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## ACCORDING TO METHOD OF GÜLEZ DETERMINATION OF RECREATIONAL POTENTIAL OF NIĞDE ATATÜRK CITY FOREST<sup>1</sup>

### ABSTRACT

In cities that have grown rapidly due to population increase in recent years, the desire for green areas has been increasing with the effect of concrete buildings. Nowadays, it is inevitable that the natural environment, which is damaged by the effects of human beings, is rapidly destroyed. In addition, the global warming-related climate change problem, which is particularly affecting arid regions, is also present. In this direction, in the city of Niğde, one of the arid cities of Turkey, efforts have been made to regain the green and natural areas. At the same time, a city forest was established in 2005, in order to increase the quality of life of the people living here, to provide aesthetic, health, psychological, ecological and economical contributions and to solve the problems caused by climate change. This facility has become an important recreational area for local people living in Niğde who do not have many alternatives. In this study, the present potential of Atatürk City Forest in Niğde province was examined by measuring recreational characteristics of urban forests. For this purpose, a questionnaire was applied to the forest users according to the method of Gülez for determining the potential of in-forest recreation. The data obtained from the questionnaire were evaluated with the SPSS 24.0 package program. The results depict the status of the city forest in terms of potential for recreation and what are the most important factors affecting this potential. Finally, various suggestions were made in order to determine the negative factors in the area and to guide the local policymakers.

**Keywords:** Environmental quality, City forest, Recreational potential, Green spaces

### 1. INTRODUCTION

With population growth, rapid and unplanned urbanization, industrialization and developing technology comes intense pressure on urban spaces, and various transportation problems and environmental pollution cause people to encounter physical, mental and socio-cultural problems. Due to the concretion in cities, settlements have grown and the land use has changed. Thus, people have started to urbanize open and green spaces in urban areas. At this juncture, people have made various changes in their lifestyles and gravitated towards rural areas in order to meet their need for green space. Strengthening the human-nature relationship by creating a natural environment in the city, providing an opportunity for recreation, bring effective in gaining an identity to the city, and making ecological contributions to the solution of environmental problems, city forests provide a great opportunity for people who yearn for green. Naturally or artificially developed, city forests are spaces that are located in or in the vicinity of a city and that contribute to the city by creating a visually attractive and interesting environment (Kiper and Öztürk, 2011). City forests offer recreational opportunities with entertaining and sportive activities for the people in the city and address all age groups. City forests were introduced in 2003 as part of General Directorate of Forestry's "Urban Forest Project". According to General Directorate of Forestry's 2016 data, there are 58 city forests in Turkey (OGM, 2016). A forest should carry certain characteristics to be called a "City Forest". Providing access to the entire city, a city forest should be located in or in the vicinity of a city, and must be at a distance of 50 km or less from the city center. It should have the characteristics of a forest, and its size should be at least 10 hectares. Furthermore, it should be developed in a way that it would functionally and visually contribute to the city's physical

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structure, ecology and landscape. The necessary environment should be created for everyone's transportation from the city to the city forest, and it should provide recreational activities with the values it has (Yılmaz, Karaşah and Erdoğan Yüksel, 2009). Recreational spaces within the forest are the places where a variety of physical and mental activities that allow relaxation and energy collection outdoors are carried out on a piece of forest or in the entire forest. Today, there is no mention of a harmony model between the modern urban development areas and the urban areas shaped by the historical city culture. There is a discontinuity and rupture between the new development areas where the conversion speed is increasing and the historical urban landscape whose conversion speed is decreasing. In order to reduce this difference, green areas suitable for settlements should be designed (Soydan, 2016).

With its increased recreational use, city forests have become a complementary element of the city landscape in our country, too. With 6.6 % forest existence (OGM, 2015), the city forest in the city of Niğde improves the life quality of people living in the city. In this context, the purpose of this study is to determine whether or not the city forest, which is vital for the city of Niğde and the people living in this city and yearning for green, fulfils the functions expected from it, to reveal whether or not the forest has enough facilities and equipment and to identify the forest's potential for recreational use. In line with the results obtained, by evaluating the present Condition, various recommendations regarding the subject were provided in the hope that they will be a guide.

