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CONTENTS

CHAPTER 1
PROPORTION AND ORDER IN ARCHITECTURAL DESIGN
Oğuz DEMİRARSLAN, Deniz DEMİRARSLAN..... 1

CHAPTER 2
EVALUATİON OF THE EFFECTS OF GREEN ROOF SYSTEMS ON URBAN LİFE QUALİTY
Uğur ÖZCAN, Muhammed Taha SEVGIN 27

CHAPTER 3
A RECREATİONAL POTENTİAL DETERMİNATİON METHOD: CASE STUDY İN ISTANBUL-AZİZPAŞA FOREST
Alev Perihan GÜRBEY 51

CHAPTER 4
NATURE-BASED TOURISM AS A RURAL REVITALIZATION TOOL: AN ANALYSIS FOR TURKEY
Sevgi OZTURK, Oznur ISINKARALAR 69

CHAPTER 5
HARDSCAPE ELEMENTS IN LANDSCAPE ARCHITECTURE - A CASE STUDY: TREETOP WALKWAY IN BAVARIAN FOREST NATIONAL PARK, GERMANY
İmge ÖZTÜRK, Bahriye GÜLGÜN..... 83

CHAPTER 6

REVISITING THE PUBLIC AND THE PUBLIC INTEREST CONCEPTS

Şirin Gülcen EREN 99

CHAPTER 7

TOURISTS' PERSPECTIVE OF CULTURAL HERITAGE AREAS: IMPORTANCE-PERFORMANCE ANALYSIS OF SAFRANBOLU

Sevgi OZTURK, Oznur ISINKARALAR,
Dilara YILMAZ, Esra CICEK 133

Chapter 3

A RECREATİONAL POTENTİAL DETERMİNATİON METHOD: CASE STUDY İN ISTANBUL-AZİZPAŞA FOREST[1]

Assist. Prof. Dr. Alev Perihan GÜRBEY[2]

1 This study has been produced from the completed Doctoral Thesis of "Generating a Recreation Planning Model in İstanbul-Azizpaşa Forest" conducted at Istanbul University, Institute of Graduate Studies in Science, Landscape Architecture Department.

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1. Introduction

People's values and behaviours are continually changing. Some cultural values that are common to societies continue in specific periods. However, the historical process, especially modern periods, show us that change is a rule rather than an exception. Cultural values govern our interaction with each other and with our physical environment. Cultural matters affecting our physical environment arise from the level of human perception of the natural environment. Today's human history is characterized by a gradual change from living in nature to living in cities. With this change, people, their relations with the natural environment; described many times to reconcile with discoveries and new forms of economic interaction (Miller, 1996). In addition to the agricultural revolution and industrialization, cities' unplanned rapid growth has seriously shaken the human-nature balance, bringing new definitions to people's relationship with nature (Walker, 1987). Alienation from the natural environment has accelerated, mainly due to the horizontal and vertical spreading of growing cities and building technology developments (Yaşlıca, 1986).

Industrial development physically changes the appearance of cities on the one hand. On the other hand, by affecting the business life socially, shortens working hours, increases the income level and causes the society to gain new social rights. As the social welfare level rises, the need for recreational activities increases, which means participation in recreational activities is one factor that shows the development level of the individuals who make up the society (Westover and Colins, 1987).

Today, as urban spaces become more artificial and monotonous, people living in the cities longing for nature and green and their recreational demands have increased. The proven healing benefits of nature on some health syndromes and psychological disorders such as stress have revealed the need and necessity for open green spaces. (Gül and Gezer, 2004). However, today's cities do not have sufficient quality and quantity of space for recreation because the development plans cannot be approved on time and cannot be implemented later. Besides rapid population migration, illegal housing, incompatibilities between the current situation-needs-necessary equipment, and the development plans' regulations affect the recreation areas (Özgür, 1992). Besides, the increase in land rents due to technological developments, political and economic rent fights also plays a role in decreasing open green spaces around the city, which should be reserved for public needs (Aslanboğa, 1988). The inadequacy of urban green spaces in terms of quantity and quality causes people to tend to forests with recreational functions in line with social needs and values (Miller, 1996).

