages of woody plants in Derdin village/Düzce (Turkey), *Eurasian Journal of Forest Science*, 8(3): 221-243.

Gül, V. (2014). Rize yöresine ait tıbbi ve aromatik bitkilere genel bir bakış, *Journal of the Institute of Science and Technology*, 4(4): 97-107.

Güner, A., Özhatay, N., Ekim, T., Başer, K.H.C. (2000). *Flora of Turkey and East Aegean Islands*. (Supplement 2). Edinburg: Vol:11, University Press.

Gürbüz, İ., Özkan, A. M., Akaydın, G., Salihoğlu, E., Günbatan, T., Demirci, F., Yeşilada, E. (2019). Folk medicine in Düzce Province (Turkey), *Turkish Journal of Botany*, 43, 1-81.

Gürdal, B., Öztürk, F. (2022). Ethnobotanical research in sürmene district (Trabzon-Turkey, Black Sea region), *Advances in Traditional Medicine*, 1-12.

Hennekens, S.M., Schaminée, J.H. (2001). TURBOVEG, a comprehensive data base management system for vegetation data. *Journal of Vegetation Science*, 12(4): 589-591.

Jones, S.B., Hoversten, M.E. (2004). Attributes of a successful ethnobotanical garden, *Landscape Journal*, 23(2): 153-169.

Karaevli, A. (2019). Korgan (Ordu) Yöresinde Gıda Olarak Tüketilen Doğal Bazı Bitki Taksonları ve Etnobotanik Özellikleri. Yüksek Lisans Tezi, Isparta Uygulamalı Bilimler Üniversitesi Lisansüstü Eğitim Enstitüsü, Isparta.

Karaköse, M., Akbulut, S., Özkan, Z.C. (2019). Ethnobotanical study of medicinal plants in Torul District, Turkey, *Bangladesh Journal Plant Taxonomy*, 26(1), 29-37.

Karakurt, E. (2014). Kelkit (Gümüşhane) İlçesinin Etnobotanik Özellikleri. Yüksek Lisans Tezi, Erzincan Üniversitesi Fen Bilimleri Enstitüsü, Erzincan.

Karcı, E. (2013). Bafra (Samsun) Halk İlaçları. Yüksek Lisans Tezi, Gazi Üniversitesi, Ankara.

Karcı, E., Gürbüz, İ., Akaydın, G., Günbatan, T. (2017). Folk medicines of Bafra (Samsun-Turkey), *Turkish Journal of Biochemistry*, 42(4): 381-399.

Kendir, G., Güvenç, A. (2010). Etnobotanik ve Türkiye’de yapılmış etnobotanik çalışmalara genel bir bakış, *Hacettepe Üniversitesi Eczacılık Fakültesi Dergisi*, 30(1): 49-80,

Köse, M. (2019). Güneysu (Rize) İlçesinin Etnobotanik Özellikleri. Yüksek Lisans Tezi, Artvin Çoruh Üniversitesi Fen Bilimleri Enstitüsü, Artvin.

Köysal, A. (2020). Gölyaka (Düzce) Yöresinde Etnobotanik Bir Araştırma. Yüksek Lisans Tezi, Düzce Üniversitesi Fen Bilimleri Enstitüsü, Düzce.

Kural, K. (2012). Trabzon Çevresinde Yayılış Gösteren Faydalı Bitkiler Üzerinde Ekonomik Botanik Yönünden Araştırmalar. Yüksek Lisans Tezi, İstanbul Üniversitesi, İstanbul.

Leto, C., Tuttolomondo, T., Bella, S.L., Licata, M. (2012). Ethnobotanical study in the Madonie Regional Park (Central Sicily, Italy) medicinal use of wild shrub and herbaceous plant species, *Journal of Ethnopharmacology*, 146, 90-112.

Özbucak, T.B., Akçin, Ö.E. (2019). Ordu ilinde bulunan bazı doğal bitkiler üzerine bir çalışma. 3. Uluslararası UNİDOKAP Karadeniz Sempozyumu, 21-23 Haziran, Tokat, Bildiri Kitabı.

Özdemir, A. (2019). Erbaa (Tokat)da Etnobotanik Bir Araştırma. Yüksek Lisans Tezi, Harran Üniversitesi Fen Bilimleri Enstitüsü, Şanlıurfa.

Özer, S., Atabeyoğlu, Ö., Zengin, M. (2009). *Prunus spinosa* L. (Çakal Eriği)'nin peyzaj mimarlığı çalışma sahasında kullanım olanakları, *GOÜ. Ziraat Fakültesi Dergisi*, 26(2): 1-7.

Özhatay, E.C. (2009). Türkiye'nin Peyzajda Kullanılabilecek Bazı Doğal Bitkileri. Yüksek Lisans Tezi, Marmara Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

Özvatan, B. (2020). Yığılca (Düzce) Yöresinde Etnobotanik Araştırmalar. Yüksek Lisans Tezi, Düzce Üniversitesi Fen Bilimleri Enstitüsü, Düzce.

Özvatan, B., Çakır, E. A., Kutlu, L. (2020). Düzce il merkezi semt pazarlarındaki bitkilerin etnobotanik açıdan incelenmesi (Karadeniz Bölgesi, Türkiye), *Düzce Üniversitesi Bilim ve Teknoloji Dergisi*, 8(1): 962-973.

Polat, R., Cakiloglu, U., Kaltalioglu, K., Ulsan, M. D., Türkmen, Z. (2015). An ethnobotanical study on medicinal plants in Espiye and its Surrounding (Giresun-Turkey), *Journal of Ethnopharmacology*, 163, 1-11.

Polunin, O. (1969). *Flowers of Europe*. New York, Toronto: Oxford University Press.

Prance, G.T. (1991). What is ethnobotany today?, *Journal of Ethnopharmacology*, 32(1-3): 209-216.

Rahman, I. U., Afzal, A., Iqbal, Z., Ijaz, F., Ali, N., Shah, M., Ullah, S., Bussmann, R. W. (2019). Historical perspectives of ethnobotany, *Clinics in Dermatology*, 37(4): 382-388.

Sağiroğlu, M., Arslantürk, A., Akdemir, Z. K., Turna, M. (2012). An ethnobotanical survey from Hayrat Trabzon and Kalkandere Rize/Turkey, *Biyolojik Çeşitlilik ve Koruma*, 5(1): 31-42.

Saraç, D.U. (2013). Rize İli Etnobotanik Özellikleri. Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Trabzon.

Seyidoğlu, N. (2009). Bazı Doğal Geofitlerin Peyzaj Düzenlemelerinde Kullanımı ve Üretimi Üzerine Araştırmalar. Doktora Tezi, İstanbul Üniversitesi Fen Bilimleri Enstitüsü, İstanbul.

Tuttu, G. (2017). Tosya (Kastamonu) İlçesinin Florası ve Etnobotaniği. Doktora Tezi, Çankırı Karatekin Üniversitesi, Çankırı.

Tuttu, G., Aytaş, İ., Dilaver, Z. (2019). Use opportunities of some natural herbaceous plants of Cankiri province in landscape applications, *International Journal of Scientific and Technological Research*, 5(3): 136-147.

Ulcay, S. (2018). Tokat Çevresinde Yayılış Gösteren Bazı Tıbbi ve Yenilebilir Bitkiler Üzerinde Morfolojik, Anatomik, Mikromorfolojik ve Etnobotanik Bir Araştırma. Doktora Tezi, Ondokuz Mayıs Üniversitesi Fen Bilimleri Enstitüsü, Samsun.

Uzun Yılmaz, Y. (2011). Beşikdüzü Yöresinde Gıda Amaçlı Kullanılan Bitkiler. Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi Üniversitesi Fen Bilimleri Enstitüsü, Trabzon.

Yener, D., Akdeniz, N.S. (2020). Evaluation of the natural geophyte taxa of Sarıyer (Istanbul) and their use in urban landscape, *Eurasian Journal of Forest Science*, 8(1): 79-93.

Yeşilyurt, E. B., Şimşek, I., Akaydın, G., Yeşilada, E. (2017). An ethnobotanical survey in selected districts of the Black Sea Region (Turkey), *Turkish Journal of Botany*, 41, 47-62.

Yüzbaşıoğlu, E. (2010). Reşadiye (A6, Tokat, Türkiye) ve Çevresinin Etnobotaniği. Yüksek Lisans Tezi, Çanakkale Onsekiz Mart Üniversitesi Fen Bilimleri Enstitüsü, Çanakkale.

Yüzbaşıoğlu, E., Tütenocaklı, T., Uysal, İ. (2020). Reşadiye (A6, Tokat) ve çevresindeki bitkilerin etnobotanik özellikleri, *Türk Tarım ve Doğa Bilimleri Dergisi*, 7(2): 420-432.

Zengin, Z. (2020). Gümüşhane Yöresinde Etnobotanik Bir Çalışma. Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Trabzon.

CHAPTER X

INVESTIGATION THE EFFECT OF URBAN AREAS ON BIOCLIMATIC COMFORT

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1. Introduction

Climate is a complex concept that represents the average values of weather events observed over many years within a geographical region (Becken, 2010). Urban climate, in contrast, pertains to the specific weather conditions in a given area, influenced by the interplay between urban development and the broader regional climate (Adıgüzel, 2018). In this context, urban climate differs from rural areas, giving rise to distinct climate characteristics in urban areas. The intricate environmental dynamics within cities lead to significant alterations in atmospheric parameters, surface evaporation, energy balance, heat storage, turbulence effects, and air circulation (Taha, 1997; Arnfield, 2003; Kanda, 2006; Cetin 2015; Cetin 2019; Cetin 2020a, b; Zeren Cetin 2019; Zeren Cetin and Sevik 2020; Zeren Cetin et al., 2020; Zeren Cetin et al., 2023a, b).

Several factors determine and directly impact the climate of cities, constituting the defining features of urban climate. These elements exert significant impacts on radiation and thermal characteristics, encompassing factors such as evapotranspiration, water retention, and atmospheric interactions within the lower atmospheric layers. In general, the fundamental characteristics of urban climates are similar worldwide. However, the regional and local conditions of each urban area differ, influencing the urban climate through local anthropogenic influences such as existing infrastructure and local economic structures. The process of urbanization, which began with the industrial revolution, has led to the emergence of urban heat islands alongside environmental degradation (Çetin

et al., 2010; Aguiar et al., 2014; Adigüzel et al., 2020; Doğan, 2013; Cetin 2015; Cetin 2019; Cetin 2020a,b; Zeren Cetin 2019; Zeren Cetin and Sevik 2020; Zeren Cetin et al., 2020; Zeren Cetin et al., 2023a,b). Urban thermal inequity can be defined as a phenomenon in which higher temperature conditions prevail in cities compared to rural or underdeveloped regions surrounding them (Adigüzel, 2018). Urban thermal inequity clearly demonstrates that temperature values in cities significantly increase compared to rural areas. Urban thermal inequity arises as a distinct consequence of urban climate and is considered one of the significant environmental challenges of the 21st century (Rizwan et al., 2008). Urban heat equity typically arises from the surplus heat produced within urban environments compared to their surrounding areas. Essentially, thermal equity pertains to the elevation of air temperature but can also encompass variations in surface temperatures. Consequently, thermal equity serves as a gauge of distinctions rather than an absolute temperature measurement (Voogt and Oke, 2002).

With the increase in the frequency of hot spells in urban areas, climate change may have adverse effects on more socio-economically disadvantaged groups, especially those with limited adaptation capacity. Consequently, urban thermal equity has emerged as a prominent research focus in recent years and is expected to intensify further, particularly in countries such as India, China, and Nigeria, which are projected to account for 35% of global population growth, in conjunction with urbanization and climate change (Oke, 1979; Li et al., 2017; Peng et al., 2012; Cetin 2015; Cetin 2019; Cetin 2020a,b; Zeren Cetin 2019; Zeren Cetin and Sevik 2020; Zeren Cetin et al., 2020; Zeren Cetin et al., 2023a,b). Interactions between urban structures and the atmosphere significantly influence thermal comfort, which in turn can profoundly impact people's overall quality of life. Thermal comfort is a critical factor affecting health, happiness, economic well-being, and recreational activities. Therefore, ensuring outdoor thermal comfort is regarded as a crucial element in urban planning and design (Çetin et al., 2010; Matzarakis and Endler, 2010; Topay, 2012; Çetin, 2016; Cetin 2015; Cetin 2019; Cetin 2020a,b; Zeren Cetin 2019; Zeren Cetin and Sevik 2020; Zeren Cetin et al., 2020; Zeren Cetin et al., 2023a,b).

In this context, bioclimatic comfort becomes a significant consideration. This study aims to comprehensively investigate bioclimatic comfort in Adana-Çukurova District during the hot and humid month of August, with a focus on the influence of population density and urban development. Enhancing thermal comfort can represent a pivotal step in enhancing the health, well-being, and overall quality of life for residents in these regions.

2. Materials and Methods

In August, mobile measurements were conducted within the study area to assess bioclimatic comfort conditions. The Kestrel 5500 mobile measurement device was employed for capturing temperature and relative humidity data. Geographic Information System (GIS) and statistical techniques were utilized to analyze and elucidate the outcomes of these measurements. Temperature and humidity maps of the study area and its vicinity were generated using the cokriging interpolation method through ArcGIS 10.8.1 software. Subsequently, the Heat Index was computed using ArcGIS Pro software.

The research involved the recording of temperature and relative humidity values at 30 distinct locations during three time points: 07:00 in the morning, 14:00 in the afternoon, and 21:00 in the evening in August 2020. For evaluating bioclimatic comfort conditions in this study, the Heat Index was adopted. In the study, a classification system utilizing the Physiological Equivalent Temperature (PET) index, which is based on thermal sensation and thermal stress levels, was used to represent bioclimatic comfort conditions in the study area and its vicinity Matzarakis et al.,1999. (Table 1).

Table 1: PET Index

PET (°C)	Human Feeling of Warmth	Thermal Stress Level
< 4	Very Cold	Extreme Cold Stress
4,1 – 8,0	Cold	Strong Cold Stress
8,1 – 13,0	Warm	Moderate Cold Stress
13,1 – 18,0	Slightly Cool	Mild Cold Stress
18,1 – 23,0	Comfortable	No Thermal Stress
23,1 – 29,0	Slightly Warm	Mild Heat Stress
29,1 – 35,0	Warm	Medium Temperature Stress
35,1 – 41,0	Hot	Strong Heat Stress
> 41,0	Very Hot	Extreme Heat Stress

Source: Matzarakis et al.,1999

2.1. Heat Index

The Heat Index is a metric that amalgamates the air temperature and relative humidity in shaded regions to reflect the perceived temperature experienced by

humans. It measures the warmth individuals sense when subjected to different humidity levels in a shaded environment. This index is alternatively known as the perceived air temperature, apparent temperature, real-feel temperature, or sensed temperature (Rothfus, 1990: 2).

The Heat Index Equation:

$$HI = c_1 + c_2T + c_3R + c_4TR + c_5T^2 + c_6R^2 + c_7T^2R + c_8TR^2 + c_9T^2R^2$$

The Heat Index is employed to compute thermal sensations based on diverse temperature and humidity readings (Table 2). The resulting factors to be considered, contingent upon the temperature conditions individuals encounter, are as follows:

Table 2: Heat Index Table

		Metrication of Template:HeatTable																
		temperature (°C)																
		27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Relative Humidity (%)	40	27	28	29	30	31	32	34	35	37	39	41	43	46	48	51	54	57
	45	27	28	29	30	32	33	35	37	39	41	43	46	49	51	54	57	
	50	27	28	30	31	33	34	36	38	41	43	46	49	52	55	58		
	55	28	29	30	32	34	36	38	40	43	46	48	52	55	59			
	60	28	29	31	33	35	37	40	42	45	48	51	55	59				
	65	28	30	32	34	36	39	41	44	48	51	55	59					
	70	29	31	33	35	38	40	43	47	50	54	58						
	75	29	31	34	36	39	42	46	49	53	58							
	80	30	32	35	38	41	44	48	52	57								
	85	30	33	36	39	43	47	51	55									
90	31	34	37	41	45	49	54											
95	31	35	38	42	47	51	57											
100	32	36	40	44	49	54												

Caution
 Extreme Caution
 Danger
 Extreme Danger

Source: <https://isaacscienceblog.com/2017/11/18/the-heat-index/>

The study area is situated in the Mediterranean Region, within the boundaries of the Çukurova District of Adana Province. It is geographically located at 37°02'40" north latitude and 37°16'54" east longitude (Figure 1). Çukurova District shares its borders with Karaisalı to the north, Seyhan to the south, Sarıçam to the east, and the Tarsus District of Mersin Province to the

west. The administrative borders of Çukurova District encompass an area of 240 km². However, since the study area is an urban residential zone, it covers a total of 30.54 km² (Adıgüzel, 2021).



Figure 1. Study Area Location Map

3. Results and Discussion

Mobile measurements conducted in the study area were employed to analyze temperature variations at different times in August. These measurements provide valuable data for assessing the influence of environmental conditions and urban factors on temperature distribution.

At 07:00 in the morning of August, the lowest recorded temperature in the study area was 26.4°C, observed in the Kurttepe region (Figure 2). In contrast, the highest temperature, reaching 30°C, was observed in the Huzurevleri District. The primary factor contributing to this temperature disparity is the dense presence of tall buildings in the study area and the limited green spaces between them. It has been observed that areas shaded by these tall buildings exhibit lower temperatures.

Temperature maps were generated from measurements taken at 14:00 in the study area. These measurements revealed the lowest temperatures in Kurttepe and Karşılılar neighborhoods at 33°C. Conversely, the highest temperature, 37.3°C, was recorded in the Huzurevleri District. It has been noted that the elevation of temperature, particularly in the Huzurevleri District, is linked to the high building density and the scarcity of green spaces.