## 2. MATERIAL AND METHOD

### 2.1. Material

Located in the coordinates of 38°05'57.51"N and 34°41'08.34"E, Niğde has a population of 352.727 according to Turkish Statistical Institute's 2017 Niğde data and dominated by the continental climate. Atatürk City Forest, located within the city of Niğde, is the main material of the study. An important element of the city's green space system, the study area is situated on a 50-hectare area on Niğde-Bor highway, 6 km away from Niğde city center. To the south of Akkaya Dam, the City Forest has plant species such as cedar wood, black pine and almond tree and bird species such as sparrow, hawk and flamingo (OGM, 2009). The City Forest which was the subject of the study carried out in 2019 is used extensively by the public for passive recreational activities like picnic, walking and cruising (Figure 1).



Figure 1. General Views from The Study Area (Orj, 2019)

### 2.2. Method

In order to determine the City Forest's recreational potential, Recreational Potential Determination Method, developed by Gülez (1990) in his study titled "An Evaluation Method for Determination of Inside of Forest Recreation Potential" and employed by many researchers in their studies (Yılmaz et al., 2009; Sandal and Karademir, 2013; Altunöz, Tırıl and Arslan, 2014; Surat, 2017; Yeşil, 2017; Yeşil and Hacıoğlu, 2018) was used as the sampling method. The survey method was used in the sampling study.

For the survey used in the study method, the people who have been to Atatürk City Forest were selected as the target group. Taking into account the population of Niğde, the number of people to be surveyed was calculated using the following formula within the 95% confidence interval (Kalıpsız, 1981; Çıngı,

1994; Yılmaz et al., 2009; Sandal and Karademir, 2013; Aksu, Kılıç, Düzgüneş, Araz and Öztürk, 2017). The data obtained at the end of the survey administered to 100 randomly selected individuals were subjected to a correlation analysis using the SPSS package program.

$$n \geq \frac{Z^2 NPQ}{ND^2 + Z^2 PQ}$$

n= the minimum number of people in the sample

Z= Confidence coefficient (95% confidence interval: 1.96)

N= Total size

P= Frequency of the measured characteristic to be seen in the universe (95%)

Q= Frequency of the measured characteristic not to be seen in the universe (Q= 1-P)

D= Acceptable error percentage

$$n \geq \frac{1.96^2 * 352727 * 0.95 * 0.05}{352727 * 0.05^2 + 1.96^2 * 0.95 * 0.05} = 72.97 \text{ (100 people were accepted)}$$

In the second phase of the method, the recreation potential determination method developed by Gülez (1990) was used. In the aforementioned method, the recreation potential of a place is formed by the Landscape Value (L), Climate Value (C), Accessibility (A), Recreational Convenience (RC) and Negative Factors (NF). For this purpose, an evaluation form was developed by making a scoring list for the factors that increase or decrease the recreation value. Landscape Value (L), Climate Value (C), Accessibility (A), Recreational Convenience (RC) have a positive effect on scoring, while Negative Factors (NF) have a negative effect. This reduces the score during the determination of the Recreation Potential (RP) (Table 1). Recreation Potential is formulated as  $RP (\%) = L + C + A + RC - NF$ , and the total score that can get from the form is 100 points.

**Table 1.** Factors Constituting Recreational Values and Highest Scores They Can Get

Symbol	Explanation	The Highest Score (Weighted Score of the Factor)
L	Landscape Value	35
C	Climate Value	25
A	Accessibility	20
RC	Recreational Convenience	20
OSE	Negative Factors	0 (The lowest -10)
RP	Recreation Potential	100

The size of the area, the presence of plants, the area's proximity to water, the surface status, the visual quality and the existing values in the area constitute the Landscape Value and represents the highest score in determining the Recreational Potential with maximum 35 points. The criteria for temperature, precipitation, insolation, sunbathing and windiness constitute the Climate Value with a maximum 25 points. The touristic importance of the region, having a city with a population of at least 100.000, time takes to reach the area, type of transportation and the other conveniences provided in transportation constitute Accessibility with a maximum 20 points. Equipment, security and staff and other conveniences in the area constitute the recreational Convenience with a maximum 20 points. In addition to these values with positive effects, pollution, safety, maintenance, noise and other negative factors bring together negative points and reduce the Recreation Potential by up to 10 points (Table 2).

