

**Promotion of systematic analysis model recreation potentiality of forest park by using water resource factor (Abidar forest park of Sanandaj city in Iran)**

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**Abstract:** The systematic analysis model (Makhdum, 1385) considers 6 elements of gradient, soil, direction, water, planet and climate to evaluate recreation potentiality of forest parks. In this survey in order to evaluation of recreation potentiality of Abidar forest park which is located in south western part of Sanandaj, with the surface of 1555 hectare, in addition to the fore mentioned elements according to the conditions of region, the water resources factor is also considered to promote systematic analysis model. Using systematic analysis model in geographic data system the map for recreation potentiality was provided. The results of this evaluation show that the under study region doesn't have first class concentrated recreation potentiality. 29% of the area has second class concentrated recreation, 38% of the region has wide spread first class recreation potentiality and 33% is of wide spread second class recreation potentiality. In order to study the impacts of an effective factor by visitors of the region, 450 questionnaires were distributed among the tourists in the region. The results show that most of the visitors announced the availability to water resources as a reason to choose the recreation region. To promote the systematic analysis model and study the effect of water resources factor on different classes of recreation based on systematic model, the map of buffer was provided and with recreation potentiality map based on systematic model was incorporated and the final recreation potentiality map was obtained. The results of this evaluation showed that 6% of region area includes first class concentrated recreation potentiality, 28% of region area second class concentrated recreation potentiality, 35% first class widespread recreation potentiality and second class widespread recreation potentiality is covered 31% of the area. Comparing two recreation potentiality maps shows that in systematic analysis model, the region doesn't have first class concentrated recreation place, but if the water resources factor is scored, 6% of the region will earn first class concentrated recreation potentiality. The results of this survey show that water resources factor, herbal coverage, accessibility ways and physical factors (gradient and direction) have the most effect on evaluation process of recreation potentiality in the region as they are mentioned in order of effectiveness. While the effective parameters in recreation potentiality evaluation in systematic analysis model are gradient, soil, direction, water, plant, and climate.

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## 1. Introduction

Nowadays, tourism industry has found a crucial role in relaxation, national economy, exporting achievements, tax incomes, employment for youth and income production for the rural parts in order to prevent their immigration to cities and protecting natural resources. Thanks to these effects, tourism attractions are enumerated as unique investments of every country and region that identifying categorizing and introducing of this crucial factor is very important in Development Plan and employment. In recent decades, population growth and communication improvement has strikingly caused in travel and transition in the world. Urbanity process and tedium of work environment make an intense tend to recreation and promenade,

especially in industrial societies, and it has created a deep concern regarding extreme fertilization of environment and natural resources. So, it is needy to structuring forest parks and natural recreation places is necessary in order to protect natural resources and reservations, tourist attractions, income production, relaxation and spending leisure time (Awladi, 2005).

Land preparation is an enterprise that has been taken wisely to benefit the natural resources in order to prevent destroying nature, and also to benefit the natural resources. According to ecological power, the evaluation of ecological power for different usages, such as recreation, is an effective step to reduce these damages (Majlajpoor, 2004). In using evaluation ecological power of land in many cases, almost all of the capabilities of natural resources are

surveyed and identified and only in special cases one or two ecological resource would be enough (Makhdum, 2006) With urbanism development and destruction of natural ecology, the need of green spaces to create ecological balance is burgeoning.

Today's green space is one of the most important vitalization systems of human being. Referring to the vital importance of green space in the world is necessary not only because of its economical value but also because of the significance of it in environment by having this point in mind that green space is enumerated as urban respiratory way and its lack results to mental and physical healthy disorders.

In parallel with irreversible industrial development importance of green space especially trees would be more understandable (Hidred, 2001). So, Evaluation of recreation capability is to determining the capability of region for ecotourism and recreation use. Capability and recreative potentiality is evaluated in different method that the most common assessment method in Iran is systematic analysis model of Makhdum. In assessment method of Makhdum recreation potentiality at first ecological resources are identified. Then they turned into the plan and compiled with each other and the outcome was environmental unit plans. Comparing this unit and Makhdum tourism ecologic model, every unit's obtained which are potentialities for recreation.