Bringing vital functions such as organizing human-society-nature relations ensures and maintains natural ecological balance to cities depending on effective recreation planning. In economically developed societies, while cities are being planned, recreation areas are also designed considering the increasing population, and the recreation needs of people are always taken into consideration. Although many experts and organizations have made plans and suggestions for the Istanbul metropolis, the current situation is unsatisfactory. The recreation areas in the metropolitan of Istanbul suffer from a lack of system, physiological and organizational inadequacy rather than physical. The primary purpose is not to create recreation areas, but to prevent naturally existing recreational areas from being used with high capacity by other functions and from slipping under the weight of different purposes.

İstanbul is a city with unique natural characteristics (such as Bosphorus, Golden Horn, forests, waterfront areas), the most crucial metropolitan in Turkey by its location, a geographical area with widely influential economic power. İstanbul metropolitan should gain an identity, which will solve all problems caused by overpopulation, urbanization, illegal construction, unemployment and industrialization. It needs to become a city having high standards on the urban environment and a city to whom the authorities have developed particular methods to protect its natural habitat.

The problem which has the most critical pressure on natural resources is overpopulation. By considering demographic projections carried out previously, Istanbul's population will become 50 million by 2050. Inhabitants in İstanbul will put pressure on the forests scattered (northern Istanbul) North of the city for recreation needs. Besides this, dissemination of settlements, founding mines and quarries in forest lands, threats such as not to find a solution to article 2-B areas and unsystematic-unrestrained recreational uses are also elements of pressure. Nowadays, forest resources used for recreational purposes are being damaged.

In Turkey, the municipal plan regulations have stated that open space requirement per 1 person is ten m² by 02.09.1999. According to the Istanbul Metropolitan Municipality reports, the amount of open space per 1 person increased to 7.04 m² by 2019 (IBB, 2021). Comparing these values shows that Istanbul is not attained the norms yet. Achieving the standards can be possible by opening forest resources to access. Therefore, resource allocation based on recreational planning efforts has increased to provide these open-access forest resources from being damaged.

2.**A Resource-Based Recreational Planning Model**

Conservation and stable utilization of natural-cultural resources may be possible with recreation planning approach. The central theme of planning is; to examine the resources in terms of their values, compatibility assessment of the activities to be brought into the resources and determining the impact levels between actions, either positive or negative.

Activities must be developed where the necessary natural resources exist, and only when the environment can absorb the development's impact. In this context, various methodologies have been developed for determining a rational use of an existing resource that anticipates the possible long-term effects on the environment, the decisions taken and that takes into consideration all the existing relations between the natural resources and the planned operations (Toccolini and Angileri, 1992). Some of these methods use the "threshold" concept to establish the limits on the environment's ability to support the planned operations (Senes and Toccolini, 1998).

Threshold analysis is instead a set of rules within which we can see where and how thresholds should be overstepped to save the input of available means for further development. This partially assists in long-term planning operations (Malisz, 1969).

Site analysis is the first step of the planning process. Variables such as soil types, geology, natural drainage, geomorphology, hydrology, climate; other biotic and geodynamic themes are the main issues on the terrain. Thematic overlay of the site's biological variables identifies as the areas of contradiction, especially those unsuitable and risky for locating human activities. Above all, overlay allows us to identify possible environmental impacts in the long run (Pérez and Pérez, 2008).

In this study, a two-stage planning model based on the features discussed within site analysis and threshold concept is established. GIS (Geographic Information System) is used for the study of synthesis.

By the same token, since it is a developed by sample model, Istanbul-Azizpasa Forest area is selected as a sample area because of its closeness to the city centre, having no recreational activities, having pressure factors like settlement areas, mining and article 2-B areas and also having natural resources which are essential for recreation potential. Azizpasa forest is located on the European side of Istanbul and has 7398,7 hectares (Figure 1). The geographical alignment of the research area is 45°60'23" – 45°51'47" north latitude and 40°42'44" - 41°82'45" east longitude.



Figure 1. *İstanbul-Azizpaşa Forest Location Map*

The stages of the established model for this study are;

a) Identification and assessment of natural resource values (water, soil and topographic structure) exist in the sample area based on conservation approaches.

b) Determination of settlement, agriculture, and article 2-B areas will be excluded from planning and mining areas with limited natural resources value. It may be planned and opened to access as a forest land by the mid-short term rehabilitation studies.

c) Determination and assessment of positive (vegetation and transportation) and negative (state of preservation, closeness to settlements and conservation areas) factors affect the area's recreation potentials.

d) Examination of recreational potential values' distribution depends on the conservation thresholds of the site's area and priorities that will be open for use.