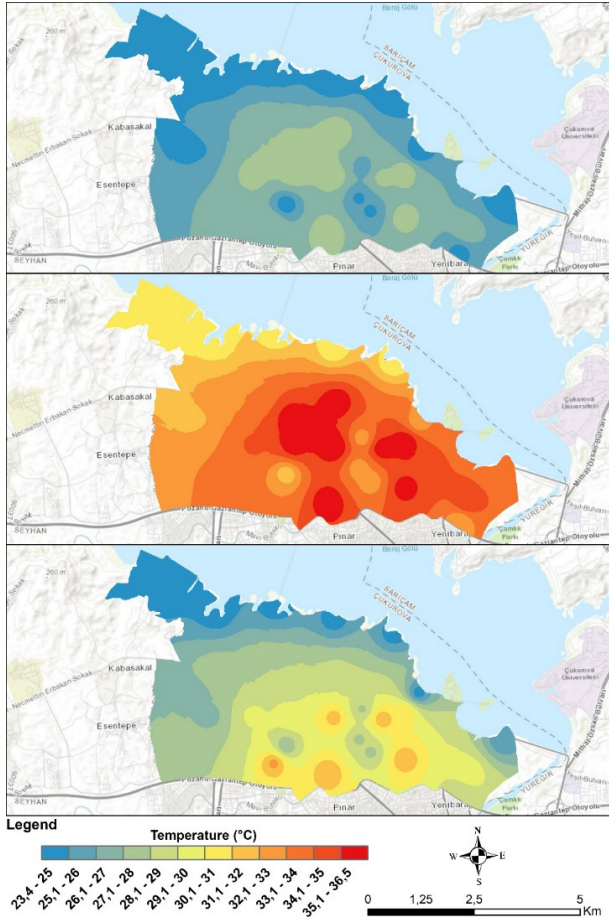


Figure 2. Temperature Maps of the Study Area

Temperature maps for August were produced as a result of measurements conducted at 21:00 in the study area. These measurements aimed to monitor nocturnal temperature fluctuations. The lowest nighttime temperature, 25.5°C, was documented in Kurttepe, while the highest nighttime temperature, 31.2°C, was observed in the Belediye Evleri District. These data enable us to analyze hourly temperature variations in the study area. Urban factors like the shadow cast by tall buildings, the presence of green spaces, and building density are crucial elements influencing temperature distribution. These analyses can contribute to making informed decisions regarding urban and environmental planning, promoting healthier urban environments. As part of this study, a relative humidity map for August was created using data gathered from mobile measurements conducted at 07:00, 14:00, and 21:00 in the study area. Relative humidity serves as a critical parameter, offering insights into climatic conditions

and environmental moisture levels. During the morning hours of August at 07:00, the lowest relative humidity rate was recorded in the Huzurevleri District at 69.4% (Figure 3). This suggests that the atmosphere is relatively more humid during the early morning, with humidity levels gradually increasing. Concurrently, the highest relative humidity rate was observed in the Huzurevleri District at 78.8%, signifying that this neighborhood experiences higher humidity levels compared to others early in the day. In the relative humidity map generated from measurements conducted at 14:00 in August, the lowest relative humidity rate for this time was documented in Mahfesiğmaz at 46.9%. This value indicates a decrease in humidity and an increase in temperature during the afternoon due to solar influence. Simultaneously, the highest relative humidity rate was noted in the Beyazevler District at 58%, highlighting a relatively more humid microclimate in Beyazevler during the afternoon.

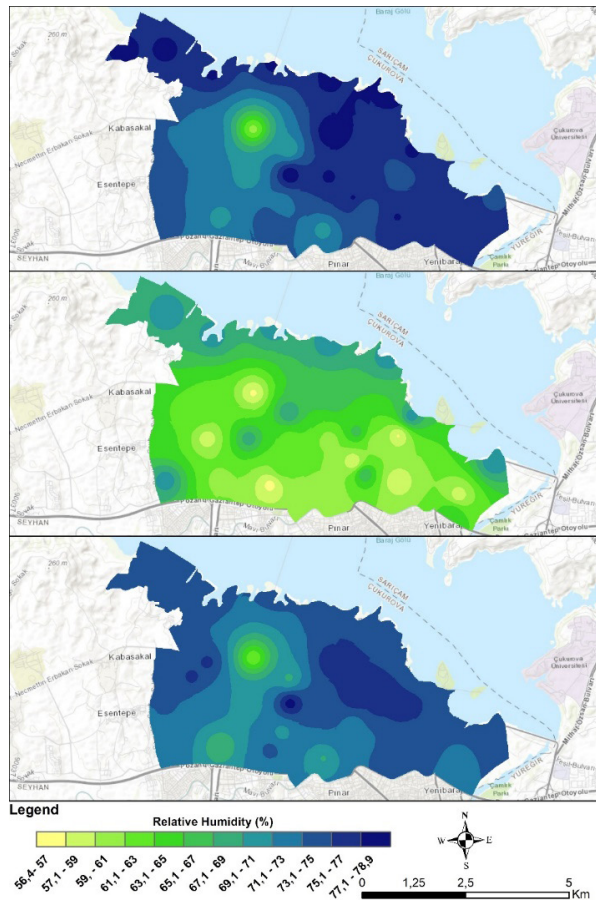


Figure 3. Relative Humidity Maps of the Study Area

The relative humidity map generated from measurements taken at 21:00 in August revealed that the lowest relative humidity rate at this time was observed in the Huzurevleri District at 58.7%. This indicates a gradual increase in humidity levels and a decrease in temperature during the nighttime hours. Conversely, the highest relative humidity rate was recorded in the Huzurevleri District at 67.8%, signifying that this neighborhood maintains a humid microclimate throughout the night. This study identifies relative humidity levels in the study area at different times during August and highlights variations in humidity between different neighborhoods. These data can significantly contribute to the understanding and management of local climate conditions.

We utilized hourly temperature and relative humidity measurements in the study area to assess and analyze the bioclimatic comfort conditions. These measurements provide foundational data for studying and comprehending how current climate conditions impact people's thermal comfort. Heat Index and Thermal Stress Level maps, generated from the acquired data, elucidate the bioclimatic conditions of the study area at different times. Measurements taken at 07:00 in the morning indicate that the study area is generally characterized by "Light Warm" and "Warm" thermal perceptions during the early hours of August. The perceived temperature values during this period range between 28.3 and 35°C. Notably, lower temperature values were observed in the northwestern region of the Kurttepe District and Karşılılar District, where thermal perception was "Slightly Warm." In other neighborhoods, the thermal perception was categorized as "Warm." This suggests that regions with high-rise buildings and limited green spaces offer better thermal comfort. Measurements at 14:00 in the afternoon reveal that "Hot" and "Very Hot" thermal perceptions predominate in August. The perceived temperature values during this period vary between 35.8 and 47.7°C. Yurt and Toros Neighborhoods, which are rich in surrounding green areas, stand out as regions with lower perceived temperature values. In other regions, the thermal perception is classified as "Very Hot." It is evident that temperature levels rise and quality of life decreases during this period in August. Measurements at 21:00 in the evening show a range of thermal perceptions, including "Slightly Warm," "Warm," and "Hot." The perceived temperature values during this period range from 25.8 to 36.2°C (Figure 4). While the inner regions of Kurttepe District and the surrounding neighborhoods exhibit a "Light Warm" thermal perception, areas with narrow spaces like Belediye Evleri and Toros Neighborhoods experience temperatures above 35°C, resulting in a "Hot" thermal perception in these regions.

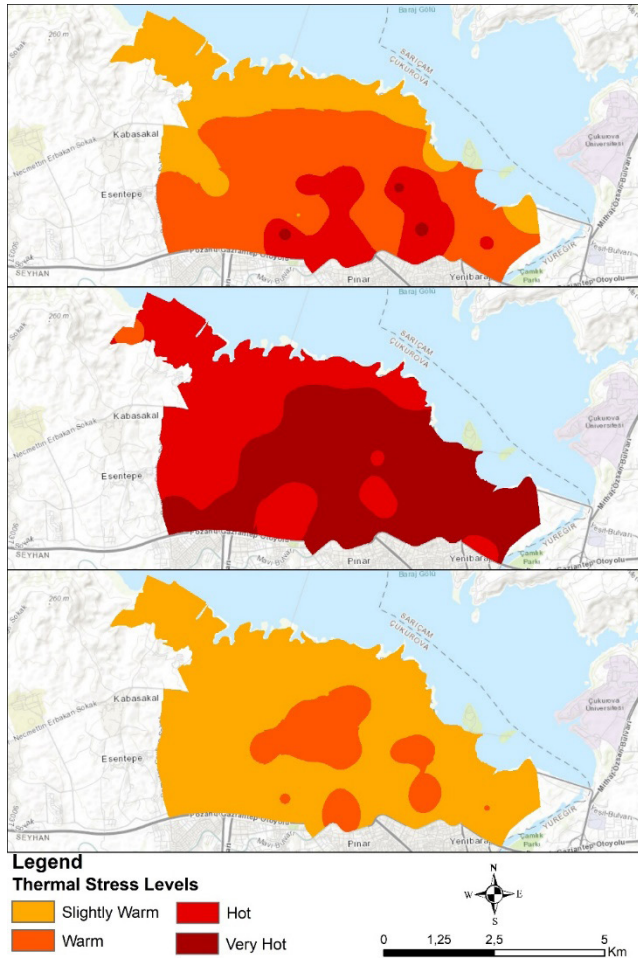


Figure 4. Thermal Stress Levels in the Study Area

These results demonstrate that the study area exhibits varying thermal comfort conditions at different times. This information can serve as a valuable guide for geographers, urban planners, and landscape architects, assisting them in implementing necessary measures to enhance the thermal comfort of urban areas. Measures such as increasing green spaces, revising building designs, and neighborhood planning adjustments can be effective strategies for improving the quality of life and reducing thermal stress. The study’s findings unequivocally illustrate how temperature, relative humidity, and bioclimatic comfort in August fluctuate across different times and regions. These discoveries provide crucial data for assessing the impact of environmental conditions and urban factors on temperature and humidity levels.

Firstly, during the 07:00 morning measurements, it was observed that temperature values were low and relative humidity levels were high. This indicates that in the early morning hours, the atmosphere is relatively more humid, resulting in higher thermal comfort. Elevated relative humidity rates, particularly in the Huzurevleri District, suggest that this neighborhood features a more humid microclimate in the early hours. In the 14:00 noon measurements, temperature values increased while relative humidity levels decreased. Thermal comfort declined during this period, characterized by “Hot” and “Very Hot” thermal perceptions. It was noted that regions with dense high-rise buildings and green areas positively influenced temperature and thermal comfort. In the 21:00 evening measurements, temperature values began to decrease, and relative humidity levels increased. During these hours, a range of thermal perceptions, including “Slightly Warm,” “Warm,” and “Hot,” were observed. It was identified that Huzurevleri District maintained a humid microclimate throughout the night. These findings hold significant implications for urban planning and landscape design. Specifically, implementing measures such as increasing green spaces, reevaluating building designs, and adjusting neighborhood layouts can have favorable effects on temperature, humidity, and bioclimatic comfort.

The outcomes of this study align with similar research in the literature. For instance, Oliveira and Andrade (2007) conducted a study examining how bioclimatic comfort can be assessed in open spaces, investigating the effects of temperature and humidity on comfort, yielding analogous results. The sum of researches conducted research evaluating bioclimatic comfort areas in Bursa, Kahramanmaras, Kastamonu, Bartın, Trabzon made at comparable findings (Cetin 2015; Cetin 2019; Cetin 2020a,b; Zeren Cetin 2019; Zeren Cetin and Sevik 2020; Zeren Cetin et al., 2020; Zeren Cetin et al., 2023a,b) as well as Kaya (2023), conducted research evaluating bioclimatic comfort areas in Kocaeli, and this study arrived at comparable findings. Conversely, a study by Lobell et al. (2008) explored the impact of irrigation on temperature and heat index, offering insights into how irrigation strategies can influence bioclimatic comfort in urban planning processes. Finally, a study by Hass et al. (2016) scrutinized temperature disparities among urban neighborhoods, aiding urban planners in comprehending temperature distribution and pinpointing hotspots.

4. Conclusions and Recommendations

This study aimed to investigate the variations in temperature, relative humidity, and bioclimatic comfort conditions across different times and regions

during August. Factors such as rapid urbanization and climate change have underscored the significance of managing thermal comfort, especially in urban areas where temperature and humidity significantly impact the quality of life. The findings of this study offer a crucial foundation for evaluating the influence of environmental conditions and urban factors on temperature and humidity levels. Initially, during the 07:00 morning measurements, it was observed that the atmosphere was relatively more humid, resulting in higher thermal comfort. During this time frame, thermal perceptions were typically categorized as “Slightly Warm” and “Warm.” This discovery suggests that the morning hours are conducive to outdoor activities or work. In urban planning processes, open green spaces should be designated as areas where people can comfortably spend time during these hours.

However, measurements at 14:00 revealed an increase in temperature values and a decrease in relative humidity levels. Thermal comfort diminished during this period, with “Hot” and “Very Hot” thermal perceptions prevailing. This underscores the need for individuals engaging in outdoor activities during this time to exercise caution. Urban planners and landscape architects should devise strategies to enhance thermal comfort, such as creating shaded areas and cooling stations to shield people from the sun’s detrimental effects. During the 21:00 evening measurements, it was observed that temperature values began to decline, and relative humidity levels increased. Thermal perceptions during these hours generally fell within the “Slightly Warm,” “Warm,” and “Hot” categories. This information implies that the evening hours may be suitable for relaxed outdoor activities. Nevertheless, it’s essential to bear in mind that thermal comfort remains relatively high during this period, necessitating safety precautions.

Another significant outcome of the study underscores the pivotal role of urban factors in influencing temperature distribution. Elements like tall building shadows, the presence of green spaces, and building density exert a substantial impact on temperature and humidity levels. These factors should be considered in urban planning processes to enhance thermal comfort. Based on the study’s findings, the following strategies and recommendations emerge:

City planners, landscape architects, and geographers should prioritize the creation of open green spaces and the development of green infrastructure, factoring in temperature and humidity variations. This can effectively enhance thermal comfort and mitigate heat stress.

In regions characterized by concentrated high-rise buildings, implementing green infrastructure projects like rooftop gardens and green roofs can help counteract environmental temperature increases while conserving energy.

Urban afforestation initiatives should be promoted, with trees playing a vital role in temperature reduction and providing shade. Additionally, irrigation strategies should be reviewed to ensure sustainability.

Public awareness campaigns regarding heatwaves and high-temperature events should be established, with a focus on creating emergency plans, especially for vulnerable populations such as the elderly.

Urban infrastructure projects should incorporate strategies aimed at reducing the effects of urban warming. This may encompass efforts in areas like green transportation, energy efficiency, and sustainable energy sources.

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References

Adigüzel, F. (2021). Yeşil Alanların Kentsel Yaşam Kalitesine Etkisinin CBS İle İncelenmesi: Çukurova Örneği (Basılmamış Doktora Tezi, İstanbul Üniversitesi, Sosyal Bilimler Enstitüsü).

Adigüzel, G. (2018). Kentsel Yeşil Alanların Mikro-İklimsel Etkilerinin İzmir-Bornova Örneğinde Araştırılması (Basılmamış Doktora Tezi, Ege Üniversitesi, Fen Bilimleri Enstitüsü, İzmir).

Aguiar, A., French, K., Chisholm, L. (2014). A Comparison of the Ameliorating Effects of Native and Exotic Street Trees on Surface Heat Retention at Dusk. *Urban Climate*, 10, 56-62.

Anonymous, 2023. The Heat Index. Isaac’s Science Blog. <https://isaacscienceblog.com/2017/11/18/the-heat-index/>. (Date of Access: 10.08.2023).

Arnfield, A.J. (2003). Micro and Mesoclimatology. *Progress in Physical Geography*, 27, 435–47.

Becken, S. (2010). The Importance of Climate and Weather for Tourism: Literature Review.

Çetin, M., Topay, M., Kaya, L. G., Yılmaz, B. (2010). Efficiency of Bioclimatic Comfort in Landscape Planning Process: Case of Kutahya. *Faculty of Forestry Journal Süleyman Demirel University, Series: A, Vol: 1*, pp: 83-95.

Çetin, M. (2016). Determination of Bioclimatic Comfort Areas in Landscape Planning: A Case Study of Cide Coastline. *Turkish Journal of Agriculture - Food Science and Technology*, 4(9), 800-804.

Cetin, M. (2015). Determining The Bioclimatic Comfort in Kastamonu City. *Environmental Monitoring and Assessment*, 187, 1-10. <https://doi.org/10.1007/s10661-015-4861-3>

Cetin, M. (2019). The Effect of Urban Planning on Urban Formations Determining Bioclimatic Comfort Area's Effect Using Satellitia Imagines on Air Quality: A Case Study of Bursa City. *Air Quality, Atmosphere & Health*, 12(10), 1237-1249. <https://doi.org/10.1007/S11869-019-00742-4>

Cetin, M. (2020a). The Changing of Important Factors in The Landscape Planning Occur Due to Global Climate Change in Temperature, Rain and Climate Types: A Case Study of Mersin City. *Turkish Journal of Agriculture-Food Science and Technology*, 8(12), 2695-2701.

Cetin, M. (2020b). Climate Comfort Depending on Different Altitudes and Land Use in The Urban Areas in Kahramanmaras City. *Air Quality, Atmosphere & Health*, 13(8), 991-999. <https://doi.org/10.1007/s11869-020-00858-y>

Doğan, M. (2013). Türkiye Sanayileşme Sürecine Genel Bir Bakış. *Marmara Coğrafya Dergisi*, 211-231.

Hass, A. L., Ellis, K. N., Reyes Mason, L., Hathaway, J. M., Howe, D. A. (2016). Heat And Humidity İn The City: Neighborhood Heat İndex Variability İn A Mid-Sized City in The Southeastern United States. *International Journal Of Environmental Research and Public Health*, 13(1), 117.

Kanda, M. (2006). Progress in The Scale Modeling of Urban Climate: Review. *Theoretical and Applied Climatology*, 84, 23–34.

Efdal, K. (2023). Evaluation of Bioclimatic Comfort Area with Heat Index: A Case Study of Kocaeli. *International Journal of Engineering and Geosciences*, 8(1), 19-25.

Li, T., Shen, H., Yuan, Q., Zhang, X., Zhang, L. (2017). Estimating Ground-Level PM_{2.5} by Fusing Satellite And Station Observations: A Geo-İntelligent Deep Learning Approach. *Geophysical Research Letters*, 44(23), 11-985.

Lobell, D. B., Burke, M. B., Tebaldi, C., Mastrandrea, M. D., Falcon, W. P., Naylor, R. L. (2008). Prioritizing Climate Change Adaptation Needs for Food Security in 2030. *Science*, 319(5863), 607-610.

Matzarakis, A., Mayer, H., Iziomon (1999). Applications of A Universal Thermal Index: Physiological Equivalent Temperature. *International Journal of Biometeorology*, 43, 76–84.