Ecologic potentiality assessment process has been done without using powerful equipments, but surely it was so difficult, costly, time consuming and full of errors. While today geographical data system in identifying resources and optimized analysis of users are noticeable (Hathout, 2002).

Bejerk and others (2006) have studied the relationship between density of herbal coverage in forest parks and visitors' general recreation. The results showed that those parks that are more suitable in terms of herbal coverage and density in attracting visitors have more capability in attracting visitors. Finally we can say that different types and ranks of recreation depend on water resources and density of herbal coverage that these factors in addition to physical ones are effective in determining recreation potentiality of park.

Analyzing different studies shows keeping dynamism, quality and quantity of natural resources so as to permanent utilization of them, is necessary that its prerequisite is recognizing potentiality and capability of the region in terms of slightly purpose. There are many researches in Iran based on systematic analysis model. Mahmudi (2007) showed that in addition to physical factors, the effect of other factors such as abuting to population focal,

accessibility to the region, existence of special attractions, play grounds and water resources must be noticed. In this paper, in order to promote systematic analysis model and considering the conditions of significant region moreover physical factors the effect of water resources factor in recreation is evaluated.

## 2. Methods and Materials

### 2.1 Materials

Abidar park with approximate scale of 1555 hectare in the south western of Sanandaj that is located between 46° , 59' , 12" to 46° , 55' , 24" and 35° , 19' , 24" and 35° , 15' , 52" north latitude and the average height of the area is 2073 m above sea level. Geology formation of the region includes three geomorphologic units, black grey chills, volcano stones and residual of kwaterner. Climate is one of the essential and better factors in tourism planning. The studies show that climate is the most important tourism attraction resource in natural environment. In order to study region's climate we used different methods and mid-dry climate obtained.

### 2.2 Research method

In order to evaluate recreative potentiality of Abidar forest park systematic analysis model that is the most common method to identify assessment and utilizing plan of land worldwide including Iran. Due to this, first the map of numeral topography 1, 25000 Sanandaj has been provided from National topography organization of Iran. Then by frontage operation of approximate scope of the area, the specific map is identified. Then by using scan method numeral site span interred into computerized software system. In order to determine exact boundaries of the park, ground removal by using GPS has been done. The available data interred in to the computer using Arcgis software system and the exact boundary of park determined. This boundary interred in to the topography map which is used in providing other maps. Gradient, direction and altitude maps in Arc/view 3.3, ARC GIS 9.1 software are provided. Then by compilation of them the earth shapes map has obtained. The second step includes and gathering of resources. In this step with collecting soil, and earth shape unit, the map of primitive potentiality of recreation map obtained. In the third step the assessment of environmental units is done. In order to study the effect of water resources factor in choosing under-study recreation region and in order to have a more real view of the effects of these factors in choosing recreation region among tourists. 450 questioners are distributed among those who were there as tourists in that region.

## 3. Promotion of systematic analysis model by using water resources factor

By identifying the importance of water resources factor in recreation all spots which are related to water resources (such as well) has been chosen by using GPS removed and has been given to software in order to establish data strand and then its map provided-figure 7 shows the situation of well in Abidar park. Based on information about choosing the recreational capability in jungles and pampas organization of country the maximum distance of water resource of recreational region is about 300m. Based on this by using Arc GIS 9.2 software around water resources of case study region is buffer 300m and its map provided (figure 7). In next step the water resources map with recreative potentiality map that is obtained by systematic analysis model incorporated and the last recreational potentiality map provided.

**4. Results**

*4.1 Results from maps*

The obtained results of gradient map showed that 1% of Abidar park surface has a slope of 0-5%, 14% has 5-15% , 41% has 15- 25% and 44% has 25-50%.

Considering these results, the most surface of the park is located between 15- 25 and 25-50 (figure 1). Based on the map, the classes of geographical direction 26% of park are 10% south ward, 6% west ward and 58% east ward. Due to these results Abidar forest park is more east ward oriented (figure 2).

