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Applying Geographic Information System in assessing the recreational potential of Hassanabad Forest Park

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ABSTRACT

Background: Hassanabad forest reserve is located in Sanandaj (west of Iran), in the vicinity of the Hassanabad historical fortress. This park is one of the tourism spots in the area which is exposed to destruction due to lack of appropriate utilization and management plans. Sustainable development in park lands need an eco-physical assessment based on biophysical capability of park land and related components and sociological considerations. **Objective**: The purpose of this research is to assess the recreational potential of Hassanabad Forest Reserve, by applying systematic analysis method and GIS. **Results:** After identifying ecological resources the required data were collected. In the next step the data were classified, analyzed and integrated to compose ecological units. Finally the map of final recreational potential was created by comparing ecological attribute of each unit with tourism ecological model for. The whole area includes recreational potential and the area which lacks it includes intensive recreation capacity of the first class. **Conclusion:** Results show that the park has intensive recreation capacity of the second class, extensive recreation capacity of the first class and extensive recreation of the second class.

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INTRODUCTION

Population increase in size and density and the growing of urban areas, increase in the contaminants in the environment especially metropolises are the issues which motivate people to use parklands and natural landscapes (Barzekar, 2005). Urban forests have positive effects on urban environment by providing ecological services and opportunity for recreation and spending leisure time (IraniBehbahani and RaziMoftakhar, 2005; Jahdi and Khanmohammadi, 2013). So, the necessity of establishing and developing of forest reserves and natural parks for attracting tourists, making income, recreation, protection of the natural resources and surviving the genetic sources seems increasingly (SaiediAshtiani, 1984). Development and altering in natural resources require an appropriate evaluation system and management plans to survive the area's natural values along with the sustain use of people from the natural resources. (Majnunyan, 1998).

A series of studies carried out using biophysical resources of parks and natural forests. Mahmoudi (2007) assessed the recreation capacity of surrounding forests of Lordegan, by applying parametric methods based on optimized compounding and scoring the related indexes. Then he identified the areas intensive and extensive recreation and specified the visitor's recreational preference.

Rashidi (2008) assessed the ecotourism capacity of the surrounding forests to Zaribarlake in Kurdistan province by GIS and applying specific models. He assessed ecological capacity of the area and classified areas suitability for intensive and extensive tourism activities; and then integrated the results with the socio- economic data to make final decision on the potential of area for recreation.

Sepahvand*et al.* (2009) assessed the ecological capacity of the Patom district forest with the possibility of multiple uses (forestry and protection). They used land topographic data including slope, direction and elevation to provide land form. The land form map was incorporated with soil and the forest type. The areas ecological capacity for tourism was determined by applying an ecological model on final maps. Finally, Patom district was categorized to three areas: beneficiary intensive recreation, extensive recreation, protection.

Gul*et al.*(2006)determined the most appropriate resort area in Guljuk Natural Park in Turkey, by applying multi-factorial assessment method and investigating the speculator requirements. They finally identified the

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appropriate recreation zone by applying GIS; they then remarked that 10 percent of the park area has the most capability for recreation activities. Zanin*et al.* (2005) studied an urban park in Brazil for recreation use. The divided this park into 5 usable zones for different activities including limited use, extensive and intensive recreation uses, special uses, rehabilitation use.

Methodology:

Due to study type and purpose of research, ecological data accessibility and study area environmental condition, Makhduom ecological model for tourism was selected. In this model, first the map of the land form is provided. For this purpose, topographic map of the area was used. So, first the maps of slope, elevation, and aspects were separately provided and classified into appropriate classes. After overlaying these maps, the map of land form units is created. The existing vegetation density map is classified to four classes including no vegetation, spare, and semi dense, dense). The map of environmental units' first grade was provided by compounding the map of the earth's shape and the map of soil layers. Then, by collecting this map and the provided vegetation density map, the final map of economical units was resulted. In this map each unit includes 5 factors: slope, direction, elevation, and soil texture and vegetation density. The earth's categorization and assessment was obtained by comparing ecological traits of each biological units and tourism ecological model (Makhduom, 2006). Each unit of the traits from the map of biological units with intensive and extensive recreation ecological model of the first and the second class were compared. The units which had the capacity of the recreation classes were determined and the capacity map of different recreation classes was provided.