**Table 2.** Recreation Potential Evaluation Form

Factors in the Formula	Factor Characteristics	Explanation	Maximum Point to be Taken
LANDSCAPE VALUE (L)	Size of the Area	Bigger than 10 hectares	4 points
		5-10 hectares	3 points
		1-5 hectares	2 points
		0.5-1 hectares	1 point
	Vegetation	Woodland, shrubbery, meadowland	7-8 points
		Only woodland and meadowland	6-7 points
		Shrubbery, meadowland, sparse woodland	5-6 points
		Meadowland, sparse woodland	4-5 points
		Only shrubbery and meadowland	3-4 points
		Shrubbery, sparse woodland	3-4 points
	Shrubbery, sparse shrubbery	2-3 points	
	Only meadowland	1-3 points	
	Sea Lake, Rivers	Seaside	7- 8 points
		Lakeside	6-7 points
		Riverside	4- points
		Creek	1-4 points
	Surface Condition	Plain	5 points
		Slightly wavy	4 points
		Little inclined, plain in some areas	3 points
		Slightly rough	2 points
		Medium rough	1 points
	Visual Quality	Panoramic views	3-4 points
Beautiful views and vistas		2-3 points	
General visual aesthetic value of the area		1-3 points	
Other characteristics	For example, nature monument, cave, historical and cultural values, wild animals, birds, etc.	1- 6 points	
CLIMATE VALUE (C)	Temperature	Average of summer months (June, July, August) °C 16-17; 18-19; 20-21; 22-23; 24-25; 34-33; 32-31; 30-29; 28-27; 26-25 1; 2; 3; 4; 5; 6; 7; 8; 9; 10 points	10
	Precipitation	Total of summer months (June, July, August) mm 50; 100; 150; 200; 250; 300; 350; 400 8; 7; 6; 5; 4; 3; 2; 1 points	8
	Insolation	Cloudiness average of summer months (June, July, August) 0-2; 2-4; 4-6; 6-8; 8-9 5; 4; 3; 2; 1 points	5
	Windiness	Wind speed average of summer months (June, July, August)	
		Less than 1 m/sec	2 points
ACCESSIBILITY (A)	Touristic Importance of the Area	Mediterranean, Aegean, Marmara coastline	3-4 points
		Black Sea coastline	2-3 points
		Important highway routes	1-3 points
		Priority areas in tourism	
	Having a city nearby with a population of at least 100.000	Within the distance of 20 km	4-5 points
		Within the distance of 50 km	3-4 points
		Within the distance of 100 km	2-3 points
		Within the distance of 200 km	1-2 points
	Time takes to reach the area (From the city with nearby with a population of at least 5000)	1 hour by walking	
		Or 0-30 minutes by a vehicle	4 points
30 min-1 hr by a vehicle		3 points	
1-2 hours by a vehicle		2 points	
Transportation (other than taxi or a private vehicle)	2-3 hours by a vehicle	1 point	
	Walking or finding a vehicle all the time	3-4 points	
Other Transportation Conveniences	Finding a vehicle at certain times	1-3 points	
	For example, having a lift, reaching by sea, etc.	1-3 points	

**Table 2.** Recreation Potential Evaluation Form (Cont.)

Factors in the Formula	Factor Characteristics	Explanation		Maximum Point to be Taken
RECREATIONAL CONVENIENCE (RC)	Picnic facilities	Stationary picnic table, barbeque, etc. (according to their quality)	1-4 points	4
	Water condition	Drinking and tap water condition (according to their quality)	1-3 points	3
	Accommodation facilities	Stationary accommodation facilities Camp with tent or no tent	2 points 1-2 points	2
	Restrooms	According to their quality	1-2 points	2
	Car park	According to their quality	1-2 points	2
	Open-air cafe, Kiosk	According to their quality	1-2 points	2
	Guard and Officer	Permanent guard/officer On weekends	2 points 1 point	2
	Other Conveniences	For example, beach, cabin and shower, rental row boats, etc. Game and sports fields, facilities, etc. (according to their quality)	1-3 points	3
NEGATIVE FACTORS (NF)	Air pollution	According to the degree of pollution	-1 – (-3) points	-3
	Being Unsafe	According to the degree of safety	-1 – (-2) points	-2
	Water Pollution	For sea, lake and rivers	-1 point	-1
	Neglect	Not doing enough maintenance	-1 point	-1
	Noise	Noises from traffic, crowd, etc.	-1 point	-1
	Other Negative Factors	For example, quarry and gravel pit, construction and factory ruins, etc.	-2 points	-2
<b>General Total Score or Inside Forest Recreation Potential (%)</b>				