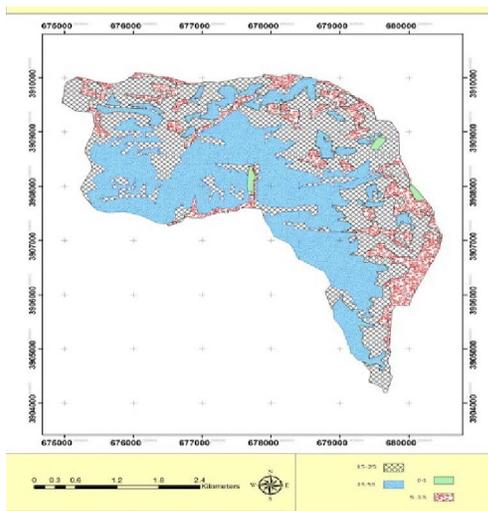


Figure 1. Gradient Map of Abidar Forest Park

Based on provided numeral-height model, park is located in the height range of 1600- 2500m of sea level. Latitudinal map is provided with 5 classes According to height map, the park is in height range of 1600-1800m from sea level (figure 3).

Based on soil map (figure 4) 60% of park's surface has loamy fibre, 3% sandy,clay, 20% clay loamy, 17% clay loamy.

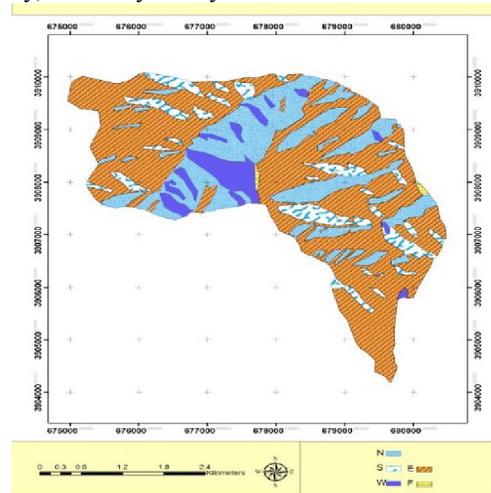


Figure 2. Direction Map of Abidar Forest Park

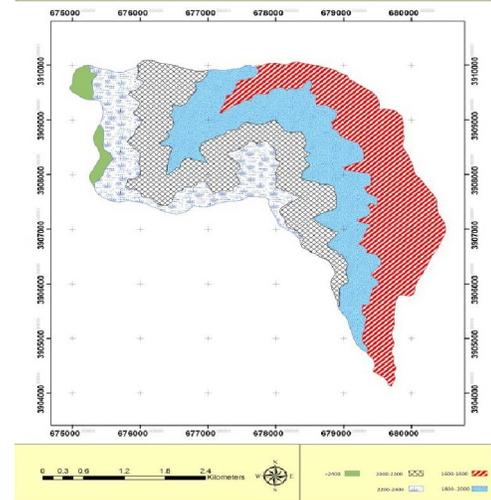


Figure 3. Height Levels Map of Abidar Forest Park

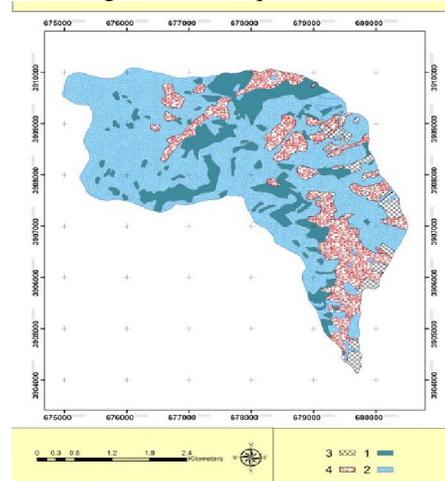


Figure 4. Soil Fibre Map of Abidar Forest Park

Based on these results, most of the park's surface has herbal coverage, less than 10% which it has a big effect on recreation (figure 5). The results of evaluating recreational capability of Abidar forest park in addition to surveying the elimination of slope 0-5 in the region when the layers are incorporating so the other parameters were not considered and we identified that Abidar forest park doesn't have intensive recreational potentiality in first class, 5% of Abidar park has intensive recreative potentiality in second class, 50%(7576440 hectare) widespread recreative potentiality in first class and 45% of park surface has widespread recreative potentiality in second class (figure 6).