2.1. Stage I: Conservation Thresholds Method Intended for Recreation

Areas having forest characteristics must be handled with a conservatory approach to maintaining their features and functions. This method established to identify and assess Istanbul-Azizpasa Forest's restrictive natural resource values intended for recreation based on a conservation approach.

In the synthesis study, the maps created by the sample area's datasets and databases generated by these maps identify the conservation approach. Datasets which are evaluated as part of existing constraints are consist of three primary datasets;

a) Water resources (surface water, dam lake and dam basin),

b) Land resources (soil, land use capability classes),

c) Topography (slope analysis).

Water resources are vital in terms of planning. Now, water is evaluated as a semi-renewable resource for being at risk of losing its renewable resource property by existing human uses. Water is handled as an essential component within the framework of achieving spatial analysis in the sample area.

All data located in each dataset, transferred to the assessment matrix of conservation thresholds and all data rated in five interval scale,

1 Less important

2 Secondary importance

3 Strong importance

4 Very strong importance

5 Extremely strong importance.

By obtaining the experts' opinion and considering environmental sustainability's main principles, subjective scoring was done in the assessment matrix (Table 1). An assessment approach is used in scoring that;

- Meets the basic needs of future generations (not only today) that based on natural resources,

- Protects and permits the use of not/limited renewable natural resources that forms the natural structure (forests, water resources, valuable lands, etc.).

A geographical information layer needs to be generated for every subtitle of datas stated in the matrix. A scoring value designates for every layer is assigned to the related attribute class in the database.

To achieve Conservation Thresholds Synthesis; land use capability classes' map, slope class map (three slope class) and surface water resources' map need to be overlaid using GIS. Determined points entry are performed with the help of probability matrixes by querying the obtained database. The layer of total values will be generated on the spatial base within the

area border. A three-class Natural Breaks Classification method will be applied to this new layer to determine the area's conservation thresholds. Depending on these threshold values, natural resource characteristics can be categorized into three groups named as areas with extremely strong, strong and less importance.

Table 1. *Assessment Matrix of Conservation Thresholds Analysis*

ASSESSMENT MATRIX OF CONSERVATION THRESHOLDS					
WATER					
Surface water resources	**1**	**2**	**3**	**4**	**5**
Surface water resources (Dam lake)					**X**
Dam basin					**X**
Rivers in basin				**X**	
Dry rivers in the basin			**X**		
Rivers out of the basin				**X**	
SOIL AND LAND					
Soil (Land-Use Capability Classes)	**1**	**2**	**3**	**4**	**5**
1. Class					**X**
2. Class					**X**
3. Class				**X**	
4. Class				**X**	
5. Class			**X**		
6. Class			**X**		
7. Class		**X**			
8. Class					**X**
Slope (%)	**1**	**2**	**3**	**4**	**5**
0-15	**X**				
15-30			**X**		
>30					**X**

2.2. Stage II: Recreational Potential Determination Method for Forest Lands in Urban Areas

For having forest characteristics under settlement pressure in urban areas, Istanbul-Azizpasa Forest considers positive and negative impacts of biological and cultural data necessary in terms of recreational potential.

In the second stage of the planning model, an analysis is established for alternative forest lands to access recreational purposes. This analysis has three primary datasets that affect recreational potential, these datasets are;

a) Positive factors (vegetation and transportation),

b) Negative factors (state of preservation, closeness to settlements and conservation areas) and

c) Conservation thresholds values.

A subjective scoring matrix generated by these datasets contributes to the area's recreational potential (Table 2). Contribution levels are rated in five interval scale;