According to the scores obtained using the evaluation form, RP % value again fell under the recreation categories listed in the Gülez (1990) method (Table 3).

**Table 3.** Evaluation of Recreation Potential

Recreation Potential Within the Forest (RP %)	
Less than 30 %	Very low
30% - 45 %	Low
46% - 60 %	Medium
61% - 75 %	High
Above 75 % 75	Very High

### 3. RESULTS AND DISCUSSION

According to the survey result, the total recreation potential of Niğde Atatürk City Forest was 55.8%. This value indicates that the study area has moderate potential in terms of recreational terms. Factors affecting usage preferences are the area's landscape value (20.50%), the area's climate value (14.00%), accessibility to the area (13.77%) and recreational conveniences (13.69%), respectively. The results revealed that city people took natural beauty into consideration the most in their recreation area preference. Similar results were reported in many studies (Şimşek and Korkut, 2009; Yılmaz et al., 2009; Atabeyoğlu, Beyli and Argan, 2017; Sü Eröz and Aslan, 2017; Yeşil, 2017; Yeşil and Hacıoğlu, 2018).

In addition to the car park outside the Atatürk City Forest, there is a checkpoint, security, information, shopping unit, restroom, fountain and a garbage bin at the entrance of the forest. In addition, there are gazebos, picnic areas, pedestrian walkways, restrooms, dishwashing areas, sports facilities, children's playgrounds, free play areas landscape observation terraces in the city forest. Although the numbers are not adequate, they are used extensively (Figure 2). The visual value of the area is an important reason for city people to prefer the forest.



**Figure 2.** Examples of Facilities Found in The Area (Orj, 2019)

Evaluation of the results of the survey developed according to Gülez method (1990) is given in Table 4.

**Table 4.** Correlation Relationship Between the Area's Recreation Potential, and Landscape Value, Accessibility, Recreational Conveniences and Negative Factors

	Landscape Value	Accessibility	Recreational Conveniences	Negative Factors	Recreation Potential
Landscape Value	1				
Accessibility	0.363**	1			
Recreational Conveniences	0.365**	0.143	1		
Negative Factors	0.523**	0.063	0.114	1	
Recreation Potential	0.911**	0.495**	0.592**	0.640**	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

According to the table, there was a significant statistical relationship between the recreation potential, and the landscape value, accessibility, recreational conveniences and negative factors at the  $p < 0.01$  significance level. Within this relationship, according to the correlation coefficient, there was a very strong relationship between recreation potential and landscape value, a nearly moderate relationship between recreation potential and accessibility, and a moderate relationship between recreation potential and the other criteria. Furthermore, there was a significant relationship between landscape value, and accessibility to the area, recreational conveniences and negative factors at the  $p < 0.01$  significance level. According to the correlation coefficients, the relationship level between the landscape value, and accessibility and recreational conveniences was low, whereas the relationship level between the landscape value and negative factors was moderate. The reason why Atatürk City Forest's landscape value is high is due to the natural and visual values of the area. Table 5 shows the relationship between the sub-criteria determining the landscape value and the recreation potential.

**Table 5.** Correlation Relationship Between the Recreation Potential and the Landscape Value Sub-Criteria

	Recreation Potential	Size of the Area	Vegetation	Sea, Lake, Rivers	Surface Condition	Visual Quality	Other Characteristics
Recreation Potential	1						
Size of the Area	-0.043	1					
Vegetation	0.788**	-0.081	1				
Sea, Lake, Rivers	0.005	0.014	0.081	1			
Surface Condition	0.267**	-0.008	0.117	-0.043	1		
Visual Quality	0.612**	-0.048	0.341**	-0.058	-0.024	1	
Other Characteristics	0.555**	0.191	0.262**	-0.219*	0.057	0.412**	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

As shown in Table 5, a statistically significant relationship was found between the recreation potential, and the vegetation, surface condition, visual quality and other characteristics at the  $p < 0.01$  significance level. The correlation degree between vegetation and recreation potential was strong. In addition, there was a moderate relationship between recreation potential, and visual quality and other characteristics of the area. Since the climate data from the meteorological station represent constant values, they were not included in the SPSS (Table 6).