4.2 Results study reasons of recreative case study region by tourists

According to these surveys about water resources and well has the biggest effect on choosing the place of settlement .The second criteria for choosing the sitting place are herbal coverage park characteristics, suitable herbal coverage , and using trees shadow.

4.3 The results of the effects of water resources factor and the way of accessing them in recreation potentiality

The existence of water resources which provide the drinkable water for tourists is one of the most crucial criteria in choosing the recreational places. And basically the areas which are away from drinkable water resources or it is impossible to carry water to there are not suitable for stationing concentrated recreation places. Involving the water resources recreational regions that their maximum distance from park is water resources was 300 meters consider as level 1 concentration areas. Also the areas which have suitable slope and have a reasonable distance from the water resources, up to 300 meters, can be considered as places which have the potentiality for locating the level 2 concentration recreation. By doing this and comparing both a/d and new maps, we can evaluate the effects of the available water resources in parks (figure 7). The results of the evaluation of recreation potentiality of Abidar, involving water resources, show that 2 percent (about 23,827 hectare) of Abidar recreational park has level 1 recreational potentiality. 23 % (339/036 Hectare) has second level, 31% (467/7040 Hectare) has wide level 1 recreation and 44 % (675/8450 Hectare) has level 2 potentiality (figure 8).

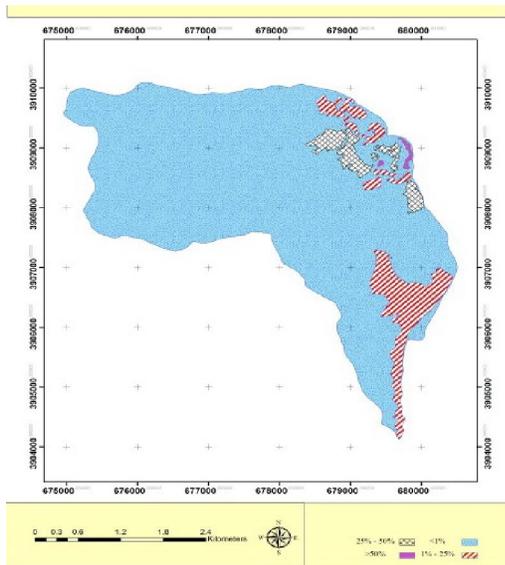


Figure 5. The Map of Plant Dense of Abidar Forest Park

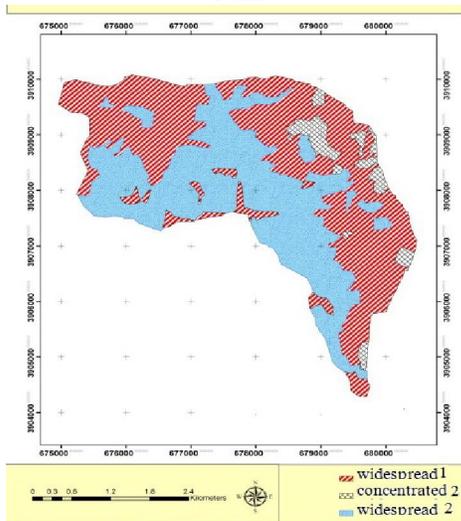


Figure 6. The Map of Environmental Units of Abidar Forest Park

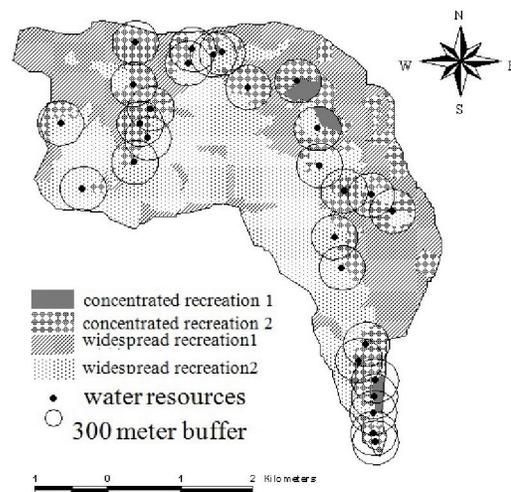


Figure 7. The Map of 300 meter buffer around water resources

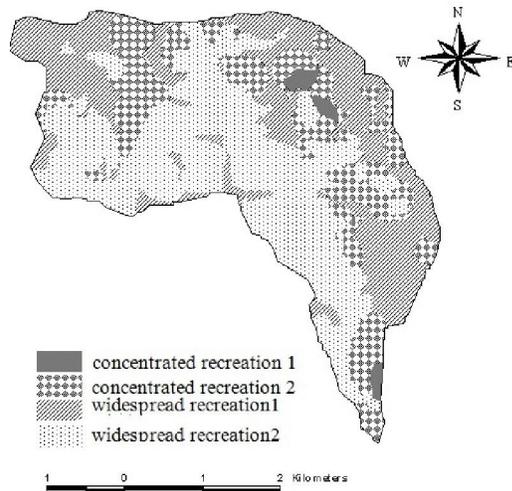


Figure 8. The final map of recreation potentiality of the park including water resources

## 5. Discussion and conclusion

### 5.1 Determining recreation potentiality according to Abidar forest park systematic analysis

According to conclusions of references above and according to the ecologic model used in Abidar forest park due to mountainous geographic situation showed that there isn't much low slope lands to start the level one concentrated recreation. 5%(73/6180 Hectare) of Abidar park has the potential for level 2 concentrated recreation which if it is possible to built tourist facilities there. As Taheri (2006), assessed nature attractions of Abas Abad Vemsak the obtained results showed that the mentioned area due to its high slope and high altitude for level one concentrated recreation tourism is not suitable. And only 3.34% of area has the level 2 concentration recreation. In Abidar forest park 50 % ( 757/6440 Hectare) of the park has the potential for level one widespread recreation and 45 % ( 675/111 Hectare) has potential for level 2 wide spread recreation. Esmailie sari (2003), evaluated Chitger Park to determine the level of wide recreation and 5.5% of the park surface is suitable for concentrated recreation and 68% of the park is suitable for widespread recreation.