Matzarakis, A., Endler, C. (2010). Climate Change and Thermal Bioclimate in Cities: Impacts and Options for Adaptation in Freiburg, Germany. *International Journal of Biometeorology*, 54, 479–483.

Oke, T.R. (1979). Review of Urban Climatology 1973-1976. WMO Technical Notes, No. 134. Geneve.

Peng, S., Piao, S., Ciais, P., Friedlingstein, P., Otle, C., Breon, F.-M., Nan, H., Zhou, L., Myneni, R.B. (2012). Surface Urban Heat Island Across 419 Global Big Cities. *Environmental Science & Technology*, 46, 696–703.

Rizwan, A.M., Dennis, L.Y.C., Liu, C. (2008). A Review on the Generation, Determination and Mitigation Of Urban Heat Island. *Journal of Environmental Sciences*, 20, 120–128.

Rothfus, L. P., and Headquarters, N. S. R. (1990). The Heat Index Equation (Or, More Than You Ever Wanted to Know About Heat Index). *Fort Worth, Texas: National Oceanic and Atmospheric Administration, National Weather Service, Office of Meteorology, 9023, 640.*

Taha, H.G. (1997). Urban Climates and Heat Islands: Albedo, Evapotranspiration, and Anthropogenic Heat. *Energy and Buildings*, 99-103.

Topay, M. (2012). Importance of the Thermal Comfort in the Sustainable Landscape Planning. *Journal of Environmental Protection and Ecology*, 13 (3), 1480–1487.

Voogt, J.A., and Oke, T.R. (2003). Thermal Remote Sensing of Urban Climates. *Remote Sens. Environ.*, 370–384.

Zeren Cetin, I., Sevik, H. (2020). Investigation of the Relationship Between Bioclimatic Comfort and Land Use by Using GIS and RS Techniques in Trabzon. *Environmental monitoring and assessment*, 192, 1-14. <https://doi.org/10.1007/s10661-019-8029-4>

Zeren Cetin, I., Özel, H.B., Varol, T. (2020). Integrating of Settlement Area in Urban and Forest Area of Bartın with Climatic Condition Decision for Managements. *Air Quality, Atmosphere & Health*, 13, 1013-1022. <https://doi.org/10.1007/s11869-020-00871-1>

Zeren Cetin, I., Varol, T., Ozel, H.B. (2023a). A Geographic Information Systems and Remote Sensing–Based Approach to Assess Urban Micro–Climate Change and Its Impact On Human Health in Bartın, Turkey. *Environmental Monitoring and Assessment*, 195(5), 540. <https://doi.org/10.1007/s10661-023-11105-z>

Zeren Cetin, I., Varol, T., Ozel, H. B., Sevik, H. (2023b). The Effects of Climate On Land Use/Cover: A Case Study in Turkey by Using Remote Sensing Data. *Environmental Science and Pollution Research*, 30(3), 5688-5699. <https://doi.org/10.1007/s11356-022-22566-z>

Zeren Çetin, İ. (2019). Trabzon Ekoturizm Potansiyelinin GIS Kullanımı İle Biyoklimatik Konfor Açısından Değerlendirilmesi, Yüksek Lisans Tezi. Kastamonu Üniversitesi Fen Bilimleri Enstitüsü. Kastamonu, Turkey. Evaluation of Trabzon ecotourism potential in terms of bioclimatic comfort using GIS, Master's Thesis. Kastamonu University Institute of Science and Technology. Kastamonu, Turkey.

CHAPTER XI

BIOMIMICRY APPROACH IN URBAN EQUIPMENT

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1. Introduction

Nature is considered to be a great source of inspiration for people. The answers to many questions we encounter in social life and designs are found in nature. There are thousands of examples of places made by living creatures in nature, which have been solved in a lightweight, economical, and practical way, to meet the basic needs of people such as protection from external influences and shelter. It is known that the human communities in the Neolithic Age tried to be inspired by nature to meet their shelter needs (Keskin, 2019; Yayan and Şahin, 2022; Zeybek, 2022).

While trying to create their own lives, people harm natural life by using non-recyclable materials and consuming more energy than produced. Although this harmful cycle cannot be stopped, it is known that it can be slowed down. People are becoming more conscious day by day. It can be said that the increase in the number of accessible resources with the development of technology makes it easier for people to learn from nature (Keskin, 2019).

It is known that the caves, shelters and makeshift tents that the first people built by providing their dominance over nature to protect themselves from natural events developed as time progressed. In this process, while human beings created new spaces by imitating nature with their instincts, they tried

to benefit both formally and functionally by imitating nature in the face of the inadequacy of technology (Ersoy, 2002; Tarhan, 2019).

To benefit from nature both formally and functionally, it is necessary to consider biomimicry. Biomimicry, which we encounter in many areas of life, also includes important issues such as sustainability, as it gives importance to the balance of protecting and using nature.

Achieving sustainability, equipping the constructed spaces with environmentally friendly materials and using the genius of nature at the maximum level are among the guidelines for the use of biomimicry in design. Biomimicry is considered important in terms of restructuring the system we use to create spaces and ensuring that the space has sustainable living conditions (Karabetça, 2016).

Although biomimicry is related to many disciplines, it is known that landscape architecture has been influenced by natural forms for centuries in this context. A building may represent a certain organic form and may not have any structural features of this form that can create innovation. Instead of showing the form of a single organism in an item, investigating the structural, mechanical, or circulatory system of this organism can lead to an innovative and sustainable design (Karabetça, 2016).

The knowledge learned from nature needs to be implemented within the scope of disciplines such as landscape architecture, urban design and spatial planning. In this context, it is necessary to benefit from the principles of biomimicry. The main purpose of this study is to contribute to the development of a biomimicry-based perspective and method in the design of urban equipment within the scope of landscape architecture. In this context, firstly, the definition of biomimicry, its relationship with landscape architecture, its evaluation within the scope of urban equipment elements and different sample designs of biomimicry-based design are mentioned.

2. Biomimicry

The term biomimicry first appeared in the scientific literature in 1962 and started to become widespread, especially in the 1980s (Aziz and El Sherif, 2015).

Biologist Janine Benyus, the founder of biomimicry, defined biomimicry as “the conscious story of the genius of life” in her book *Innovation Inspired by Nature* (URL1, 2023).

Biomimicry is defined as the full or partial imitation of a living creature in nature in terms of color, texture, function, or form (Kuday, 2009; Kaya et al., 2017; Kaya et al., 2018).

The art and science of imitating nature for technological purposes is rooted in the past. Leonardo da Vinci is one of the most important figures in history, who carefully examines nature for inspiration. In the 1480s, Da Vinci researched the flights of birds and bats and turned this knowledge into flying vehicles. While there is debate that these designs have never been tested in the field, they are still a significant source of inspiration to today's inventors (Marshall and Lozeva, 2009). Leonardo da Vinci said, "The human mind will never be able to make a more beautiful, simpler, or more direct discovery than the discoveries of nature. The statement "Because nothing is missing or something is too much in the discoveries of nature" has served as a qualified resource for humanity in every period and all developments (Öztürk, 2015).

The goal of biomimicry is to create products, processes, and policies that are well-adapted to sustain life on Earth and provide innovative improvements to our lifestyles. For this, it aims to help with the following issues (Akgöze, 2015):

- Sustainability
- Performance improvement
- Energy conservation
- Reducing costs
- Destroying and redefining the concept of "garbage"

3. Biomimicry in the Discipline of Landscape Architecture

The application of biomimicry is by its very nature a multidisciplinary process and a universal tool that encourages collaborative thinking. Landscape Architecture is also a profession that encompasses knowledge from various disciplines and is often in a primary position among multiple design disciplines in terms of facilitation. Using biomimicry principles as a guide rather than as a structured doctrine creates the necessary fluidity for successful design practice (Sandzen, 2015).

Imitating nature is not only copying the image but also the solution to the problem by transferring the function. It is also necessary to apply biomimicry in landscape architecture to create design projects without disturbing the order of nature. To develop biomimicry in terms of landscape design, it is necessary to include biomimicry in education first. In most of the landscape architecture departments in the world, courses, seminars, and laboratory studies on biomimicry are given. The concept of biomimicry plays an important role in providing students with design and creativity skills in landscape architecture

education programs, as in all disciplines involving design and creativity processes. In this context, researchers argue that the nature-inspired approach is a cognitive process that supports the acquisition of new information and helps to learn, and that design-related problems can be solved more easily, creatively and in a holistic way.

4. Biomimicry within the Scope of Urban Equipment Elements

Today, the usage areas of biomimicry are increasing day by day. In industry, robot industry, landscape designs and various architectural fields; appear within the scope of elements such as functionality or formality.

Urban equipment elements in recreation areas are important landscape elements that contribute to increasing the quality of urban life. Urban equipment elements, which have become an important element of the city by integrating with their environment, are one of the most important tools that contribute to the formation of a city identity and development of collective memory with the integrity they establish with the city (Kurter and Kaya, 2019; Zeybek, 2020).

It is possible to say that landscape architecture plays an active role in equipment element designs. When people spend time outdoors, they often make use of the equipment. While the equipment are being designed, the materials used must adapt to the outdoor conditions and the equipment must be created in line with ergonomic measures. Considering such criteria, it is necessary to design equipment elements that can be easily used by all age groups and disabled individuals.

It is possible to say that nature exists for everyone, as nature prepares the ground for all living things to benefit from it. For this reason, it is necessary to take inspiration from nature in the design of the equipment. It is necessary to evaluate features such as sustainability, being suitable for every person and diversity in design within the scope of equipment elements. In this context, biomimicry should be used.

5. Design Criteria of Urban Equipment Elements

Urban equipment elements should be compatible with the location, size and meaning of the urban space, reflect the character of the environment in which they are located, and should also be considered in terms of providing psychological comfort to the users. At the same time, the socio-cultural and ideological structure of the society should be considered beyond the different needs of the users in the design process (Kurter and Kaya, 2019).

Other features that should be found in urban equipment elements that allow to facilitate urban life and obtain more aesthetic environments are (Kurter and Kaya, 2019);

- should comply with standards in terms of ergonomics and physical properties,
- must be original designs that take into account functional and aesthetic features in their designs,
- it should be portable and mountable, spare parts should be easy to find,
- they should be easy to maintain,
- must be solid,
- can be evaluated as being resistant to vandalism

6. Examples of Biomimicry in the Design of Urban Equipment Elements

Examples of biomimicry in the design of urban equipment elements (UEE) are given in Figure 1-30. The images on the left are the photos of the equipment element, and the images on the right are the inspiration objects of the equipment elements.



Figure 1. UEE 1 (URL2, 2023)



Figure 2. Sea Shell (URL3, 2023)



Figure 3. UEE 2 (URL4, 2023)



Figure 4. Orange Peel (URL5,2023)



Figure 5. UEE 3 (URL6, 2023)



Figure 6. Cloud (URL7, 2023)



Figure 7. UEE 4 (URL8, 2023)



Figure 8. Turtle (URL9, 2023)



Figure 9.UEE 5(URL10, 2023)



Figure10. Banana(URL11, 2023)



Figure 11. UEE 6 (URL12, 2023)



Figure 12. Wing (URL13, 2023)



Figure 13.UEE 7 (URL14, 2023)



Figure 14.Wave (URL15, 2023)

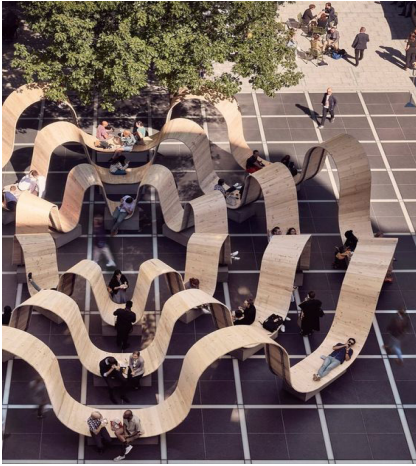


Figure 15. UEE 9 (URL18,2023)

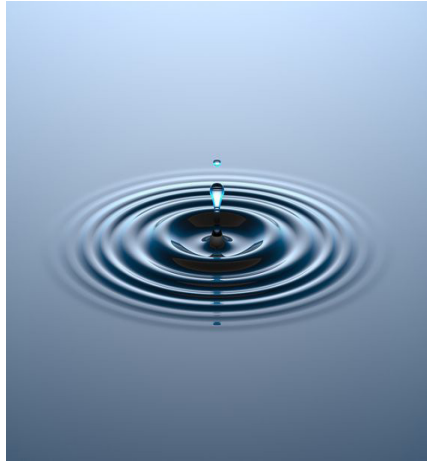


Figure 16. Circular Motion of Water
URL19, 2023)



Figure 17. UEE 10(URL20, 2023)



Figure 18. Flower (URL21, 2023)



Figure 19. UEE 11 (URL22, 2023)



Figure 20. Mushroom (URL23,
2023)



Figure 21. UEE 12(URL24, 2023)

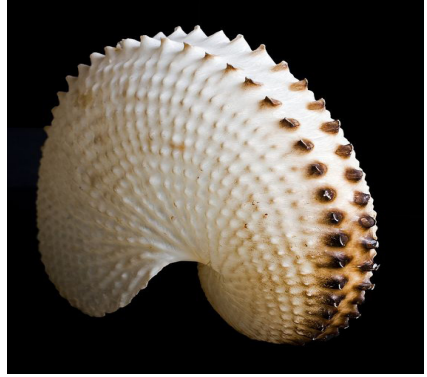


Figure 22. Sea Shell(URL25, 2023)



Figure 23. UEE 13(URL26, 2023)

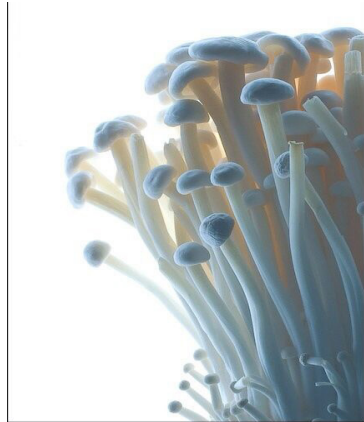


Figure 24. Mushroom
(URL27, 2023)



Figure 25. UEE 14 (URL28, 2023)



Figure 26. Mushroom
(URL29, 2023)



Figure 27. UEE 15 (URL30, 2023)



Figure 28. Bird Nest (URL31, 2023)



Figure 29. Kentsel donatı-15
(URL32, 2023)



Figure 30. Coral (URL33, 2023)

7. Results

As a result of the biomimicry approach, certainly, natural, economical, ergonomic, structurally strong and durable, as well as aesthetic, ecological and sustainable designs will be created shortly, with the design criteria as a basis (Karabetça, 2016).

Imitation of many organisms found in nature at micro and macro scales; takes place by blending the knowledge, experience, applicability and results taken from nature. The biomimicry design approach brings aesthetics to the product through form as a priority in designs inspired by nature. Imitation of nature only with form does not add functionality to the design other than aesthetics. The functional inspiration of a design means that it has a structure that directs the form, fulfills the rules and functions created, and controls it. The biomimicry design approach aims to produce sustainable, ecological and environmentally friendly designs by seeking solutions from nature for the

difficulties and problems that arise during the design phase of the projects (Tarhan, 2019).

Considering the current state of nature; a pioneering system has been designed to increase the sensitivity required for the protection of the ecological balance and to give nature the value it deserves as of today. Thanks to criteria that have biomimetic features to a large extent, it will be ensured that the rules of nature are the basis of the designs. Incorporating design criteria developed with biomimicry support into the design process to interpret spaces differently and make them suitable for nature and to achieve the goal of biomimetic design will be an important step in design (Karabetça, 2016).

In designs inspired by nature, it is possible to be inspired by a single living thing, as well as a combination of more than one organism feature. In this way, innovative designs will emerge and the goals of biomimicry will be met (Keskin, 2019).

It is understood that the concept of biomimicry is a multifaceted concept that can lead to study for many disciplines. There is no field of study that nature cannot touch and be useful in producing solutions. The subject of establishing a relationship with nature is much more important in terms of the discipline of urbanism. One of the most important components of urban identity and collective memory in settlements of different scales is urban landscape. The green infrastructure system created within the city's building stock is the most important link the city establishes directly with nature and it is extremely essential for the sustainability of the urban ecosystem. It almost defines the ideal city where people sustainably spend their lives in relation to nature and do not compromise on quality of life while doing this (Seymenoğlu, 2019; Zeybek, 2020).

Imitation of nature is one of the important solutions in the continuity of nature, together with the growth of cities, the increase in the urban population and the climatic crises. Considering the concepts such as urban metabolism, zero fossil energy, low carbon cities, biophilic designs and biophilic cities, it has been observed that these concepts are related to biomimicry. The main purpose of each of them is to produce structures that are inspired by nature in terms of form or strategy and are compatible with nature, although they are not imitations of nature (Seymenoğlu, 2019).

Nature has many unexplored features in its own body. More things may be learned in terms of design over time, together with what technology brings with these features. As a return to progress by adapting without harming nature, existing designs seem to be very useful for people's use. However, with the

development of technology, it is not certain that this result can be positive or negative in cases where it is not possible to predict where the trials and ends will go. Considering the search for a solution from nature with biomimicry to a situation that may pose a problem for a design, defining the problem well and working together with other disciplines will ensure that the solution is reached quickly (Çelikel and Uçar, 2020).

The contribution of the research to the urban equipment elements within the scope of landscape architecture is to instill in people the ability to spend time in spaces that provide harmony between nature and the environment and to see nature as a library because nature is not only a parameter in terms of protection, but also because there is a lot of information to be learned from nature. In this context, it is aimed that the findings obtained as a result of the research will be a base for future studies.