**Table 6.** Climate Data

	June	July	August
Average Temperature (°C)	20.6	24.3	23.4
Total precipitation (mm=kg÷m <sup>2</sup> )	42.2	1.4	0.8
Insolation (hour)	7.6	9.6	11.2
Average Wind Speed (m÷sn)	2.1	2.6	2.9

City Forest's climate value was determined to be 14 points using the Gülez Method (1990). According to the information obtained from the Directorate of Meteorology, Niğde's average temperature in the summer is 22.7°C (4 points), its total precipitation is 44.4 mm (8 points), its insolation duration is 9.4 hours (1 point) and its average wind speed is 2.5 m÷sn (1 point).

Table 7 presents the relationship between the sub-criteria determining the accessibility value and the recreation potential.

**Table 7.** Correlation Relationship Between Recreation Potential and Accessibility Sub-Criteria

	Recreation Potential	Touristic Importance	Existence of a City with 100.000 Population	Time Takes to Reach the Area	Transportation	Other Transportation Conveniences
Recreation Potential	1					
Touristic Importance	-0.408**	1				
Existence of a City with 100.000 Population	-0.208*	0.025	1			
Time Takes to Reach the Area	0.586**	-0.550**	-0.107	1		
Transportation	0.186	-0.305**	0.394**	0.188	1	
Other Transportation Conveniences	0.643**	-0.179	-0.320**	0.270**	-0.083	1

\* Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)

According to Table 7, there was a significant statistical relationship between recreation potential, and touristic importance, time takes to reach the area and other transportation conveniences at the  $p < 0.01$  significance level, whereas there was a significant statistical relationship between recreation potential and the existence of a city with 100.000 population at the  $p < 0.05$  significance level. While the correlation relationship between recreation potential and touristic importance was low and reverse, correlation relationship between recreation potential and the existence of a city with 100.000 population was weak and reverse. Furthermore, the relationship between recreation potential and time takes to reach the area and other transportation conveniences were determined to be moderate.

The relationship between the recreation potential and sub-criteria making up the recreational conveniences is presented in Table 8.

**Table 8.** Correlation Relationship Between Recreation Potential and Recreational Conveniences Sub-Criteria

	Recreation Potential	Picnic Facilities	Water condition	Accommodation Facility	Restroom	Car Park	Open-air Cafe, Kiosk	Guard and Officers	Other Conveniences
Recreation Potential	1								
Picnic Facilities	0.487**	1							
Water condition	0.748**	0.435**	1						
Accommodation Facility	0.584**	-0.084	0.462**	1					
Restroom	-0.184	0.090	-0.122	-0.117	1				
Car Park	-0.066	0.277**	-0.076	-0.288**	0.432**	1			
Open-air Cafe, Kiosk	-0.166	0.082	-0.098	-0.172	-0.025	0.200*	1		
Guard and Officers	0.133	0.132	0.206*	0.103	0.045	0.046	0.035	1	
Other Conveniences	-0.219*	-0.187	-0.221	-0.212*	0.324**	0.207*	0.085	0.049	1

\* Correlation is significant at the 0.05 level (2-tailed) \*\*Correlation is significant at the 0.01 level (2-tailed)

According to the correlation relationship given in Table 8, there was a significant statistical relationship between recreation potential, and picnic facilities, water condition and accommodation facilities at the  $p < 0.01$  significance level, whereas there was a significant statistical relationship between recreation potential and the area's other conveniences at the  $p < 0.05$  significance level. A reverse correlation was seen between recreation potential and the area's other conveniences. While the correlation relationship between recreation potential and water conditions referring to drinking and tap water facilities was strong, the relationship between recreation potential and picnic facilities was low and the relationship between recreation potential and accommodation facilities was moderate.