1 Having very low recreational potential

2 Having low recreational potential

3 Having average recreational potential

4 Having high recreational potential

5 Having very high recreational potential

Table 2. *Assessment Matrix of Recreational Potential Analysis*

ASSESSMENT MATRIX OF RECREATIONAL POTENTIAL ANALYSIS					
POSITIVE FACTORS					
Vegetation (Stand)	**1**	**2**	**3**	**4**	**5**
Gap					**X**
Broad-leaved stand					**X**
Mixed stand				**X**	
Coniferous stand	**X**				
Degraded broad-leaved stand				**X**	
Degraded coniferous stand		**X**			
Coppice stand			**X**		
Slope (%)	**1**	**2**	**3**	**4**	**5**
0-20					**X**
>21	**X**				
Proximity to transportation	**1**	**2**	**3**	**4**	**5**
0-500 m.					**X**
501-1000 m.					**X**
1001-1500 m.				**X**	
1501-2000 m.			**X**		
2001-2500 m.		**X**			
2501-3000 m.	**X**				
NEGATIVE FACTORS					
Settlement pressure	**1**	**2**	**3**	**4**	**5**
0-500 m.	**X**				
501-1000 m.	**X**				
1001-1500 m.		**X**			
1501-2000 m.			**X**		
2001-2500 m.				**X**	

2501-3000 m.						**X**
3001-3500 m.						**X**
Closeness to protected areas		**1**	**2**	**3**	**4**	**5**
Interior conservation area	**Natural areas with less and secondary importance**		**X**			
	Natural areas with strong importance	**X**				
0-200 m.			**X**			
201-400 m.			**X**			
401-600 m.				**X**		
601-800 m.					**X**	
801-1000 m.						**X**
1001-1200 m.						**X**
CONSERVATION THRESHOLD VALUE						
Natural areas with less and secondary importance						**X**
Natural areas with strong importance				**X**		
Natural areas with very strong and extremely strong importance		**X**				

Scoring system is built based on the following data;

2.2.1. Positive Factors

Vegetation: It is observed that open lands and broad-leaved stands in forest areas prioritize the recreation area's installations (Pehlivanoğlu, 1987). Therefore, these areas have taken 5 points for having very high recreational potential. Other stand distributions have also taken points according to their recreation potential.

Slope: In the light of the findings of survey and inventory works, it has emerged that the slope of the land is one of the most important limiting factors on recreational activities. As a result of the analysis, areas with 0-20 % slope value are suitable, areas having 21-40 % slope value is not economically ideal for recreational activities (National Parks Acts 2873, 1983). Areas having 0-20 % slope value are rated as areas having very high recreational potential.

Proximity to transportation: Recreation potential of an area makes sense as long as it can be reached. In other words, if many people will benefit from a site and if those people are not faced with a significant transport problem to get over there, that area's conformity to recreation will increase significantly (Gülez, 1990). In terms of urban planning principles and planning techniques, it is known that pedestrians walking

distance radius is 500-750 m. This specified range is also appropriate to the walking distance of 15-20 min. that mentioned in the attainability level studies for recreation potential. Thus, the recreational potential score is assigned according to the distance to the area's main transport routes.

2.2.2. Negative Factors

Closeness to protected areas: In planning, nominal conservation and use regulations that bring out different regions, called "Zoning System" are being implemented. According to the technical prospectus for recreational areas (Anon., 2005), the buffer zone is a transition area between the protection and utilization zone. It is established to maintain the protected area's natural and cultural resources against usages' influence and effect. Buffer zone distance for protected areas is 200 meters. (Geray ve Akesen, 2001). Sites nearby the protected areas have low recreational potential.

Settlement pressure: Changes in natural resources occur as a result of past and present human activities. Industrial development profoundly impacted landscape pattern, forest composition, habitat availability, water resource integrity and wildlife abundance. These impacts are caused by the combination of land clearing for roads, agriculture, clear-cuts for settlement installation and human-caused fires.

Zones of influence are areas within forest stands that are impacted by outside activities. This zone for different impacts usually extends from as little as 1 meter up to 500 meters. When it comes to a more intense effect, it can be up to 1 kilometre. As mentioned above, closeness to settlement areas decreases recreational potential (SFF, 1999).

Conservation thresholds synthesis values

The sample area is divided into three parts according to the conservation threshold values;

- Natural areas with very strong and extremely strong importance,
- Natural areas with strong importance and
- Natural areas with less and secondary importance.

Upon natural resource value, the area ratio can be opened for recreational use is high in natural areas with less and secondary importance. This increases the recreational potential value of the area.

To designate forest resource's recreational potential, the maps are used which code values of positive-negative factors' database and point values in the assessment matrix of recreational potential analysis, assigned to the related attribute classes.

All layers for positive and negative factors and the conservation threshold analysis layer need to overlay using GIS. A layer of total values will be generated on the spatial base within the area border by examining the obtained database. The layer of total values will be considered under three main group with the help of the three-class Natural Breaks Classification method. Forest area can be categorized as areas with low, average and high recreational potential.