References

- Akgöze, F.(2015). Biyomimikri: Doğanın Tasarımı. <https://medium.com/sherpa-blog-bulten/biyomimikri-do%C4%9Fan%C4%B1n-tasar%C4%B1m%C4%B1-18e89673b445> (Erişim Tarihi: 20.05. 2023)
- Aziz, M.S., El Sherif, A.Y. (2015). Biomimicry as an approach for bio-inspired structure with the aid of computation, *Alexandria Engineering Journal*, 55(1), 707-714.
- Çelikel, S.B.,Uçar, S., (2020). Çelikel, S.B. ve Uçar, S., (2020). Biyomimikri: Doğayla Uyumlu Yeni Bir Tasarım Modeli, *Humanities Sciences (NWSAHS)*, 15(2):51-60
- Ersoy, A. (2002). *Sanat Kavramlarına Giriş*. İstanbul: Yorum Sanat Yayıncılık.
- Karabetça, A.R. (2016). Biyomimikri destekli mekan tasarımı ölçütleri ve bu ölçütlerin örnekler üzerinde incelenmesi. Doktora Tezi, Mimar Sinan Güzel Sanatlar Üniversitesi.
- Kaya, L. G., Yücedağ, C., Çokyigit, H. (2017). Design of Separator Element Inspired by Peacock Feather for a Proposed Café-Bar, WMCAUS 2017, World Multidisciplinary Civil Engineering, Architecture - Urban Planning Symposium, 12-16 June 2017, 737, Prague.
- Kaya, L.G., Yücedağ, C., Aşıkutlu, H.S. (2018). Reflections of Biomimicry to Spatial Design, ECSAC 2018, European Conference on Science, Art and Culture, 19-22 April 2018, 23-33, Antalya, Türkiye.
- Keskin, R. (2019). Doğadan esinlenen mekansal tasarımlarda analoginin kullanımı: Biyomimikri. Master's thesis, Burdur Mehmet Akif Ersoy University.

Kuday, I., (2009). Tasarım Sürecinin Destekleyici Faktör Olarak Biyomimikri Kavramının İncelenmesi, Yüksek Lisans Tezi. Mimar Sinan Güzel Sanatlar Üniversitesi Fen Bilimleri Enstitüsü, İstanbul, Türkiye.

Kurter, N., Kaya, Z. (2019). Kentsel donatı elemanlarının peyzaj mimarlığı açısından değerlendirilmesi: Çankırı Örneği. *Bartın Orman Fakültesi Dergisi*, 21(1): 81-96.

Marshall, A., Lozeva, S. (2009). Questioning The Theory and Practice of Biomimicry. *International Journal of Design & Nature and Ecodynamics*. 4(1): 1-10.

Öztürk, A.F. (2015). Mimarlıkta temel tasarım eğitim yöntemi olarak biyotaklit. Master's thesis, Maltepe Üniversitesi, İstanbul.

Sandzen, S. (2015) Biomimicry As Design Lens For Landscape Architecture. The University of Georgia.

Seymenoğlu, H. E., (2019). Kentsel Tasarıma Doğadan İlham Almak; Biyomimikri. Yıldız Teknik Üniversitesi. Yüksek Lisans Tezi, Fen Bilimleri Enstitüsü.

Tarhan, S. (2019). Doğanın İnovasyonu; Biyomimikri ve Bu Bağlamda Konya Tropikal Kelebek Bahçesi Örneği. TC Selçuk Üniversitesi-Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, İç Mimarlık ve Çevre Tasarımı Anabilim Dalı, Yüksek Lisans Tezi, Konya.

URL-1, 2023 <https://toolbox.biomimicry.org/introduction/>

URL-2, 2023 <https://tr.pinterest.com/pin/648940627577079978/>

URL-3, 2023 <https://tr.pinterest.com/pin/648940627577080020/>

URL-4, 2023 <https://tr.pinterest.com/pin/648940627577080118/>

URL-5, 2023 <https://tr.pinterest.com/pin/648940627577080141/>

URL-6, 2023 <https://tr.pinterest.com/pin/648940627577080184/>

URL-7, 2023 <https://tr.pinterest.com/pin/648940627577069549/>

URL-8, 2023 <https://tr.pinterest.com/pin/648940627577066243/>

URL-9, 2023 <https://tr.pinterest.com/pin/648940627577080498/>

URL-10, 2023 <https://tr.pinterest.com/pin/648940627577066265/>

URL-11, 2023 <https://tr.pinterest.com/pin/648940627577080605/>

URL-12, 2023 <https://tr.pinterest.com/pin/648940627577080678/>

URL-13, 2023 <https://tr.pinterest.com/pin/648940627577080739/>

URL-14, 2023 <https://tr.pinterest.com/pin/648940627577066296/>

URL-15, 2023 <https://tr.pinterest.com/pin/648940627577080832/>

URL-16, 2023 <https://tr.pinterest.com/pin/648940627577080845/>

URL-17, 2023 <https://tr.pinterest.com/pin/648940627577080913/>

URL-18, 2023 <https://tr.pinterest.com/pin/648940627577080921/>

URL-19, 2023 <https://tr.pinterest.com/pin/648940627577080936/>

URL-20, 2023 <https://www.thisiscolossal.com/2021/06/paul-cocksedge-time-loop/>

URL-21, 2023 <https://tr.pinterest.com/pin/648940627577081005/>

URL-22, 2023 <https://tr.pinterest.com/pin/648940627577066328/>

URL-23, 2023 <https://tr.pinterest.com/pin/648940627577081463/>

URL-24, 2023 <https://tr.pinterest.com/pin/648940627577066532/>

URL-25, 2023 <https://tr.pinterest.com/pin/648940627577081120/>

URL-26, 2023 <https://tr.pinterest.com/pin/648940627577067190/>

URL-27, 2023 <https://tr.pinterest.com/pin/648940627577081450/>

URL-28, 2023 <https://tr.pinterest.com/pin/648940627577081352/>

URL-29, 2023 <https://tr.pinterest.com/pin/648940627577081428/>

URL-30, 2023 <https://tr.pinterest.com/pin/527836018842929606/>

URL-31, 2023 <https://bilimvegelecek.com.tr/index.php/2022/06/28/>

URL-32, 2023 <https://tr.pinterest.com/pin/648940627577433500/>

URL33, 2023 <https://tr.pinterest.com/pin/84794405477936262/>

Tarhan, S. (2019). Doğanın İnovasyonu; Biyomimikri ve Bu Bağlamda Konya Tropikal Kelebek Bahçesi Örneği. TC Selçuk Üniversitesi-Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, İç Mimarlık ve Çevre Tasarımı Anabilim Dalı, Yüksek Lisans Tezi, Konya.

Yaşlı, R. (2021). Peyzaj tasarımında biyomimikri uygulamaları: Antalya Düzlerçamı mesire alanı örneği. Akdeniz Üniversitesi. Yüksek Lisans Tezi, Fen Bilimleri Enstitüsü.

Yayan, G.H., Şahin, M. (2022). The Art of Light at the Intersection of Nature and Technology and the Works of Bruce Munro. *Eurasian Journal of Researches in Social and Economics (EJRSE)*. 9(3): 467-490.

Zeybek, O. (2020). Urban Identity, Collective Memory and Public Space Relations at The Mevlana Museum. *Trends in Landscape, Agriculture, Forest and Natural Science*. Cambridge Scholars Publishing. Feb, 2020. p.129 – 137. ISBN: 978-1-5275-4300-3.

Zeybek, O. (2020). Kimlik Arayışının Kentsel Peyzaj Biyografisindeki İzleri: Sandıklı Örneği. Mimarlık, Planlama ve Tasarım Alanında Teori ve Araştırmalar – II. Gece Kitaplığı Yayınevi, Aralık, 2020. s.1 – 19. ISBN: 978-625-7702-95-9.

Zeybek, O. (2022). Neolitik Devrimden Sürdürülebilir Yerleşim Modellerine. *Mimarlık & Planlama & Tasarımda Araştırma ve Değerlendirmeler – I*. Gece Kitaplığı Yayınevi, Ekim, 2022. s.55 – 71. ISBN: 978-625-430-452-1.

CHAPTER XII

MULTI-CRITERIA DECISION-MAKING METHODS IN SUSTAINABLE TOURISM

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1. Introduction

The impact of globalization has made the workplace increasingly stressful, leading to a greater need for entertainment and relaxation. As a result, there has been a surge in demand within the tourism industry, which has intensified competition among businesses in this field (Süzer and Doğdubay, 2022; Ayaş, 2007). Tourism is widely recognized as a vital source of income for developing countries. Developing countries are adopting tourism as an economic policy tool in order to make their natural and cultural resources attractive and to get a share from the tourism market (Demirdağ, 2022; Alkan, 2015). Tourism now holds a central position in the global economy, significantly contributing to economic and social development. Tourism activities are gaining more importance every day in order to balance the level of development between regions, to use resources effectively, to increase the number of tourists and tourism income (Celik Uguz, 2011).

Tourism sector has been based on mass tourism for a long time. Tourism has become one of the fastest growing sectors as local governments develop tourism and market the geography, topography, history, culture and traditions of cities to tourists. However, if the resources underpinning the tourism sector aren't adequately protected and nurtured, it becomes challenging to compete with other

tourist destinations. The surge in environmental problems is a consequence of the increasing consumption trend (Yeksan and Akbaba, 2019; Karapınar and Barakazı, 2017). Especially tourists visiting destinations and tourism enterprises trying to meet their needs lead to a certain amount of deterioration in the natural and socio-cultural environment. Sometimes it may not be possible to recover the destroyed resources again and it requires a long process (Alkan, 2015). Consequently, the concept of sustainable development has been introduced to the tourism industry, with the aim of fostering more environmentally friendly tourism planning and practices (Yang et al., 2020a).

Sustainability, as a comprehensive concept, encompasses economic development, social progress, and environmental protection. Sustainable tourism strives to protect nature and understand the social responsibilities related to local people. Sustainable tourism, also known as responsible tourism, soft tourism, minimum impact tourism or alternative tourism, meets the needs of today's tourists and host communities while preserving and developing future opportunities based on this principle (İlban et al., 2023; Karapınar and Barakazı, 2017). Sustainable tourism helps to demonstrate the social, economic and cultural benefits of tourism with a sustainable understanding, without harming the environment or nature, and emphasizes the positive impact of tourism (Koçoğlu et al., 2020).

Sustaining the long-term viability of tourism necessitates the thoughtful choice of suitable decision-making methods. In the context of sustainable tourism, it is essential to make decisions while taking into account a multitude of factors and variables. As observed in the literature, multi-criteria decision-making methods are widely utilized in various tourism sectors, including wetland tourism, rural tourism, island tourism, coastal tourism, sports tourism, ecological tourism, spa tourism, and within protected areas and national parks (Michalena et al., 2009; García-Melón et al., 2012; Wang et al., 2016; Lee and Hsieh, 2016; Mak et al., 2017; Yılmaz and Zorlu, 2018; Yang et al., 2020a; Yang et al., 2020b; Tamer and Yangil, 2021; İşler and Akyurt, 2021; Tajer and Demir, 2022; Janošik et al., 2023).

Multi-criteria decision-making methods are highly effective in evaluating complex situations, requiring minimal reliance on traditional statistical assumptions and only a small expert interview dataset. The purpose of multi-criteria decision-making methods is to integrate objective research data with subjective expert judgments and to provide effective management information to support decision makers in creating optimum strategies (Yang et al., 2020b).

However, decision-makers often face the challenge of selecting the most appropriate method, which should be influenced by the nature of the problem and the specifics of the decision-making process at hand. This careful consideration ensures that the chosen method aligns effectively with the unique characteristics of their situation (Dalbudak and Rençber, 2022).

The objective of this study is to investigate the application of multi-criteria decision-making methods in academic literature (1), to analyze how sustainability is applied in various fields of tourism through scientific studies (2), to reveal the diverse applications of these studies in different contexts (3) and to evaluate the strengths and limitations of applying multi-criteria decision-making methods in these tourism-related fields (4). It is thought that the conclusion and recommendations of this study will contribute to future research to find the most appropriate method according to the fields of study.

2. Sustainable Tourism

The integration of mass tourism into daily life, alongside the development of heavy industries after the industrial revolution, has brought both benefits and significant environmental damage. Furthermore, rapid population growth and the deterioration caused by excessive consumption of natural resources have made it necessary to protect the environment. Thus, it has created a reaction against excessive and unconscious consumption of natural resources in societies (Garda and Temizel, 2016).

The negative impact of mass tourism on the physical and social environment prompted the exploration of new tourism models to ensure the industry's sustainability and mitigate inherent risks. This shift has led to increased interest in sustainable tourism. In summary, the concept of sustainability also appears as a concept that is emphasized in tourism, where natural resources are consumed unplanned. As the concept of sustainability gains importance, the relationship between tourism and the environment becomes increasingly important (Taşçıoğlu and Yıldırkan, 2023; Yeksan and Akbaba, 2019). The concept of sustainability was first highlighted in the 1987 report of the United Nations World Commission on Environment and Development, titled "Our Common Future." Since then, it has gained growing prominence on the global agenda (Eser et al., 2010).

In the modern world, both globalization and the concept of sustainability hold significant importance. Sustainability has permeated nearly every facet of human life, from agriculture and urban planning to technology and tourism. The sustainability of many examples has been exemplary in various fields. They are

all located in different social dimensions, but the common feature is that they focus on the future of people and aim to protect the resources of the area under consideration (Civelek, 2023; Beyhan and Ünügür, 2010).

The concept of sustainable tourism gained significant prominence during the 1990s, particularly following the emergence of the idea of sustainable development highlighted in the Brundtland Report (Güven, 2016). Sustainable tourism, which has a controversial definition, is often confused with the concept of ecotourism. Ecotourism is a type of tourism that includes health, culture, entertainment and travel, but sustainable tourism affects all tourism practices today. Sustainable tourism is defined as the transfer of existing resources in such a way that they can be used by future generations without being destroyed, polluted or destroyed, and includes the concepts of ecotourism, cultural tourism, rural tourism and responsibility tourism. The core objective of sustainable tourism is to develop and implement tourism plans that protect and sustain natural, cultural, ecological, and biological resources while promoting tourism (Demirdağ, 2022; Keskin and Örgün, 2015).

Sustainable tourism is not a distinct type of tourism; instead, it's an approach that can be applied to enhance the environmental, social, and economic benefits of all forms of tourism. It highlights the need to balance resource management in a way that satisfies economic, social, and aesthetic demands, all while preserving cultural authenticity, crucial ecological processes, and biodiversity. Therefore, effective planning plays a critical role in minimizing potential adverse consequences. Consequently, contemporary tourism planning aims to strike a balance between fostering competitive tourism activities and preserving the natural and cultural assets that underpin this industry (Lozano-Oyola et al., 2012).

3. Multi-Criteria Decision-Making Methods

Decision-making is the assessment of the current situation and choosing the most appropriate one from various activities to achieve a goal. Decision-making from an expert point of view includes various stages such as defining the problem, developing possible solutions, selecting criteria, determining the results of each solution, evaluating solutions, and choosing the best solution. In order to facilitate this process, decision-making techniques with a large number of criteria have been developed. These techniques are used to enable decision makers to reach the decision result in the fastest and easiest way possible in cases where there are more than one criteria (Demir and Kartal, 2020).

Various multi-criteria decision-making methods are employed to arrive at the optimal solution for multi-criteria decision-making problems. The main MCDM methods are AHP, DEA, FST, TOPSIS, GP, CBR, GRA/GRM, ANP, FUZZY AHP, ELECTRE, PROMETHEE, VIKOR, FUZZY TOPSIS, DEMATEL, PRAGMA, SAW, MAUT, BWM, SMART and Fuzzy ANP (Taherdoost and Madanchian, 2023), it is possible to see that they are applied in different fields of study. The references selected in the literature review are briefly explained in Table 1.

In the examination of research utilizing MCDM methods, it's apparent that the Analytical Hierarchy Process (AHP), despite its age, has consistently retained its recognition and relevance, including in recent times (Dalbudak and Rençber, 2022). It continues to be applied in various domains, including logistics, tourism, education, healthcare, public administration, the oil industry, textile industry, telecommunications, electronics industry, economics, and agriculture to the present day (Ilgaz, 2018; Lee and Hsieh, 2016; Wang et al., 2021; Podgórski, 2015; Cestari et al., 2018; Motamedi et al., 2018; Kim and Park, 2019; Adebisi et al., 2015; Şeker and Özgürler, 2012; Naseer et al., 2022; Kumar and Pant, 2022).

BWM is specialized in oil industry, supply chain Management, agriculture, tourism, healthcare, risk assessment and telecommunications (Nasirzadeh et al., 2021, Khan et al., 2022a; Kolagar, 2019; Tajer and Demir, 2022; Torkayesh et al., 2021; Amiri et al., 2021; Aydin et al., 2022; Pidchenko et al., 2023), SAW method is used in the fields of tourism, risk assessment, healthcare, energy sector, career and job, education, transportation and finance/economics (Sari, 2021; Valipour et al., 2018; Abirami and Askarunisa, 2017; Shakouri et al., 2014; Purba, 2021; Aminudin et al., 2018; Muslihudin et al., 2018; Mursyid et al., 2021), VIKOR method is used in the fields of healthcare, energy sector, career and job, supply chain management, education, transportation, finance/economics and tourism (Huang et al., 2021; Kumar and Samuel, 2017; Safrizal et al., 2021; Rajesh, 2018; Siew et al., 2021; Demir et al., 2023; Demir et al., 2019; Bagheri et al., 2018), ELECTRE method is used in the fields of transportation, education, supply chain management, tourism, energy sector, healthcare and agriculture (Carra et al., 2023; Özkan, 2013; Parthiban et al., 2010; Ilic et al., 2020; Lee and Chang, 2018; Singh, 2021; Banihabib and Shabestari, 2017), PROMETHEE method is used in the fields of tourism, healthcare, agriculture, energy sector, transportation, education, supply chain management, risk assessment and management (Lopes et al., 2018; Mishra et al., 2018; Dehghan et al., 2021;

Angilella and Pappalardo, 2021; Oubahman and Duleba, 2021; Živković et al., 2017; Govindan et al., 2017; Liu et al., 2021; Amaral and Costa, 2014), TOPSIS method is used in the fields of tourism, healthcare, telecommunications, finance/economics, risk management, supply chain management, education, agriculture, logistics, energy sector and electronics industry (Bagheri et al., 2018; Malekpoor et al., 2018; Goyal and Kaushal, 2017; Dinçer and Yüksel, 2018; Abdel-Basset and Mohamed, 2020; Ortiz-Barrios et al., 2020; Ersoy, 2021; Hadikurniawati et al., 2019; Wang et al., 2019; Vavrek and Chovancová, 2019; Menon and Ravi, 2022) and The DEMATEL method finds extensive application in various fields, including supply chain management, logistics, healthcare, tourism, agriculture, risk assessment, education, energy sector, transportation and career and job (Wu and Chang, 2015; Khan et al., 2022b; Si et al., 2017; Nilashi et al., 2019; Hui and Kexin, 2023; Li et al., 2020; Mamites et al., 2022; Zhao et al., 2021; Trivedi et al., 2021; Tsai, 2018).