The relationship between the recreation potential and the negative factors, the last criteria on the evaluation form, is presented in Table 9.

**Table 9.** Correlation Relationship Between Recreation Potential and Negative Factors Sub-Criteria

	Recreation Potential	Air Pollution	Being Unsafe	Water Pollution	Neglect	Noise	Other Factors	Negative
Recreation Potential	1							
Air Pollution	0.562**	1						
Being Unsafe	0.365**	0.450**	1					
Water Pollution	-0.039	0.011	-0.083	1				
Neglect	0.030	0.107	0.077	0.313**	1			
Noise	-0.030	0.008	-0.064	0.505**	0.241*	1		
Other Negative Factors	0.672**	0.630**	0.482**	-0.065	0.089	0.009	1	

\*Correlation is significant at the 0.05 level (2-tailed) \*\*Correlation is significant at the 0.01 level (2-tailed)

Presenting the relationship between recreation potential and negative factors sub-criteria, Table 9 shows that there was a significant statistical relationship between recreation potential, and air pollution, being unsafe and other negative factors at the  $p < 0.01$  significance level. While the correlation relationship between recreation potential and being unsafe was low, the relationship between recreation potential and air pollution and other negative factors was moderate.

#### 4. CONCLUSION AND SUGGESTIONS

The recreation potential of the Atatürk City Forest was determined to be 55.8% according to the survey administered to the city forest users (Table 10). Since the area's recreation potential is within the 46%-60% range according to the Gülez Method (1990), the forest's potential is at a moderate level.



**Table 10.** Atatürk City Forest Recreation Potential

Symbol	Explanation	Maximum Point (Weighted Point of the Factor)	Present Point	Future Point
L	Landscape Value	35	20.50	22.16
C	Climate Value	25	14.00	14.00
A	Accessibility	20	13.77	15.17
RC	Recreational Conveniences	20	13.69	20
NF	Negative Factors	0 (The lowest -10)	-6.16	-3.34
RP	Recreation Potential	100	55.8	67.99

The study results revealed that because of the strong relationship between recreation potential and landscape value, the most important factor attracting the people of Niğde to the City Forest was the forest's landscape characteristics. Within this factor, the effect of vegetation is quite high. Furthermore, the study results put forth that people of Niğde did not give importance to the size of the recreation area but instead they preferred a smaller area with vegetation, with no slopes and with high visual values. Similarly, the water condition, which had a strong relationship with recreation potential under the recreational facilities, was very important for the users. Considering that the people of Niğde mostly use this area for picnics, it is very important to bring the facilities of the area to the highest level so that it will meet the demands.

In terms of the vegetation sub-criteria listed under the landscape value, the general visual aesthetic value of the area will be increased by enriching the vegetation by keeping the maintenance in the deteriorated areas of the vegetated areas. Thus, full points can be received from both the vegetation and aesthetic value. Since the climate value was evaluated according to the data received from the meteorology, there will not be any changes recommended. However, in terms of the other transportation conveniences sub-criteria listed under the transportation factor, the recreation potential of the forest and the number of visitors might be increased by providing public transportation specifically for the area at least during the summer months at certain days and hours. In addition, by making improvements in the quality of all of the recreational conveniences aimed at meeting the daily needs, user satisfaction will increase and the maximum point can be received from this factor. By doing this, the recreation potential of the area will be positively affected. In the short term, it will be possible to reset the negative points coming from the negative factors by improving security, maintenance and other negative factors.

Upon overcoming the aforementioned failings, a significant increase in the recreation potential can be achieved and the potential can climb up to the level good (61%-75%) as shown in Table 10. However, the city of Niğde is quite inadequate in terms of recreational resources. For this reason, planning, implementation and control should be carried out as a whole in order to create a modern and healthy city environment. Using the areas for recreation and tourism purposes should be paid the utmost attention by taking into account the balance of protection and use. Making the necessary arrangements to protect and improve the Niğde Atatürk City Forest, making the public participate in the planning and management of other recreational resources, and the development and implementation of functional, aesthetic and managerial approaches are important for the urban people who seriously feel the lack of recreation areas.

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