3. Findings

3.1. Conservation Thresholds Method

After point entries stated in the Assessment Matrix of Conservation Thresholds by querying the database, Azizpasa Forest' land use capability classes' map, slope class-map and surface water resources' map overlayed using GIS. A layer of total values was generated and evaluating this layer with three-class Natural Breaks Classification method, the area's conservation thresholds point range is shown in Table 3, (Figure 2). The spatial distribution of Azizpasa Forest's conservation thresholds is also shown in Table 4 (Figure 3).

Table 3. *Natural Resource Characteristics Depend on Conservation Threshold Values*

Natural Resource Characteristics	Conservation Thresholds (Point)
Areas with very strong and extremely strong importance	**9-18**
Areas with strong importance	**4-8**
Areas with less and secondary importance	**0-3**

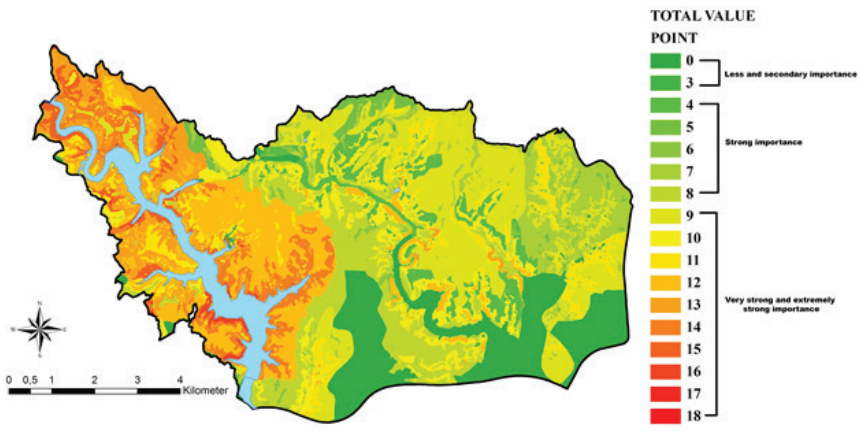

Figure 2. *Map of Total Values for Conservation Thresholds*

Table 4. *Spatial distribution of Azizpasa Forest's Conservation Thresholds*

Conservation Thresholds	Area (Ha.)
Natural areas with less and secondary importance	1356
Natural areas with strong importance	1812.7
Natural areas with very strong and extremely strong importance	4230
Total	7398.7

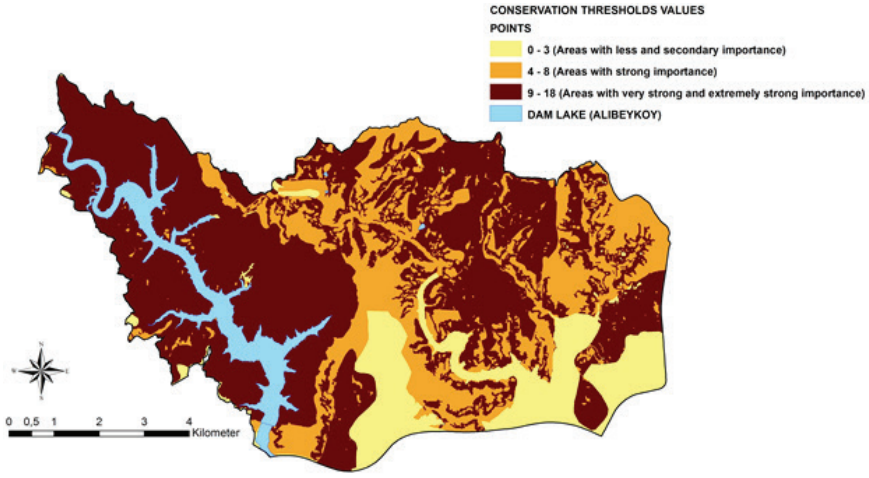

Figure 3. *Distribution of Conservation Thresholds*

According to the sample area's conservation threshold data and forest management plans designated for recreational planning model, a planning proposal is not established to non-forest areas (settlement and agriculture areas) and article 2-B areas. Mining areas within Azizpasa Forest have limited natural resource value, but they can be planned and opened to access as a forest land by the mid-short term rehabilitation studies. Spatial distribution of areas that are excluded from planning in Azizpasa Forest is as shown in Table 5.