Table 1: The references selected in the literature review

Researchers	Industry/Function/ System	Methodology
Ilgaz (2018)	Logistics	AHP-TOPSIS
Lee and Hsieh (2016)	Tourism	fuzzy Delphi-AHP
Wang et al. (2021)	Education	AHP
Podgórski (2015)	Healthcare Industry	AHP
Cestari et al. (2018)	Public Administration	AHP
Motamedi et al. (2018)	Oil Industry	AHP
Kim and Park (2019)	Textile Industry	SWOT-AHP
Adebiyi et al. (2015)	Telecommunications	AHP
Şeker and Özgürler (2012)	Electronics Industry	SWOT-AHP
Naseer et al. (2022)	Economics	AHP
Kumar and Pant (2022)	Agriculture	AHP
Nasirzadeh et al. (2021)	Oil Industry	BWM
Khan et al. (2022a)	Supply Chain Management	BWM
Kolagar (2019)	Agriculture	BWM-WASPAS
Tajer and Demir (2022)	Tourism	SWOT-BWM
Torkayesh et al. (2021)	Healthcare Industry	BWM- LBWA- CoCoSo
Amiri et al. (2021)	Supply Chain Management	Fuzzy BWM

Aydin et al. (2022)	Risk Assessment	BWM- MABAC- FMEA
Pidchenko et al. (2023)	Telecommunications	BWM-CRITIC- MARCOS
Sari (2021)	Tourism	AHP-SAW
Valipour et al. (2018)	Risk Assessment	SWARA- COPRAS- FANP- FAHP- FTOPSIS- SAW- EDAS
Abirami and Askarunisa (2017)	Healthcare Industry	SAW-TOPSIS
Shakouri et al. (2014)	Energy Sector	DEA-SAW
Purba (2021)	Career and Job	SAW
Aminudin et al. (2018)	Education	SAW
Muslihudin et al. (2018)	Transportation	Fuzzy SAW
Mursyid et al. (2021)	Finance/Economics	SAW
Huang et al. (2021)	Healthcare Industry	Modified VIKOR
Kumar and Samuel (2017)	Energy Sector	VIKOR-AHP
Safrizal et al. (2021)	Career and Job	VIKOR
Rajesh (2018)	Supply Chain Management	VIKOR
Siew et al. (2021)	Education	AHP- VIKOR
Demir et al. (2023)	Transportation	AHP- VIKOR
Demir et al. (2019)	Finance/Economics	Fuzzy AHP- VIKOR
Bagheri et al. (2018)	Tourism	VIKOR- TOPSIS
Carra et al. (2023)	Transportation	AHP- ELECTRE
ÖZKAN (2013)	Education	ELECTRE
Parthiban et al. (2010)	Supply Chain Management	ELECTRE
Ilic et al. (2020)	Tourism	ELECTRE-AHP
Lee and Chang (2018)	Energy Sector	WSM- VIKOR- TOPSIS- ELECTRE
Singh (2021)	Healthcare Industry	Fuzzy AHP- ELECTRE-I
Banihabib and Shabestari (2017)	Agriculture	Modified TOPSIS-AHP- ELECTRE III-SAW
Lopes et al. (2018)	Tourism	PROMETHEE
Mishra et al. (2018)	Healthcare Industry	PROMETHEE

Dehghan et al. (2021)	Agriculture	PROMETHEE II-Fuzzy-Fuzzy AHP
Angilella and Pappalardo (2021)	Energy Sector	PROMETHEE
Oubahman and Duleba (2021)	Transportation	PROMETHEE
Živković et al. (2017)	Education	SWOT-PROMETHEE/ GAIA-GDSS
Govindan et al. (2017)	Supply Chain Management	PROMETHEE
Liu et al. (2021)	Risk Assessment	TODIM-PROMETHEE
Amaral and Costa (2014)	Management	PROMETHEE II
Malekpoor et al. (2018)	Healthcare Industry	TOPSIS-CBR
Goyal and Kaushal (2017)	Telecommunications	AHP- TOPSIS
Dinçer and Yüksel (2018)	Finance/Economics	DEMATEL- TOPSIS
Abdel-Basset and Mohamed (2020)	Risk Management	TOPSIS-CRITIC
Ortiz-Barrios et al. (2020)	Supply Chain Management	AHP- DEMATEL- TOPSIS
Ersoy (2021)	Education	DEA- TOPSIS
Hadikurniawati et al. (2019)	Agriculture	AHP- TOPSIS
Wang et al. (2019)	Logistics	DEA- TOPSIS
Vavrek and Chovancová (2019)	Energy Sector	TOPSIS
Menon and Ravi (2022)	Electronics Industry	AHP- TOPSIS
Wu and Chang (2015)	Supply Chain Management	DEMATEL
Khan et al. (2022b)	Logistics	DEMATEL
Si et al. (2017)	Healthcare Industry	Modified DEMATEL
Nilashi et al. (2019)	Tourism	DEMATEL-Fuzzy TOPSIS
Hui and Kexin (2023)	Agriculture	HFLTS-DEMATEL
Li et al. (2020)	Risk Assessment	DEMATEL- TOPSIS
Mamites et al. (2022)	Education	DEMATEL
Zhao et al. (2021)	Energy Sector	DEMATEL
Trivedi et al. (2021)	Transportation	DEMATEL
Tsai (2018)	Career and Job	DEMATEL

4. Multi-Criteria Decision-Making Methods in Sustainable Tourism in the World and in Turkey

In this section, for the purpose of this study, scientific studies conducted on sustainable tourism in different areas around the world, the MCDM methods used, and the benefits and shortcomings of these methods were examined. The studies examined are briefly described in Table 2.

In the Tsaour and Wang (2007) study conducted on Green Island in Taiwan, after determining the indicators of sustainable tourism development of small islands, the Delphi technique was used to determine the final indicators in the evaluation of sustainable tourism development. Then, the weights of the criteria were calculated using the Analytical Hierarchy Process. Finally, fuzzy set theory was used to evaluate the sustainability of tourism development. It was explained that since the evaluation of sustainable tourism development is complex, the most inclusive and flexible method should be used for the solution. Therefore, within the scope of the study, it was emphasized that the AHP method, which systematizes complex problems and is easy to apply, is used to calculate the weights of the study.

In the study conducted by García-Melón et al. (2012) in Los Roques National Park in Venezuela, the Analytic Network Process and a Delphi-type decision-making procedure were employed. The objective was to involve stakeholders in the strategic assessment of sustainable tourism supported by stakeholders related to national parks, aiming to facilitate their participation in the consensus-building process. In the study, a significant drawback of ANP was explained as the difficulty in conducting sensitivity analysis of ANP results. In response to this concern, the Delphi method was recommended as a potential solution. The study concluded that the ANP process was valuable not only for achieving a final prioritization of strategies but also for facilitating discussions and reflections.

In the study by Krstic et al. (2015) aimed at analyzing the economic indicators of the sustainable development of spas in Serbia, the VIKOR method was used to determine the level of economic sustainability of tourist destination development, and the FANMA method was used to determine weight coefficients. The study highlighted that multi-criteria analysis (VIKOR) could be successfully applied to rank spas based on the level of economic sustainability in tourism. Furthermore, it was emphasized that it is possible to adjust the criteria (number and type of indicators) and weights according to observed tourist destinations,

and other multi-criteria methods can also be applied to rank spas and other tourist destinations based on the level of sustainable development in tourism.

Lee and Hsieh (2016) conducted a study on wetland tourism in Taiwan with the aim of identifying indicators for sustainable wetland tourism. This research, consisting of two parts, employed the fuzzy Delphi method in the first part to determine the fundamental dimensions and indicators. In the second part, the study used the Analytic Hierarchy Process (AHP) to examine the weights of these dimensions and indicators. The use of the Analytic Hierarchy Process (AHP) method in the study was explained by its common application for evaluating respondents' expressed opinions. This method is favored because it allows academics to effectively structure complex issues, such as the relative importance of sustainable tourism indicators in hierarchical data form. Consequently, AHP was emphasized as an effective approach for assessing the relative importance of sustainable tourism indicators.

Yang et al. (2020a) study in Taichung City, Taiwan, introduced a two-stage Multi-Criteria Decision-Making (MCDM) model to incorporate sustainable development into sports tourism. In the first stage, they used Bayesian BWM to determine important criteria, while the second stage involved Rough DEMATEL to identify cause-and-effect relationships among these criteria. This model offers valuable insights for the sustainable development of sports tourism in cities.

In Tajer and Demir (2022) study, they integrated the Best-Worst Method (BWM), a multi-criteria decision-making (MCDM) approach, with SWOT analysis to determine the resource values of ecotourism and strategies for maintaining landscape sustainability in Masuleh village, Iran. BWM was chosen due to its advantages over other MCDM methods, such as fewer pairwise comparisons, ease of understanding, high accuracy, and time efficiency. However, the study noted that the accuracy of BWM results was affected by some complex survey questions and redundancy in certain surveys. For the improvement of future BWM studies, it was recommended to increase participant numbers, present surveys in face-to-face or online formats, and share sample problem-solving with participants in advance to reduce time consumption and enhance accuracy.

In the study by Janošik et al. (2023), the Pivot Pairwise Relatives Criteria Importance Assessment (PIPRECIA) method was applied to evaluate and rank the types of development indicators for sustainable tourism. Within the context of the research, PIPRECIA was found to be applicable and useful for identifying the importance of indicators, those crucial to improving the sustainability of

tourism operations, based on the decision-maker's perspective. A notable weakness of the method used in the study is its reliance on the input of a single decision-maker, leading to subjective outcomes. Additionally, the examples presented in the research are hypothetical and not linked to specific travel destinations. In order to obtain the most realistic results, it is recommended to involve a larger number of decision-makers and base the calculation procedures on uncertain or interval numbers to account for environmental variability to a greater extent. The application of suitable extensions of the PIPRECIA method in sustainable tourism represents critical recommendations for future research. Lastly, the observation of the potential applications of Multi-Criteria Decision-Making (MCDM) methods in the field of tourism can facilitate the decision-making process and lead to more informed decisions.

In the study conducted by Akbarian Ronizi et al. (2023) in Isfahan province, Iran, various rural tourism activities and their suitability for tourists were analyzed with varying levels of risk across nine activity types. The research utilized the Fuzzy Method-AHP and Ordered Weighted Averaging (OWA) methods. The study highlighted the successful application of fuzzy models and multi-criteria decision-making methods like AHP and OWA in tourism use planning. It explained that the OWA model is capable of modeling complex real-world decision problems. Additionally, it emphasized that AHP, AHP-OWA, and Fuzzy AHP-OWA can be used in various spatial decision-making processes. Ultimately, the study underscored the utility of the OWA method, allowing managers and planners to explore different scenarios in a region and providing insights that can assist tourists in selecting the most suitable tourism activities.

In Zhu et al. (2023) study on the ecotourism of West Lake in Hangzhou, China, SWOT and TOPSIS techniques were employed to mitigate negative impacts and discover optimal tourism regulations and strategies. The study concluded that TOPSIS, as a decision-making method, offers a straightforward yet effective prioritization approach. It was noted that TOPSIS is beneficial because it incorporates both quantitative and qualitative criteria into the analysis. Furthermore, the study recommended a multi-faceted approach for prioritizing development strategies in West Lake tourism. This approach involves using Friedman's test to establish priorities, employing AHP and BWM methods to determine criteria weights, and employing fuzzy logic-based evaluations to manage uncertainty.

Table 2: Sustainable tourism studies using MCDM methods in the world

Researchers	Country	Methodology	Industry/Function/ System
Tsaur and Wang (2007)	Taiwan	Delphi technique -AHP-Fuzzy set theory	Island Tourism
García-Melón et al. (2012)	Venezuela	ANP-Delphi approach	National Park
Krstic et al. (2015)	Serbia	VIKOR-FANMA	Thermal Spring
Lee and Hsieh (2016)	Taiwan	AHP	Wetland Tourism
Yang et al. (2020a)	Taiwan	Bayesian BWM- rough DEMATEL	Sports Tourism
Tajer and Demir (2022)	Iran	SWOT-BWM	Ecotourism
Janošik et al. (2023)	-	PIPRECIA	Indicators of Sustainable Tourism
Akbarian Ronizi et al. (2023)	Iran	Fuzzy method- AHP-OWA	Rural Tourism
Zhu et al. (2023)	China	SWOT-TOPSIS	Ecotourism

Turkey is a major player in the global tourism industry, consistently ranking among the top 10 countries for international tourist arrivals and the top 17 for international tourism revenues. It is renowned for its abundant natural, cultural, and historical attractions, which attract foreign tourists. In recent years, Turkey has shifted toward sustainable tourism practices and expanded its tourism activities throughout the year (Kişi, 2019).

There are many research studies on sustainable tourism in Turkey (Eser et al., 2010; Celik Uguz, 2011; Altanlar and Akıncı, 2011; Alkan, 2015; Bilgiçli and Eetürk, 2022; Taşçioğlu and Yıldırkan, 2023). In the examination of research related to sustainable tourism, it is possible to come across studies that utilize Multi-Criteria Decision-Making (MCDM) methods. Scientific studies that employ MCDM methods are briefly described in Table 3.

Ok et al., (2011) study on the ecotourism planning of Cehennemdere Valley in the Mersin province of Turkey employed the Analytic Hierarchy Process (AHP), ELECTRE I, and ELECTRE III methods. The research highlighted the significant benefits of ELECTRE and AHP in solving complex problems related to natural resource management. It emphasized that these techniques serve as strong and flexible decision-making tools that assist decision-makers in

determining priorities and making informed decisions throughout the decision-making process.

In the research conducted by Özdemir Işık and Demir (2017) on the coastal of Trabzon province in Turkey, they utilized the Analytic Hierarchy Process (AHP) and ELECTRE methods to investigate the effects of existing coastal characteristics and historical-cultural changes in recreation and tourism. The study's methods and findings have been emphasized as potentially significant contributions to the sustainable tourism planning of other urban coastal areas.

Yılmaz and Zorlu (2018) study, focusing on Sinop province in Turkey as a tourism destination, utilized the SWOT-AHP method to determine the most prioritized factors in evaluating sustainable tourism in Sinop. This research, based on multi-criteria decision-making processes, explained that it helps prioritize strategies for the sustainable development of tourism in destinations and allows for the implementation of alternative actions in accordance with this prioritization.

Kişi (2019), research on sustainable tourism in Zonguldak province, Turkey, employed SWOT analysis to identify key strategic factors for developing sustainable tourism. Additionally, the Analytic Hierarchy Process (AHP) method was used to prioritize these factors. The study indicated that the proposed strategies within an analytical framework would lead to the design of sustainable tourism development planning. It also emphasized that the method provided decision-makers with a systematic approach for implementing sustainable tourism strategies and generating appropriate solutions for the tourism sector. Furthermore, it was mentioned that the SWOT-AHP method could be integrated with other multi-criteria decision-making methods in future research related to sustainability.

Tamer and Yangil (2021) conducted research using the Analytic Hierarchy Process (AHP), a multi-criteria decision-making method, to determine the prioritization of managers' perspectives on sustainable tourism and their perceptions of sustainable tourism dimensions in hotel businesses operating in Bodrum, Turkey. In the study, it was explained that the consistency ratio level in AHP should be less than 0.10, and the research achieved a consistency ratio of 0.01, indicating high accuracy, and was below the 0.10 threshold.

In the study by İşler and Akyurt (2021) on ecotourism in Giresun province, Turkey, the Analytic Hierarchy Process (AHP) method was used to determine the importance of criteria affecting ecotourism in the perceptions of travel

agency managers. AHP was highlighted for its ease of comprehensibility in solving complex and multidimensional problems. However, it was noted that when the CR (Consistency Ratio) value in this method exceeds 0.10, it either indicates a calculation error in the AHP method or that the survey participants provided inconsistent responses. Therefore, it was recommended to repeat the AHP analysis for the reasons mentioned.

In the Türk (2022) study, a SWOT analysis was initially conducted to assess the sustainable tourism potential of Pamukkale, and then the obtained factors were evaluated using SWOT-AHP. The study explained that while SWOT analysis helps identify factors influencing sustainable tourism potential, it is used in conjunction with AHP because SWOT does not provide numerical explanations. The method used in the research highlighted that it is possible to determine and enhance Pamukkale's sustainable tourism potential, prioritize the identified factors, and develop alternative strategies based on this prioritization.

Table 3: Sustainable tourism studies using MCDM methods in Turkey

Researchers	Methodology	Industry/Function/System
Ok et al. (2011)	AHP, ELECTRE I ve III	Ecotourism
Özdemir Işık and Demir (2017)	AHP ve ELECTRE	Urban Coastal Areas- Sustainable Tourism Planning
Yılmaz and Zorlu (2018)	SWOT-AHP	Tourism Destination Development
Kişi (2019)	SWOT-AHP	Sustainable Tourism Development
Tamer and Yangil (2021)	AHP	Perspectives on Sustainable Tourism
İşler and Akyurt (2021)	AHP	Ecotourism
Türk (2022)	SWOT-AHP	Development of Sustainable Tourism Strategies

5. Discussion and Conclusion

Tourism has witnessed significant expansion and development since the end of World War II (Ozkaya and Demirhan, 2022). Sustainable tourism has become increasingly vital in response to the rapid growth of the global tourism industry and its negative impacts on the environment, local cultures, and

social structures. The goal of sustainable tourism is to minimize these adverse effects while maximizing the socio-economic benefits for tourist destinations. This necessitates careful, long-term planning, management, and monitoring of tourism activities to strike a balance between development and preservation (Kişi, 2019). In this context selecting appropriate decision-making methods is vital to ensure the sustainability of tourism. The use of multi-criteria decision-making methods is crucial in addressing complex situations and providing decision-makers with valuable insights by integrating objective data and expert opinions. However, choosing the most appropriate method depends on the specific problem and decision-making context, requiring careful consideration to ensure a good fit for the situation. MCDM methods serve as valuable tools for addressing the intricate challenges posed by sustainable tourism. They offer a structured approach for decision-makers to navigate the multifaceted aspects of sustainability, considering economic, environmental, and social factors. Even though each method has its advantages and disadvantages, the choice should align with the specific needs of the sustainable tourism project.