### 5.2 Determination of the effective factor on different classes by distributing question in Abidar forest park

The results show that 41% of the visitors announced that the existence of water resources, and 34% stated that suitable herbal coverage are the reasons of choosing their favorite place. They introduced these two factors as effective parameters on recreation region. And also we can say that according to the low gradient in same regions and concentration of people around water resources it is essential to add in another layer of information such

as water resources instead of plant thickness factor and physical factor in Makhdum model.

### 5.3 Effects of water resources on different levels of recreation (Upgrading the systematic analysis model)

In this survey, after providing the plan of primary recreation potentiality, water resources' layers have been considered as a positive factor so this map is contracted, and final plan will be provided .so, as it was clarified 2% (23.827 Hectare) of Abidar park has potentiality for level one concentrated recreation place, 23% (339,636 Hectare) has potentiality for level 2 concentrated recreation,31% (467,7040 Hectare) has potentiality for level 1 wide spread recreation and 44%(675,8450 Hectare) of the park surface has potentiality for level 2 wide spread recreation. By comparing both old and new map the effectiveness of water resources in the park was clear. Comparing the obtained results from the recreation potentiality map according to systematic analysis model with the final recreation potentiality map (including water resources factor) showed that some places were suitable due to slope, soil, direction and other parameters for level 2 concentrated recreations. But because of its far distance to water resources there is a lack of tourists and visitors and also frontage surveys show that some places due to slope, soil, direction and other parameters is suitable for level 1 recreation but because of having water resources visitors like to promenade there more than other places. These results indicate that water resources which provide drinkable water for visitors are one of the crucial criteria in selecting recreation places, because visitors need about 40 to 120 liters of water per day. Finally we can come to account that this water resources factor comparing to soil and direction of slope has more effects on recreation in the case study region. These results indicate that different types and levels of recreation in the case study region depend on water resources factor. And this factor with physical and natural resources is effective in determining the potentiality of recreation in Abidar Forest Park.

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