Table 5 *Spatial Distribution of Out-Of-Planning Areas in Azizpasa Forest*

Out-of-planning areas	Area (ha)
Settlement areas	964,85
Agriculture areas	270,15
Article 2-B areas	187,79
Total	1422,79
Mid and short term planning areas	
Mining areas	188,74
Total sum	1611,53

When the map layers that belong to areas that excluded from planning, analyzed in GIS, it is seen that a portion of article 2-B areas are being used as agriculture or settlement field. Spatial distribution of article 2-B areas used for agriculture and housing are as shown in Table 6.

Table 6. *Distribution of Article 2-B Areas Used for Agriculture And Settlement*

Spatial distribution of article 2-B areas	Area (ha.)
Settlement areas (article 2-B status)	48,71
Agriculture areas (article 2-B status)	41,57
Total	90,28

After removing these areas in article 2-B status, 916,14 ha residential area and 228,58 ha agriculture area remains.

Out-of-planning areas' layers and Conservation Thresholds Analysis map are overlayed by using GIS. After that, it is determined that 5877,45 ha of the area is going to be planned. Spatial distribution of planning areas on conservation thresholds is as shown in Table 7.

Table 7. *Spatial distribution of planning areas on conservation thresholds*

Conservation Thresholds	Area (Ha.)
Natural areas with less and secondary importance	545,8
Natural areas with strong importance	1555,97
Natural areas with very strong and extremely strong importance	3775,68
Total	5877,45

The dam lake (368,75 ha) is also extracted as well as the out-of-planning areas. After that, it is determined that 5508,7 ha area having forest characteristics will be planned.

3.2. Recreational Potential Determination Method

After point entries stated in the Assessment Matrix of Recreational Potential Analysis by querying the database, a layer of total values was generated (Figure 4). The layer has considered under three main group with the help of the three-class Natural Breaks Classification method (Table 8). After considering the total values layer for recreational potential, distribution of planning areas' recreational potential is shown in Table 9 (Figure 5).

Table 8. *Analysis Points Based on Recreational Potential Value*

Recreational potential value	Analysis points
Areas with low recreational potential	6-13
Areas with average recreational potential	14-18
Areas with high recreational potential	19-26

Table 9. *Spatial Distribution of Planning Areas' Recreational Potential*

Recreational potential value	Area(ha)
Areas with low recreational potential	1342,65
Areas with average recreational potential	2817,19
Areas with high recreational potential	1348,86
Total	5508,7