The goal of this paper is to explore the application of multi-criteria decision-making (MCDM) methods across various industries and provide an extensive analysis of how these MCDM techniques are employed in research papers within the field of sustainable tourism. In an examination of research that utilizes Multi-Criteria Decision-Making (MCDM) methods, it can be seen that AHP, BWM, SAW, VIKOR, ELECTRE, PROMETHEE, TOPSIS and DEMATEL methods are widely used in logistics, tourism, education, healthcare industry, public administration, oil industry, textile industry, telecommunications, electronics industry, economics, agriculture, supply chain management and risk assessment fields (Şeker and Özgürler, 2012; Goyal and Kaushal, 2017; Banihabib and Shabestari, 2017; Ilgaz, 2018; Cestari et al., 2018; Mishra et al., 2018; Kim and Park, 2019; Li et al., 2020; Ortiz-Barrios et al., 2020; Siew et al., 2021; Nasirzadeh et al., 2021; Mursyid et al., 2021; Tajer and Demir, 2022).

In the analysis of academic studies related to sustainable tourism, both on a global scale and within Turkey, it is noticeable that the Analytic Hierarchy Process (AHP) is commonly utilized as one of the multi-criteria decision-making methods. The AHP method has been explained as an advantageous method in various studies and is often integrated with other MCDM methods. For example, in the study on island tourism conducted by Tsaour and Wang (2007), the AHP method was emphasized as a method that can systematize complex problems and is easy to apply in calculating the study's weights. In the study on wetland

tourism by Lee and Hsieh (2016), it was explained that AHP is an effective approach for assessing the relative importance of sustainable tourism indicators. In the study by Ok et al. (2011), hybrid AHP, ELECTRE I, and ELECTRE III methods were used, and it was determined that ELECTRE and AHP have significant advantages in solving complex problems related to natural resource management, serving as powerful and flexible decision-making tools. In the study by Özdemir Işık and Demir (2017), AHP and ELECTRE methods were integrated, and it was emphasized that this integrated approach would make a significant contribution to sustainable tourism planning. In the study conducted by Yılmaz and Zorlu (2018) in Turkey, SWOT-AHP methods were employed, and it was explained that these methods assisted in prioritizing strategies for sustainable tourism development in destinations. Similarly, in the study by Kişi (2019), SWOT-AHP methods were integrated, emphasizing that it provided decision-makers with a systematic approach for implementing sustainable tourism strategies and generating suitable solutions for the tourism sector. In the study on ecotourism by İşler and Akyurt (2021), it was mentioned that AHP was beneficial in solving complex and multi-dimensional problems due to its comprehensibility. However, it was noted that the AHP analysis needed to be repeated due to inconsistent responses from survey participants. In the study by Tamer and Yangil (2021), it was highlighted that the consistency ratio of the AHP results was 0.01, indicating a high level of accuracy for this method. In Türk study (2022), the integration of SWOT-AHP methods was emphasized, and it was highlighted that this method can be used to determine and enhance the sustainable tourism potential of the study area, prioritize the identified factors, and develop alternative strategies based on this prioritization.

In the research conducted by Yang et al. (2020a) on sports tourism, Bayesian BWM and Rough DEMATEL methods were integrated. It was explained that this proposed model provided managerial outputs for the development of sports tourism in cities and was characterized as a systematic method. In the study by Tاجر and Demir (2022), which integrated SWOT and BWM methods in ecotourism, it was emphasized that BWM is advantageous compared to other MCDM methods due to requiring fewer pairwise comparisons, being easy to understand, and having high accuracy. In the study conducted by Krstic et al. (2015), which employed the VIKOR and FANMA methods, it was determined that VIKOR could be successfully applied to rank thermal spas based on their level of economic sustainability in tourism. In the study by Zhu et al. (2023) focusing on ecotourism, the use of SWOT and TOPSIS revealed the utility of

TOPSIS due to its capability to analyze both quantitative and qualitative criteria. In the study conducted by Janošik et al. (2023) utilizing the PIPRECIA method, it was found that PIPRECIA can be applied and is beneficial in enhancing the sustainability of tourism operations. However, a limitation of the study was its reliance on the input of a single decision-maker, leading to subjective outcomes. It was suggested that involving a larger number of decision-makers in the study would address this issue.

In conclusion, this article discusses various MCDM methods such as Analytic Hierarchy Process (AHP), Best-Worst Method (BWM), VIKOR, and more, highlighting their applications in sustainable tourism worldwide and in Turkey. These methods aid in decision-making by evaluating and prioritizing complex factors associated with sustainable tourism. In assessing the advantages and disadvantages of these methods, it's evident that AHP's clarity and versatility make it a strong contender for addressing sustainable tourism issues. However, the suitability of the method may vary depending on the specific context and preferences of decision-makers. Ultimately, the choice of MCDM method should align with the unique requirements of each sustainable tourism project, ensuring that it leads to decisions that are both sustainable and contextually relevant.

6. Recommendations

Further Research Integration: Future research endeavors should continue to integrate MCDM methods into the sustainable tourism domain. A variety of techniques, including AHP, BWM, VIKOR, ELECTRE, DEMATEL, and TOPSIS, have proven their utility in addressing tourism-related challenges. Researchers and policymakers are encouraged to explore the adaptability and comparative advantages of these methods in different tourism contexts.

Leveraging AHP's Clarity: The Analytic Hierarchy Process (AHP) has been a stalwart in sustainable tourism. Its advantages lie in its comprehensibility and ease of use. Decision-makers in sustainable tourism planning can confidently employ AHP for its clarity in structuring complex problems.

BWM's Specialization: Best-Worst Method (BWM) has shown its prowess in sectors like oil industry, supply chain management, healthcare industry, tourism and agriculture. Decision-makers in these domains may find BWM particularly suitable for evaluating sustainability criteria in their specific contexts.

SWOT-AHP Synergy: SWOT analysis in conjunction with AHP has proved beneficial in evaluating sustainable tourism potential. This combination allows

decision-makers to identify key factors, assess their importance, and prioritize strategies effectively.

Stakeholder Engagement: Sustainable tourism thrives on stakeholder cooperation and engagement. Decision-makers should prioritize involving various stakeholders, including local communities, tourists, and tourism businesses, in the decision-making process. MCDM methods can be instrumental in aggregating and assessing the diverse perspectives and priorities of these stakeholders.

Consistency and Reliability: In the utilization of MCDM methods, maintaining consistency and reliability in data collection and analysis is crucial. Researchers should adhere to established guidelines and best practices to ensure that the results accurately reflect the preferences and priorities of participants.

Sensitivity Analysis: Given the potential subjectivity of MCDM results, sensitivity analysis should be routinely conducted to assess the robustness of findings. Decision-makers should possess an understanding of the constraints and uncertainties linked to the results produced by MCDM and should make well-informed decisions through thorough analysis.

Interdisciplinary Collaboration: Sustainable tourism issues are inherently interdisciplinary. Collaborative efforts between experts in tourism, environmental science, economics, sociology, and other fields are essential for addressing the multifaceted challenges posed by tourism development.

Integration with Sustainable Policies: The findings and recommendations generated through MCDM should be seamlessly integrated into sustainable tourism policies and practices. These insights should inform strategic planning, resource allocation, and regulatory frameworks that promote sustainable tourism development.

Education and Training: Decision-makers and stakeholders involved in sustainable tourism should be equipped with the necessary education and training in MCDM methods. This empowers them to use these tools proficiently and make informed decisions.

Monitoring and Evaluation: Continuous monitoring and evaluation of sustainable tourism initiatives are essential. MCDM methods can contribute to ongoing assessments of the effectiveness of implemented strategies, allowing for timely adjustments and improvements.

Consider Local Context: In the selection of an MCDM method, it is essential to account for the distinctive context of the sustainable tourism project.

Factors such as the region's characteristics and stakeholder dynamics should influence the choice of method.

Essentially, sustainable tourism is a vital approach to balance economic growth, environmental conservation, and societal well-being. The incorporation of MCDM techniques equips decision-makers with the tools to navigate this complex path. By following the guidance provided above, researchers, policymakers, and industry leaders can propel the agenda of sustainable tourism forward, ensuring its ongoing success while preserving the planet and its communities for future generations.

References

- Abdel-Basset, M., Mohamed, R. (2020). A Novel plithogenic TOPSIS-CRITIC Model for Sustainable Supply Chain Risk Management. *Journal of Cleaner Production*, 247, 119586.
- Abirami, A. M., Askarunisa, A. (2017). Sentiment Analysis Model to Emphasize the Impact of Online Reviews in Healthcare Industry. *Online Information Review*, 41(4), 471-486.
- Adebiyi, S.O., Oyatoye, E.O., Kuye, O.L. (2015). An Analytic Hierarchy Process Analysis: Application to Subscriber Retention Decisions in the Nigerian Mobile Telecommunications. *International Journal of Management and Economics*, 48, 63–83.
- Akbarian Ronizi, S.R., Mokarram, M., Negahban, S. (2023). Investigation of Sustainable Rural Tourism Activities with Different Risk: A GIS-MCDM Case in Isfahan, Iran. *Earth and Space Science*, 10(4), e2021EA002153.
- Alkan, C. (2015). Sustainable Tourism: An Application for Alaçatı Destination. *Journal of Yasar University*, 10(40), 6692-6710.
- Altanlar, A., Akıncı, K. G. (2011). Research on the Attitude and Expectations of Tourists and Citizens of the Area for Sustainable Tourism Planning: Case of Akçakoca. *Journal of Environmental Sciences*, 3, 39-54.
- Amaral, T. M., Costa, A.P. (2014). Improving Decision-making and Management of Hospital Resources: An Application of the PROMETHEE II Method in an Emergency Department. *Operations Research for Health Care*, 3(1), 1-6.
- Aminudin, N., Huda, M., Kilani, A., Embong, W. H. W., Mohamed, A. M., Basiron, B., Triono, A. (2018). Higher Education Selection Using Simple

Additive Weighting. *International Journal of Engineering and Technology (UAE)*, 7(2.27), 211-217.

Amiri, M., Hashemi-Tabatabaei, M., Ghahremanloo, M., Keshavarz-Ghorabae, M., Zavadskas, E. K., Banaitis, A. (2021). A New fuzzy BWM Approach for Evaluating and Selecting a Sustainable Supplier in Supply Chain Management. *International Journal of Sustainable Development & World Ecology*, 28(2), 125-142.

Angilella, S., Pappalardo, M.R. (2021). Assessment of a Failure Prediction Model in the European Energy Sector: A Multicriteria Discrimination Approach with a PROMETHEE Based Classification. *Expert Systems with Applications*, 184, 115513.

Aydin, N., Seker, S., Şen, C. (2022). A New Risk Assessment Framework for Safety in Oil and Gas Industry: Application of FMEA and BWM Based Picture fuzzy MABAC. *Journal of Petroleum Science and Engineering*, 219, 111059.

Bagheri, M., Shojaei, P., Khorami, M. (2018). A Comparative Survey of the Condition of Tourism Infrastructure in Iranian Provinces Using VIKOR and TOPSIS. *Decision Science Letters*, 7(1), 87-102.

Türk, B. (2022). Evaluation of Pamukkale's Sustainable Tourism Potential Via SWOT-AHP (A'WOT). *Pamukkale University Journal of Social Sciences Institute*, (53), 235-251.

Banihabib, M.E., Shabestari, M.H. (2017). Decision Models for the Ranking of Agricultural Water Demand Management Strategies in an Arid Region. *Irrigation and Drainage*, 66(5), 773-783.

Beyhan, Ş.G., Ünügür, S. M. (2010). Sustainable Tourism and Identity Model in the Context of Contemporary Requirements. *İTÜDERGİSİ/a*, 4(2).

Bilgiçli, İ., Eetürk, S. (2022). Investigation of Environmental Effects of Ecotourism in Karasu within the Scope of Sustainable Tourism. *Journal of Social, Humanities and Administrative Sciences*, 5(8), 1110-1129.

Carra, M., Botticini, F., Pavesi, F. C., Maternini, G., Pezzagno, M., Barabino, B. (2023). A Comparative Cycling Path Selection for Sustainable Tourism in Franciacorta. An Integrated AHP-ELECTRE Method. *Transportation Research Procedia*, 69, 448-455.

Cestari, J. M. A. P., Loures, E. D. F. R., Santos, E. A. P. (2018). A Method to Diagnose Public Administration Interoperability Capability Levels Based on Multi-criteria Decision-making. *International Journal of Information Technology & Decision Making*, 17(01), 209-245.

Civelek, M. (2023). Analysis of Tourism Education Students' Metaphors Regarding Sustainable Tourism. *Nevşehir Hacı Bektaş Veli Üniversitesi SBE Dergisi*, 13(2), 1025-1038.

Celik Uguz, S. (2011). Alternative Tourism Potential of Burhaniye in the Frame of Sustainable Tourism. *Marmara geographical review*, (24), 332-353.

Dalbudak, E., Rençber, Ö.F. (2022). A Literature Review on Multi-criteria Decision-Making Methods. *Gaziantep Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 4(1), 1-17.

Dehghan, P., Azarnivand, H., Khosravi, H., Zehtabian, G., Moghaddamnia, A. (2021). An Ecological Agricultural Model Using fuzzy AHP and PROMETHEE II Approach. *Desert*, 26(1), 71-83.

Demir, A., Shawkat, S., Majeed, B. N., Budur, T. (2019). Fuzzy AHP and VIKOR to Select Best Location for Bank Investment: Case Study in Kurdistan Region of Iraq. In *Effective Investments on Capital Markets: 10th Capital Market Effective Investments Conference (CMEI 2018)* (pp. 485-510). Springer International Publishing.

Demir, E., Ak, M.F., Sarı, K. (2023). Pythagorean fuzzy Based AHP-VIKOR Integration to Assess Rail Transportation Systems in Turkey. *International Journal of Fuzzy Systems*, 25(2), 620-632.

Demir, G., Kartal, M. (2020). *Güncel çok kriterli karar verme teknikleri*. Akademisyen Kitabevi.

Demirdağ, Ş.A. (2022). The Place and Importance of English Education in the Scope of Sustainable Tourism: A Critical Approach. *Güncel Turizm Araştırmaları Dergisi*, 6(1), 251-262.

Dinçer, H., Yüksel, S. (2018). Financial Sector-based Analysis of the G20 Economies Using the Integrated Decision-making Approach with DEMATEL and TOPSIS. In *Emerging Trends in Banking and Finance: 3rd International Conference on Banking and Finance Perspectives* (pp. 210-223). Springer International Publishing.

Ersoy, Y. (2021). Performance Evaluation in Distance Education by Using Data Envelopment Analysis (DEA) and TOPSIS Methods. *Arabian Journal for Science and Engineering*, 46(2), 1803-1817.

Eser, S., Dalgın, T., Çeken, H. (2010). Cultural Tourism as a Sustainable Tourism Type: The Case of Ephesus. *Aegean Geographical Journal*, 19(2), 27-34.

García-Melón, M., Gómez-Navarro, T., Acuña-Dutra, S. (2012). A Combined ANP-delphi Approach to Evaluate Sustainable Tourism. *Environmental Impact Assessment Review*, 34, 41-50.

Garda, B., Temizel, M. (2016). Types of Sustainable Tourism. *Selcuk University Journal of Social and Technical Researches*, (12), 83-103.

Govindan, K., Kadziński, M., Sivakumar, R. (2017). Application of a Novel PROMETHEE-Based Method for Construction of a Group Compromise Ranking to Prioritization of Green Suppliers in Food Supply Chain. *Omega*, 71, 129-145.

Goyal, T., Kaushal, S. (2017). An Intelligent Scheduling Scheme for Real-time Traffic Management Using Cooperative Game Theory and AHP-TOPSIS Methods for Next Generation Telecommunication Networks. *Expert Systems with Applications*, 86, 125-134.

Güven, A. (2016). Creative Tourism in the Scope of Sustainable Tourism: Sample of Antalya City. Yüksek Lisans Tezi, Akdeniz Üniversitesi, Antalya.

Hadikurniawati, W., Winarno, E., Santoso, D. B. (2019). A Mixed Method Using AHP-TOPSIS for Dryland Agriculture Crops Selection Problem. In 2019 3rd International Conference on Informatics and Computational Sciences (ICICoS) (pp. 1-5). IEEE.

Huang, S. W., Liou, J. J., Chuang, H. H., Tzeng, G. H. (2021). Using a Modified VIKOR Technique for Evaluating and Improving the National Healthcare System Quality. *Mathematics*, 9(12), 1349.

Hui, X., Kexin, Z. (2023). Dynamic evaluation of a post-pandemic agricultural traceability system, based on the HFLTS-DEMATEL method. *International Journal of Quality & Reliability Management*.

Ilgaz, A. (2018). Evaluation of Personel Selection Criteria for Logistic Sector with AHP and TOPSIS Methods. *Journal of Süleyman Demirel University Institute of Social Sciences*, 1(32), 586-605.

Ilic, B., Djukic, G., Balaban, M. (2020). Sustainable Development Directions of Rural Tourism of Timok Region. *Економика пољопривреде*, 67(1), 157-174.

İlban, M. O., Gümrükçü, S., Yıldız, N. (2023). Responsible Tourism in Sustainable Tourism Studies. *Gastroia: Journal of Gastronomy and Travel Research*, 7(1), 201-210.

İşler, H., Akyurt, H. (2021). Determination of the Travel Agencies' Perceptions of Ecotourism Criteria with AHP Method: The Case of Giresun. *Türk Turizm Araştırmaları Dergisi*, 5(2), 1103-1121.

Janošik, M., Popović, G., Vukotić, S. (2023). A Multiple-criteria Approach for the Evaluation of Comparative Indicators of Sustainable Tourism. *Hotel and Tourism Management*, 11(1), 113-125.

Karapınar, E., Barakazı, M. (2017). Evaluation of Cultural Heritage Tourism as a Sustainable Tourism: Gobeklipe Ruins. *Güncel Turizm Araştırmaları Dergisi*, 1(1), 5-18.

Keskin, E., Örgün, E. (2015). Conceptual Analysis of Sustainable Tourism Phenomenon by Means of Word Association Test: Ürgüp Sample. *Journal of Tourism and Gastronomy Studies*, 3/1 (2015) 30-40.

Khan, M. I., Khan, S., Haleem, A. (2022a). Analyzing Barriers Towards Management of Halal Supply Chain: A BWM Approach. *Journal of Islamic Marketing*, 13(1), 66-80.

Khan, S., Singh, R., Haleem, A., Dsilva, J., Ali, S. S. (2022b). Exploration of Critical Success Factors of Logistics 4.0: A DEMATEL Approach. *Logistics*, 6(1), 13.

Kim, Y.J., Park, J. (2019). A Sustainable Development Strategy for the Uzbekistan Textile Industry: The Results of a SWOT-AHP Analysis. *Sustainability*, 11(17), 4613.

Kişi, N. (2019). A Strategic Approach to Sustainable Tourism Development Using the A'WOT Hybrid Method: A Case Study of Zonguldak, Turkey. *Sustainability*, 11(4), 964.

Koçoğlu, C.M., Saraç, Ö., Batman, O. (2020). Local Public Attitudes for the Development of Sustainable Tourism in Safranbolu. *Türk Turizm Araştırmaları Dergisi*, 4(1): 202-219.

Kolagar, M. (2019). Adherence to Urban Agriculture in Order to Reach Sustainable Cities; A BWM–WASPAS Approach. *Smart Cities*, 2(1), 31-45.

Krstic, B., Petrovic, J., Stanišić, T. (2015). Analysis of Key Indicators of Economic Dimensions of Spas' Sustainable Development in Serbia as Tourism Destinations. *Ekonomika, Journal for Economic Theory and Practice and Social Issues*, 61(1350-2016-107385), 61-71.

Kumar, A., Pant, S. (2022). Analytical Hierarchy Process for Sustainable Agriculture: An Overview. *MethodsX*, 101954.

Kumar, M., Samuel, C. (2017). Selection of Best Renewable Energy Source by Using VIKOR Method. *Technology and Economics of Smart Grids and Sustainable Energy*, 2, 1-10.

Lee, H.C., Chang, C.T. (2018). Comparative Analysis of MCDM Methods for Ranking Renewable Energy Sources in Taiwan. *Renewable and sustainable energy reviews*, 92, 883-896.

Lee, T.H., Hsieh, H.P. (2016). Indicators of Sustainable Tourism: A Case Study from a Taiwan's Wetland. *Ecological Indicators*, 67, 779-787.

Lopes, A. P. F., Muñoz, M. M., Alarcón-Urbistondo, P. (2018). Regional Tourism Competitiveness Using the PROMETHEE Approach. *Annals of Tourism Research*, 73, 1-13.

Lozano-Oyola, M., Blancas, F. J., González, M., Caballero, R. (2012). Sustainable Tourism Indicators as Planning Tools in Cultural Destinations. *Ecological indicators*, 18, 659-675.

Li, X., Han, Z., Zhang, R., Zhang, Y., Zhang, L. (2020). Risk Assessment of Hydrogen Generation Unit Considering Dependencies Using Integrated DEMATEL and TOPSIS Approach. *International Journal of Hydrogen Energy*, 45(53), 29630-29642.

Liu, R., Zhu, Y. J., Chen, Y., Liu, H. C. (2021). Occupational Health and Safety Risk Assessment Using an Integrated TODIM-PROMETHEE Model Under Linguistic Spherical fuzzy Environment. *International Journal of Intelligent Systems*, 36(11), 6814-6836.

Mak, B. K., Cheung, L. T., Hui, D. L. (2017). Community Participation in the Decision-making Process for Sustainable Tourism Development in Rural Areas of Hong Kong, China. *Sustainability*, 9(10), 1695.

Malekpoor, H., Mishra, N., Kumar, S. (2018). A Novel TOPSIS-CBR Goal Programming Approach to Sustainable Healthcare Treatment. *Annals of Operations Research*, 1-23.

Mamites, I., Almerino, P., Sitoy, R., Atibing, N. M., Almerino, J. G., Cebe, D., ..., Ocampo, L. (2022). Factors Influencing Teaching Quality in Universities: Analyzing Causal Relationships Based on Neutrosophic DEMATEL. *Education Research International*, 2022.

Menon, R.R., Ravi, V. (2022). Using AHP-TOPSIS Methodologies in the Selection of Sustainable Suppliers in an Electronics Supply Chain. *Cleaner Materials*, 5, 100130.

Michalena, E., Hills, J., Amat, J. P. (2009). Developing Sustainable Tourism, Using a Multicriteria Analysis on Renewable Energy in Mediterranean Islands. *Energy for Sustainable Development*, 13(2), 129-136.

Mishra, S. S., Muduli, K., Dash, M., Yadav, D. K. (2018). PROMETHEE-Based Analysis of HCWM Challenges in Healthcare Sector of Odisha. In *Smart Computing and Informatics: Proceedings of the First International Conference on SCI 2016, Volume 1* (pp. 163-170). Springer Singapore.

Motamedi, P., Bargozin, H., Pourafshary, P. (2018). Management of Implementation of Nanotechnology in Upstream Oil Industry: An Analytic Hierarchy Process Analysis. *Journal of Energy Resources Technology*, 140(5), 052908.

Mursyid, M., Kusuma, H., Tohirin, A., Sriyana, J. (2021). Performance Analysis of Islamic Banks in Indonesia: The Maqashid Shariah Approach. *The Journal of Asian Finance, Economics and Business*, 8(3), 307-318.

Muslihudin, M., Susanti, T. S., Maselena, A., Pringsewu, S. (2018). The Priority of Rural Road Development Using fuzzy Logic Based Simple Additive Weighting. *International Journal of Pure and Applied Mathematics*, 118(8), 9-16.

Naseer, S., Song, H., Aslam, M. S., Abdul, D., Tanveer, A. (2022). Assessment of Green Economic Efficiency in China Using Analytical Hierarchical Process (AHP). *Soft computing*, 1-11.

Nasirzadeh, H., Amin-Tahmasbi, H., Khalili, H. A. (2021). Investment Analysis in Privatization of National Iranian Drilling Company Using Systems Dynamics and BWM Technique. *Energy Policy*, 148, 111963.

Ayaş, N. (2007). Environmentally Sustainable Tourism Development. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 9(1), 59-69.

Nilashi, M., Samad, S., Manaf, A. A., Ahmadi, H., Rashid, T. A., Munshi, A., Almkadi, W., Ibrahim, O., Ahmed, O. H. (2019). Factors Influencing Medical Tourism Adoption in Malaysia: A DEMATEL-Fuzzy TOPSIS Approach. *Computers & Industrial Engineering*, 137, 106005.

Ok, K., Okan, T., Yilmaz, E. (2011). A Comparative Study on Activity Selection with Multi-criteria Decision-making Techniques in Ecotourism Planning. *Scientific Research and Essays*, 6(6), 1417-1427.

Oubahman, L., Duleba, S. (2021). Review of PROMETHEE Method in Transportation. *Production Engineering Archives*, 27.

Ortiz-Barrios, M., Miranda-De la Hoz, C., López-Meza, P., Petrillo, A., De Felice, F. (2020). A Case of Food Supply Chain Management with AHP, DEMATEL, and TOPSIS. *Journal of Multi-Criteria Decision Analysis*, 27(1-2), 104-128.

Ozkaya, G., Demirhan, A. (2022). Multi-Criteria Analysis of Sustainable Travel and Tourism Competitiveness in Europe and Eurasia. *Sustainability*, 14(22), 15396.

Özdemir Işık, B., Demir, S. (2017). Integrated Multi-criteria Decision-making Methods for the Sustainability of Historical–Cultural Structures on the Trabzon Coastline. *Sustainability*, 9(11), 2114.

Özkan, T.K. (2013). ELECTRE Method in Education: A School Selection Problem. *choice*, 4.

Parthiban, P., Mathiyalagan, P., Punniyamorthy, M., Dominic, P. D. D. (2010). Optimization of Supply Chain Performance Using MCDM tool– A Case Study. *International Journal of value chain management*, 4(3), 240-255.

Pidchenko, S., Kucheruk, O., Pyvovar, O., Stetsiuk, V., Mishan, V. (2023). A multi-criteria Approach to Decision-making in Telecommunication Network Components Selection.

Podgórski, D. (2015). Measuring Operational Performance of OSH Management System—A Demonstration of AHP-based Selection of Leading Key Performance Indicators. *Safety science*, 73, 146-166.

Purba, R. (2021). Decision Support System for Determining Homeroom Teachers at Musda Perbaungan Private Vocational Schools Using the Simple Additive Weighting Method. *Journal Basic Science and Technology*, 10(2), 42-51.

Rajesh, R. (2018). Measuring the Barriers to Resilience in Manufacturing Supply Chains Using Grey Clustering and VIKOR Approaches. *Measurement*, 126, 259-273.

Celik Uguz, S. (2011). Alternative Tourism Potentail of Burhaniye in the Frame of Sustainable Tourism. *MARMARA GEOGRAPHICAL REVIEW*, (24), 332-353.

Safrizal, S., Ambyar, A., Verawardina, U. (2021). Development of Knowledge Sharing Model Using Decision Support System in Determine Feasible on the Job Training in Vocational School Using Vikor Method. *IJISTECH (International Journal of Information System and Technology)*, 4(2), 583-590.

Sari, N. K. A. P. (2021). Implementation of the AHP-SAW Method in the Decision Support System for Selecting the Best Tourism Village. *Jurnal Teknik Informatika CIT Medicom*, 13(1), 24-35.

Shakouri, H., Nabae, M., Aliakbarisani, S. (2014). A Quantitative Discussion on the Assessment of Power Supply Technologies: DEA (data envelopment analysis) and SAW (simple additive weighting) as Complementary Methods for the “Grammar”. *Energy*, 64, 640-647.

Si, S. L., You, X. Y., Liu, H. C., Huang, J. (2017). Identifying Key Performance Indicators for Holistic Hospital Management with a Modified DEMATEL Approach. *International journal of environmental research and public health*, 14(8), 934.

Siew, L.W., Hoe, L.W., Fai, L.K., Bakar, M.A., Xian, S. J. (2021). Analysis on the e-learning method in Malaysia with AHP-VIKOR model. *International Journal of Information and Education Technology*, 11(2), 52-58.

Singh, A. (2021). An Integrated Approach Towards Ranking Hospitals Using Fuzzy AHP and ELECTRE-I Technique. *International Journal of Healthcare Management*, 14(2), 499-508.

Süzer, Ö., Doğdubay, M. (2022). The Importance and Competitive Advantage of Local Food on Sustainable Tourism Movement (A Conceptual Approach). *Saffron Journal of Culture and Tourism Research*, 5(2), 255-269.

Şeker, Ş., Özgürler, M. (2012). Analysis of the Turkish Consumer Electronics Firm Using SWOT-AHP Method. *Procedia-social and behavioral sciences*, 58, 1544-1554.

Tajer, E., Demir, S. (2022). Ecotourism Strategy of UNESCO City in Iran: Applying a New Quantitative Method Integrated with BWM. *Journal of Cleaner Production*, 376, 134284.

Taherdoost, H., Madanchian, M. (2023). Multi-criteria decision making (MCDM) methods and concepts. *Encyclopedia*, 3(1), 77-87.

Tamer, E.T., Yangil, F.M. (2021). Sustainability indicators in tourism: An application on hotel business managers. *Business & Management Studies: An International Journal*, 9(3), 943.

Taşcıoğlu, H., Yıldırkan, R. (2023). A Research on Sustainable Tourism and Environmental Attitudes of Bungalow Managers in Sapanca. *Journal of Tourism and Gastronomy Studies*, 11 (2), 969-990

Torkayesh, A. E., Pamucar, D., Ecer, F., Chatterjee, P. (2021). An integrated BWM-LBWA-CoCoSo framework for evaluation of healthcare sectors in Eastern Europe. *Socio-Economic Planning Sciences*, 78, 101052.

Trivedi, A., Jakhar, S. K., Sinha, D. (2021). Analyzing barriers to inland waterways as a sustainable transportation mode in India: a dematel-ISM based approach. *Journal of Cleaner Production*, 295, 126301.

Tsai, S.B. (2018). Using the DEMATEL model to explore the job satisfaction of research and development professionals in china's photovoltaic cell industry. *Renewable and Sustainable Energy Reviews*, 81, 62-68.

Tsaur, S.H., Wang, C.H. (2007). The evaluation of sustainable tourism development by analytic hierarchy process and fuzzy set theory: An empirical study on the Green Island in Taiwan. *Asia Pacific Journal of Tourism Research*, 12(2), 127-145.

Valipour, A., Sarvari, H., Tamošaitiene, J. (2018). Risk assessment in PPP projects by applying different MCDM methods and comparative results analysis. *Administrative Sciences*, 8(4), 80.

Vavrek, R., Chovancová, J. (2019). Assessment of economic and environmental energy performance of EU countries using CV-TOPSIS technique. *Ecological Indicators*, 106, 105519.

Wang, S. H., Lee, M. T., Château, P. A., Chang, Y. C. (2016). Performance indicator framework for evaluation of sustainable tourism in the Taiwan coastal zone. *Sustainability*, 8(7), 652.

Wang, X.Y., Li, G., Tu, J.F., Khuyen, N.T.T., Chang, C.Y. (2021). Sustainable education using new communication technology: Assessment with analytical hierarchy process (AHP). *Sustainability*, 13(17), 9640.

Wang, Z., Hao, H., Gao, F., Zhang, Q., Zhang, J., Zhou, Y. (2019). Multi-attribute decision making on reverse logistics based on DEA-TOPSIS: A study of the Shanghai End-of-life vehicles industry. *Journal of cleaner production*, 214, 730-737.

Wu, H. H., Chang, S. Y. (2015). A case study of using DEMATEL method to identify critical factors in green supply chain management. *Applied Mathematics and Computation*, 256, 394-403.

Yang, J.J., Chuang, Y.C., Lo, H.W., Lee, T.I. (2020 a). A two-stage MCDM model for exploring the influential relationships of sustainable sports tourism criteria in Taichung City. *International journal of environmental research and public health*, 17(7), 2319.

Yang, J.J., Lo, H.W., Chao, C.S., Shen, C.C., Yang, C.C. (2020 b). Establishing a sustainable sports tourism evaluation framework with a hybrid multi-criteria decision-making model to explore potential sports tourism attractions in Taiwan. *Sustainability*, 12(4), 1673.

Yeksan, Ö., Akbaba, A. (2019). A Bibliometric Analysis of Sustainable Tourism Articles. *Güncel Turizm Araştırmaları Dergisi*, 3(2), 220-231.

Yılmaz, A., Zorlu, K. (2018). Prioritization of Sustainable Tourism Strategies in Sinop by Using SWOT-AHP Analysis. *Journal of International Social Research*, 11(61).

Zhao, G., Ahmed, R. I., Ahmad, N., Yan, C., Usmani, M. S. (2021). Prioritizing critical success factors for sustainable energy sector in China: A DEMATEL approach. *Energy Strategy Reviews*, 35, 100635.

Zhu, Y., Chen, C., Zhang, G., Lin, Z., Meshram, S. G., Alvandi, E. (2023). Investigation of West Lake Ecotourism Capabilities Using SWOT and TOPSIS Decision-Making Methods. *Sustainability*, 15(3), 2464.

Živković, Ž., Nikolić, D., Savić, M., Djordjević, P., Mihajlović, I. (2017). Prioritizing strategic goals in higher education organizations by using a SWOT–PROMETHEE/GAIA–GDSS model. *Group Decision and Negotiation*, 26(4), 829-846.

CHAPTER XIII

LANDSCAPE PROJECT PROCESS IN LANDSCAPE ARCHITECTURE EDUCATION

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1. Introduction

Adopting nature-based approaches in design solutions contributes to making societies more sustainable. It aims to support people to be better prepared against various environmental, social, and economic challenges. This approach also requires a systematic approach to environmental change based on understanding the structure and functioning of ecosystems, including human actions, perceptions, and consequences, while recognizing the importance of nature (Acar and Acar, 2020). Instead of ignoring existing data in design fields and introducing new design concepts, sustainable approaches that produce solutions to problems and needs while preserving the original should be preferred (Korkut and Kiper, 2020).

Landscape design, in its simplest definition, is a space arrangement work. When doing landscape design, it is necessary to create designs that create a defined perception of space. This is done by creating useful volumes that are functional and can be perceived in three dimensions. These studies are carried out at the end of a long-term process called the design process. At the same time, landscape design is a process of shaping and detailing the design area in line with the decisions taken in upper-scale planning. The purpose of landscape design is to reveal the best possible spatial composition in the study area (Korkut and Kiper, 2020).

Landscape design is a process consisting of successive stages. The data obtained from the beginning to the end of this process must be analyzed in the best possible way. It is important to make design decisions in a way that can be used with this data. In this respect, the design will also contribute to its originality depending on the situation it is in. Environmental data should be analyzed and handled in a way that contributes to the design. Turning negative features into positive ones and revealing alternative uses should be addressed as a result of environmental data analysis. At this point, natural data is extremely important, especially in terms of producing different alternatives in design. The use of data obtained from the environment in designs is also necessary in terms of ecological parameters. (Acar and Acar, 2020). After the concept of a sustainable city came to the fore, ecological approaches in landscape designs have become increasingly important. For sustainable cities, ecological and economic systems must be in healthy and harmonious unity. (Korkut and Kiper, 2020).

Landscape design is not only the design of open spaces outside buildings but also dominates an understanding that associates and integrates the city and the region with architectural products through landscapes. At the same time, it is an important mechanism that reduces the disconnection between architecture and urban planning and integrates them by establishing the relationship between natural landscape and cultural landscape. In other words, the basis of the concept of landscape is the earth, which we know as nature, and in addition to its projection on the earth, architecture functions as a tool to reconstruct the relations between urban, rural, and regional scales (Kaplan, 2020).

The field of design synthesizes data from ecology, engineering, and social sciences together with the planning and design knowledge fields. This situation brings landscape design to the point of interdisciplinary, system engineering, as well as the act of physical shaping. Landscape design, which is in motion and dependent on the dynamism of the landscape, basically aims to recreate living environments and their relationships on earth in disciplinary (landscape architecture) and interdisciplinary (landscape architecture, architecture, urbanism, and regionalism) environments, in macro and micro scale index, in landscape/infrastructure/system format. It is about the construction of the project (Kaplan, 2020).

Since the discipline of Landscape Architecture is a multifaceted profession that incorporates concepts from different disciplines, it is necessary to integrate different systems and components into each other in its education. It is aimed to create A productive environment that complements the education given in landscape architecture education with design studios and supports the creative

process. A common atmosphere created by sharing different ideas is reflected in the final product. This product is adopted by all students participating in the process. As a result, students are offered a creative working environment that supports their creativity. In this environment, design education is also considered as a personality training on the path to mastery, and instead of instilling a generally accepted method in the studio, it is aimed to allow each student to discover their path. In design education, different products emerge depending on the person, perception, and approach to the subject. The emergence of different products results from a design problem determined at the beginning of the design process, that is, the solution expected from the designer, and the designer's approach to the subject, perception, creativity, and perspective. The aim of this situation is for students to learn and understand design in the education process. The resulting designed product emerges as a result of the creative problem-solving phase (Acar and Bekar, 2017; Özkan et al., 2016).