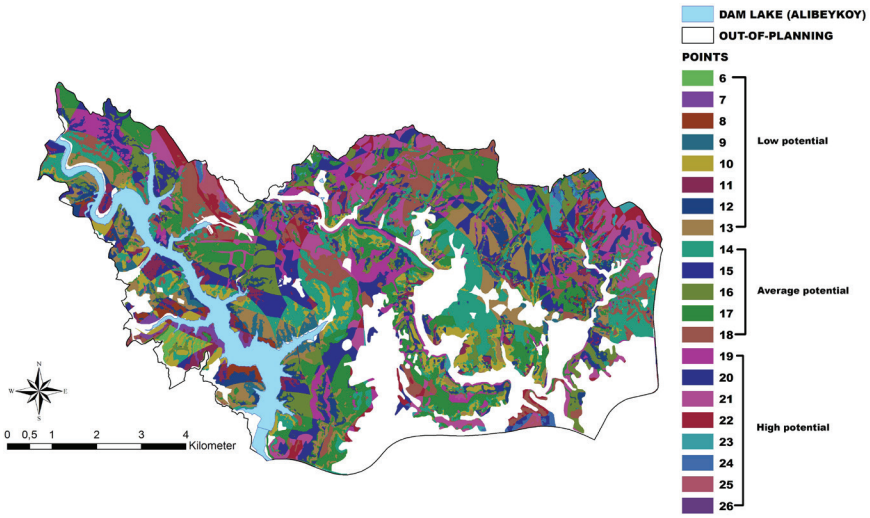

Figure 4. *Map of Total Values for Recreational Potential*

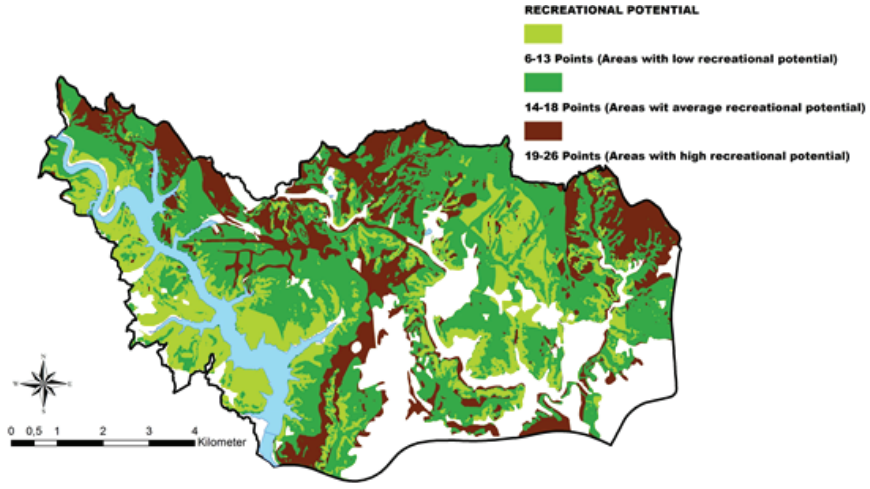

Figure 5. *Distribution of Recreational Potential*

4. Summary and Conclusions

Non-living natural factors' data of Azizpasa Forest as water resources, soil and geomorphological structure are analyzed using conservation thresholds analysis for recreation. Water resources are in danger of extinction because of global warming. Due to the formation of the soil, and geomorphological structure take many years; these factors have an immense effect on the natural structure and resource value of the area. Other non-living natural factors of geology and climate data were not taken into consideration. There is no geological formation that adds value to the research area planned for recreational purposes. Also; there is no

difference in elevation and topographic appearance that make a difference in temperature, the sun is not affecting recreational activities due to the forest structure have a closure of 50%, the precipitation conditions that do not make a difference in urban forests in terms of recreation and northeast aspects that affected by dominant wind direction has a small range of 9 %. According to the 6831 Forest Act research area, the forest regime is subject to the forest regime, and natural factors can be eliminated, the value of the resources with human action (fire, etc.) thus vegetation and fauna data have not defined the synthesis of conservation thresholds.

Forest lands are strict preservation areas according to the Forest Act 6831 thence settlement pressure was discussed in the research area's boundaries within this study.

It should not be forgotten that every urban area and every natural source have a different ecosystem and natural worth. Therefore, the pressure components and the other variables that affect recreation potential can change due to the character of urban and its source values. The model has a scoring system which can be used by applying all the mentioned differences.

To have accurate results from these syntheses; evaluated databases should be distinguished and efficient on recreational use and restricted as a source value in this model's application field.

According to the "Resource-Based Recreational Planning Model" created in the scope of this study; areas with high recreational potential have the priority to be opened for use. However, the intensity of use varies depending on the conservation thresholds of the area. Areas with average recreational potential will be the second priority areas to be opened for use.

What is needed to provide natural sources' sustainability in urban areas is to determine the worth of detail, control the inventory periodically, and preserve. Natural and cultural factors and legal regulations changes should be updated on the digital platform's maps.

It is a threat for the forest resources that the urban development tendency is through to the North. Because of the absence of legal legislation to avoid this process; it has become necessary to restructure urban management, renew the municipal ideology and compose new urban policies. Hence, the metropolitan municipality should prevent that faulty urban development by redefining their assessments.

Averting the increase of urbanization, especially in the large metropolitans such as Istanbul can only be possible by applying efficient policy instruments.

Istanbul is a great metropolis and has not enough active open spaces yet. Open space norms can be implemented by revising the municipal plans. The spaces should be created to respond to the recreation need of the citizens in the residential neighbourhood. Consequently, the pressure on the open spaces of urban can be lightened.

Planning of the local forests should have a stabilizing and regulating characteristic on social pressure. For this purpose, mentioned planning should be progressive, variable, leading and flexible in itself.

An initial decision should belong to the natural source of recreational planning. Excessive and false uses of natural resources cause losing the renewing ability and are being harmed. So far, most people have tried to control nature, but the result is the people have suffered in any case. They were, therefore planning actions to be compatible with nature a must. This study will be an example of future recreation planning studies based on natural sources in urban areas.

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