In this study, the Bursa Uludağ University Landscape Architecture Landscape Project I course is taken into consideration. The landscape design process is explained throughout the course.

2. Material and Method

The material of the study was collected from Bursa Uludağ University, Faculty of Agriculture, Department of Landscape Architecture II. Semester Landscape Project I course. It constitutes a process that will form the basis of the Landscape Project process, in which the main concepts are introduced and the achievements of basic design and expression techniques courses are transformed into a concrete product.

The duration of the Landscape Project I course is 14 weeks. This course is a prerequisite course based on Expression Techniques and Basic Design courses. First of all, expression techniques and basic design principles must be understood. In line with the purpose of the course, weeks 1-2 are a process in which basic concepts are explained and introduced based on the landscape project. In this context, concepts such as plans, development plans, blocks, parcel, scale, structures, and their environments, and the relationship between buildings and outdoor spaces are explained. As a result, the project process is started by understanding the basic concepts in the landscape project process, architectural concepts, analysis of structures with different functions and their environments, and the relationships of these structures with their outdoor spaces. This project course combines basic knowledge with the landscape project design process.

The 14-week program of the course was created using Anonymous, (1985), Anonymous, (2014), Grant (1993), Altunkasa and Uslu (2016), Özkan et al., (2016), Acar and Bekar (2017), Düzenli et.al (2017), Düzenli et.al (2018), Düzenli et al., (2019), sources, lecture notes and current landscape design studies.

3. Results

Landscape Project I aims for students to be able to recognize the landscape project process, use related concepts in the landscape project process, apply the achievements of other courses (basic design and expression techniques, etc.) in the landscape project process, and carry out original and creative studies that develop their imagination. In this regard, the studies and achievements made during the 14 weeks are explained.

Week 1: Introducing Landscape Architecture and Related Concepts, Introducing the Concepts of the Zoning plan, current plan, and Current Pplan, Explaining the Concepts of Block and Parcel, Introducing Scale;

Spatial plans are plans that make land use and construction decisions prepared to protect and develop physical, natural, historical, and cultural values, to ensure the balance of protection and use, to support sustainable development at the country, regional, and city levels, to create healthy and safe environments with a high quality of life (Anonymous, 2014). These plans; are divided into spatial strategy plans, environmental plans, and zoning plans. These plans are graded under the headings of planning and design level, planning area, scale, planning authority, and plan approval authority. The concepts of spatial strategy plans, environmental plans, zoning plans (master zoning plan and implementation zoning plan), and next-stage urban design projects in this tier are explained with examples. Similarly, the concepts of block and parcel are explained and discussed with examples. While these plans and concepts are introduced, the concept of scale is reinforced and scales at the plan level and scales at the design level are explained with examples.

Week 2: Analysis of Buildings and their Environments with Different Functions;

To the extent that landscape design, which establishes the use of outdoor space, is related to the design of the fixed architectural space, belonging can be created by establishing the indoor-outdoor relationship in an ideal way. When

the relationship between indoor and outdoor spaces is established functionally and semantically as well as physically, the individual's or individuals' sense of attachment to the place will be reinforced (Kaplan, 2020).

In landscape design, it is important to see the attitude that buildings are a part of the landscape and the whole. It is important for buildings with different functions to integrate with the landscape as if they were an extension of their environment and to reflect the spirit of the place with forms and materials (Gürler, 2020).

Here, buildings with different functions (residences, mass housing, holiday villages, schools, shopping malls, etc.) are examined in their internal space relations and their connections with the outdoors. It is a process that must be addressed to understand the indoor and outdoor relationships to be established in landscape projects. At this point, it is necessary to know the concepts that will best recognize both the structure and the landscape. In this process, existing examples need to be examined and assimilated as a part of education.

Week 3: -Determining the subject of Landscape Project I, introducing the Landscape Design Process, Determining the Problem/Issue- Introduction of the Area- Introduction of the User- Evaluation of the Information Gathering stages;

To carry out Landscape Design and start the landscape design process, the subject of the project must be determined. Since the Landscape Project, I course is the first step to explaining and making students understand the landscape design process, this project is aimed to choose a subject that will be close to the students and that will easily meet their wishes and needs. At this stage, the subject of the study was determined as a canteen and its surroundings located on the University campus. The next stage is to evaluate the landscape design process and the subject at stages in the process.

Area selection (Area features and needs of people using it), Problem determination, Data collection (Survey and literature studies; Results created by matching area features and needs) Area analysis and Environmental analysis (Program analysis and needs program, function diagram, theme, concept and Development of the scenario), Area structure diagram (Spot diagram), Preliminary project (Preliminary design), Final project (Final design), Application project are aimed to be comprehended in this period. The process is explained in all its stages.

This week, the area selection and problem/problem identification phase are first discussed, based on the Landscape design process. The most important issue here is to choose the area suitable for use. It is necessary to determine the location of the selected area, provide macro and micro scale plans, and provide a site plan.

Afterwards, by identifying the existing problems in the area to be designed, ideas that will contribute to the development of the design are developed.

Another important issue in this process is to reveal the answer to the question of who will use the area and the user base. In landscape design, along with the recognition of the land, the user is also recognized in the best way, resulting in both aesthetic and functional designs. What does it do when it recognizes the user? How does it? Where does it? What does it do? The answers to your questions should be presented in the most accurate way possible.

While designing for a landscape project, it is necessary to conduct research that will support the process and help in designing solutions by researching different studies and products within the subject and collecting data and information. Examples appropriate to the framework of the subject should be compiled. What are the appropriate uses for the canteen for students? What can be done for the canteen and surrounding areas? Users are asked to scan the literature (books, magazines, internet, etc.) in line with their wishes and expectations.

With the data obtained, the data collection process for the area begins to get to know the area. At this stage, survey work for the area and information-gathering work for the area should be carried out. While the survey is being carried out, the natural, cultural, and visual features of the area are discussed in detail with all its sub-headings, both spatial plan data and literature information, and students are informed in line with these headings and plans, and they are asked to create suitable products for each of them.

These data will be important bases for the next stage. Students will analyze the area and environment with this data.

Week 4: Theme-Concept-Scenario-Determining Area Uses, Creating a Function Diagram;

The theme is the main idea of the topic. What is an idea to solve the problem after knowing the domain and the user? What kind of subject? It is the stage that determines how to approach the area. With this determined subject, the uses of the area are also shaped.

Concept, on the other hand, is the reflection of the solutions to the field together with the main idea. It can be defined as a special approach or way in

which the requirements, content, context, and thoughts regarding the solution are brought together. It is the process in which this determined content is transferred as a linear expression.

The concept is handled in landscape project studies as a concept that develops by imitating nature.

The system of space activities that will develop with the determined main idea will form the scenario. At the same time, a Scenario is a set of sentences that describe the transformation of field uses into a process. The scenario should include space uses consisting of creative activities. It should be integrated with the theme with differences appropriate to the purpose. While preparing the scenario, it should also appear as a synthesis of the answers received to the questions we asked while getting to know the user. Students are asked to create a scenario that should revolve around a main theme and is a series of activities that include different, interesting, and original uses of space. Again, students are expected to reveal their differences by the purpose within the scope of the scenario. The scenario also means connecting activities organically. When the scenario is constructed, fluidity must be ensured with the activities. To achieve the fluidity of the activities, priorities should be ranked. Events have precursor events before they are carried out and follow-up events after the event ends. These activities highlight the main event. By expressing this flow in the best way in the scenario, how the area will be designed is constructed. This flow is also explained in linear expression and the form of a diagram. In other words, the system of space uses and activities developing within the framework of the determined main idea is described in linear expression without scale.

Week 5: Selecting the Suitable One for the Project from the Suggestion and Stain Plan Studies and Making a Preliminary Design;

Once the themes and concepts are clarified, space usage is determined. A needs list is prepared that includes area uses. It is desired that the relationship between the space used in this need list and the system of activities be shaped by each student's theme.

At this stage, students are expected to express on a scale how the space uses they have developed in line with the themes they are working on will be placed in the area. Students are asked to generate options to find the most suitable established activity areas. Completed stain plans are discussed with their instructors. Stain plans are developed during the course in line with the teachers' criticisms. And it is discussed again with their teachers. For stain plans that reach a sufficient level, approval is received the following week to move

on to the preliminary project phase, in line with the concepts determined by the students. Students continue to develop their projects. Along with the location selections for the use of the area they received approval from, the approaches they took within the concept began to develop a linear expression to form a basis for their work. Transition is made to the preliminary design phase. In this process, students are asked to generate many options.

Week 6: Creating a Preliminary Design;

Three different suggestions developed in line with the determined concepts are discussed. In line with the suggestions discussed, it is decided to develop the project based on 1 suggestion, and preliminary project/preliminary design development studies continue during the course. The designated spaces, transportation axes, and green areas are developed on the project in line with the land uses determined for the area.

While the canteen and its surroundings are being designed within the scope of the subject during the preliminary design stage, students are asked to consider the existing canteen structure in the area together with the land or concept lines. At this stage, it is desired to design original and different space uses, as well as indoor-outdoor relationships, canteen, and surrounding uses, student uses within the campus.

Week 7: Creating a Preliminary Design;

The preliminary project development process continues. Students are asked to do a lot of sketching. The spaces, transportation axes, and green areas determined in line with the land use determined for the area are developed on the project. Here, within the scope of the study, importance is given to the integration of the canteen and its surroundings within the concept. While the structure of the canteen is desired to match the land conditions and project lines, the relationship between area uses and activities is also not ignored. Preliminary design approaches that will respond to these principles are sought and evaluated in students' studies. Evaluation of options for the original design approach continues at this stage.

Week 8: Preliminary Design Creation and Model Making;

The preliminary project development process continues. Students are asked to do a lot of sketching. The spaces, transportation axes, and green areas determined in line with the land use determined for the area are developed on

the project, and the projects developed with themes and concepts continue to be developed simultaneously with the 3rd Dimension model works. To evaluate the harmony of the landscape projects developed with the preliminary design with the land, to harmonize the topographic structure of the land with the land uses and the linear expression of the project, the third dimension of the project developed with drawing is also handled with a model.

Week 9: Project Drawing and Model Making;

While the spaces, transportation axes, and green areas determined in line with the land uses determined for the area are developed in linear expression on the project, simultaneously they continue to be developed with a 3rd Dimensional model of what they will look like on the area.

The ideas developed for the canteen and its surroundings are evaluated in both the second and third dimensions. Ideas are discussed with the students and guidance is given to find the most appropriate solution in line with the theme and concept they have determined.

Week 10: Drawing of the Project and Making a Model ;

The spaces, transportation axes, and green areas determined in line with the land use determined for the area are developed on the project. At this stage, the main lines that become clear are requested to be resolved in more detail. What kind of flooring will be used for the spaces, how will the equipment be used, etc. It is again developed with a theme and concept. It is clarified in interior analyses in line with the scale of the project. Solutions are made in line with the activities. Simultaneously, the project development process continues by transferring the 3rd dimension of how it will look on the field onto the model.

Each week continues by supporting each other and contributing to the development of the project. As of this week, how plant material should be used on the project is discussed.

Students have not yet mastered the herbal material in this project period. It does not have the necessary infrastructure for vegetative design. However, they need to decide how they will be placed on the project with their features such as size, shape, form, and the characteristics of being coniferous and broad-leaved.

This study aims to understand how to handle the vegetative design approach in the landscape design process, the selection of vegetal material with survey data, and the use of vegetal material in parallel with the theme and concept of the project.

Week 11: Drawing of the Project (Plan, Section, View) and Model Making;

The spaces, transportation axes, and green areas determined in line with the land use determined for the area are developed on the project. What kind of flooring will be used for the spaces, how will the equipment be used, etc. It is again developed with a theme and concept. It is clarified in interior analyses in line with the scale of the project. Solutions are made in line with the activities. Simultaneously, the project development process continues by transferring the 3rd dimension of how it will look on the field onto the model.

At this stage, where the project outlines become clear and the project approaches the final stage, the project is presented in more detail with narrative techniques other than plans and models. At this stage, sections are taken from suitable points for the project. And again, appearances are determined with appropriate perspectives.

Week 12: Project Drawing, Model Making, Sectional Drawing, Appearance Drawing-Final Design-Final Project;

The spaces, transportation axes, and green areas shaped by the land use determined in line with the project subject become clear on the project. What kind of flooring will be used for the spaces, how will the equipment be used, etc. Again, it is developed with a theme and concept. It is given its final shape through criticism and discussions. This process is completed by simultaneously transferring the 3rd dimension of how it will look on the field onto the model. Projects are drawn according to appropriate graphic expression techniques. At this stage, a section and a view from a determined angle are made from the section points determined on the project.

Week 13: Project Drawing, Model Making, Section Drawing, Elevation Drawing-Final Design-Final Project ;

Projects are drawn according to appropriate graphic expression techniques. The missing parts are completed. Necessary deficiencies in the model work are completed in line with the criticisms. The section and elevation are completed and discussed. Preparations are made for the final presentation and delivery. The project is brought to its final form.

Week 14: Drawing of the Project - Final Design - Final Project and Model Making;

The developed projects are finalized and prepared for presentation. Projects are drawn according to appropriate graphic expression techniques.

For final project required (Figure 1) ;

- Structural landscape (hard ground - soft ground) 1/100 scale (rapido) (1)
- Planting /1/100 scale (rapido)(1)
- Section (1) or view/silhouette (1) at 1/100 scale(rapido)
- Model in 1/100 scale

In the study, Bursa Uludağ University Landscape Architecture Department II. Within the scope of Semester Landscape Project I, projects are progressing by following 14-week development programs.

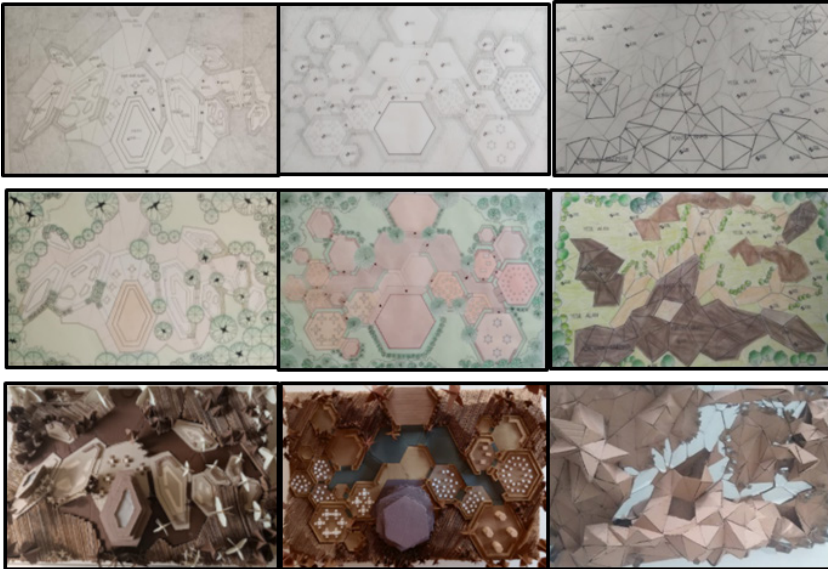


Figure 1. Some examples of final design (Designed by Ayşe Sudenaz Balta, 2023; İrem Bilgin, 2023; Merve Ceren Yıldız, 2019)

4. Conclusion

This course is very important in terms of understanding and grasping design as it is the beginning stage for Landscape Project courses and the first project course in landscape architecture education. Within the scope of this course, students apply the knowledge they acquired in the first-semester basic design and expression techniques courses. This course is the first step to learning the landscape design process during the four-year landscape architecture education process. Within the scope of this course, students are expected to understand the landscape design process steps. In addition, it is a course that supports the development of study discipline so that students can master the processes that are effective in the development of designs in landscape design.

For students to be original in their landscape designs, it is aimed to focus on the concepts of theme and concept and to give the main structure of the project with these concepts. Each student was asked to produce projects in which different and original stories would be told, and this goal was aimed to be achieved with a 14-week development process. The final products are intended to be products that integrate with the theme and concept at every stage and in every detail. For students, this project process created an important basis for project courses in subsequent academic years.

References

- Acar, H., Bekar, M. (2017). Peyzaj mimarlığı eğitiminde bir stüdyo çalışması: kıyı alanı peyzaj tasarım projesi, *MEGARON*, 12(2), 329-34
- Acar, H., Acar, C. (2020). Peyzaj tasarımında doğa temelli yaklaşımlar, *Mimarlıkta Peyzaj Tasarımı*, (p.79-110). Nobel Akademik Yayıncılık.
- Altunkasa M.F., Uslu C. (2016) *Peyzaj Tasarımı*. Birsen Yayınevi.
- Anonymous, (1985). İmar Kanunu, Resmi gazete tarihi: 03/05/1985. <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.3194.pdf> erişim tarihi: 01.09.2023
- Anonymous, (2014). Mekansal planlar yapım yönetmeliği, 29030 sayılı Resmi gazete tarihi: 14.06.2014.
- Düzenli, T., Yılmaz, S., Alpak, E.M. (2018). *Kentsel açık mekanların peyzaj tasarım kriterleri*, IKSAD Publishing House.
- Düzenli, T., Mumcu, S., Özkan D.G., Alpak, E.M. (2017). Peyzaj mimarlığı eğitiminde kentsel obje tasarımlarının sanatsal açıdan incelenmesi, *Sanat eğitimi dergisi*, 5(1), 57-68.
- Düzenli, T., Yılmaz, S., Çiğdem, A. (2019). Modular system approach in design education, *Gazi University Journal of Science Part B: Art, Humanities, Design And Planning*. 7(3): 357-363.
- Grant, W. (1993). *From Concept to Form: In Landscape Design*, Wiley.
- Korkut, A., Kiper, T. (2020). Kentsel alanlarda peyzaj tasarımı, *Mimarlıkta Peyzaj Tasarımı*, (p.111-146). Nobel Akademik Yayıncılık.
- Kaplan, A. (2020). Peyza(lar)ın dinamik bağlamı üzerinden tasarımı ve (inter) disiplinler boyutu, *Mimarlıkta Peyzaj Tasarımı*, (p.23-42). Nobel Akademik Yayıncılık.
- Özkan, D.G., Alpak, E.M., Düzenli, T. (2016). Tasarım eğitiminde yaratıcılığın geliştirilmesi: peyzaj mimarlığı çevre tasarımı stüdyo çalışması, *IJASOS- International E-Journal of Advances in Social Sciences*, 2 (4),136-143.