Hassanabad forest reserve is one of the Sanandaj city parks and it is located in the southwest of Sanandaj city. The whole extent of the park is 434/6 hectare which is located between 46°55′ and 46° 52′E and 35°15′ and 35°19′ N. The average slope of the parkland is 30% and its height ranges between 1600-2160 m ASL. The geology system of the area includes three geomorphologic units, gray black shale, volcanic rocks and quaternary deposits. The least average yearly temperature is (-5) in February and the most (38) is in August and the raining average is estimate about 459 mm. A series of maps of park including topography, vegetation density, and soil in the scale of 1/25000 have been obtained from the Department of Natural Resources and Watershed Management of Kurdistan. A localized model for outdoor recreation based on socio-ecological properties of Iran was developed by Makhduom (1986). This model uses several criteria to assess and rank natural landscapes including forest park for recreation proposes. The model rank natural lands into four classes. To assess recreational potential for park land first the required data should be collected and processed. The data comprised a series of maps including: topography, elevation, slope, aspect, soil types and vegetation type and density of park land. GIS software was used to analysis and classified the resources maps and data. Each map was classified and ranked to desire classes for further possessing.

Maps of elevation, slope and aspects were overlaid to create landform units then these unites map were integrated with vegetation map to provide environmental units map. In the next step each environmental unit were compared and assessed by Makhduom ecological model. Finally, the recreational capacity of the park was assessed and identified by applying Makhduom ecologic model for recreation.

Results:

The map of park slope was provided in four classes (Fig. 1) and the map of direction by applying topographic map in Arc GIS environment (Fig. 2).

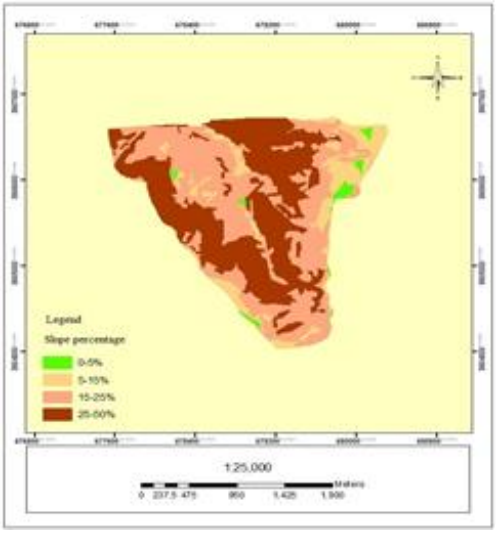

Fig.1: Percentage map of slope floors of the park

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Table 1: Slope percentage of forest park floors

Floors	Slope percentage	Area(ha)	Area (%)
1	0-5	7.14	1.64
2	5-15	52.83	12.15
3	15-25	189.67	43.64
4	25-50	185.04	42.57
Total		434.6	100

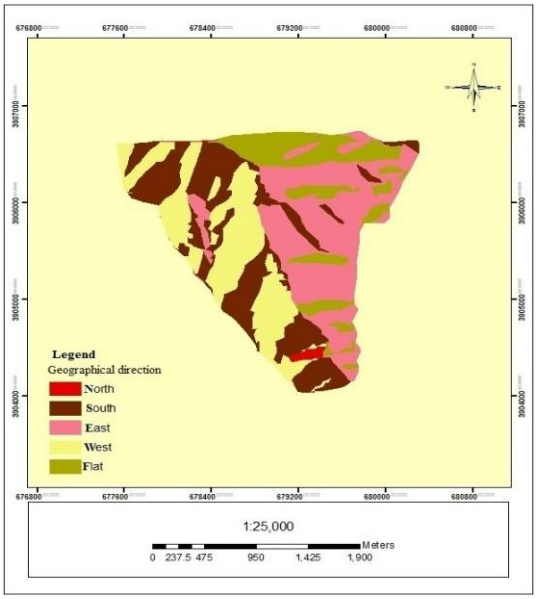

Fig. 2: Map of direction of the park

Table 2: Classification of geographical park direction

Floors	Geographical direction	Area(ha)	Area (%)
1	Without direction	65.37	15.04
2	Eastern(E)	143.58	33.04
3	Northern(N)	3.5	0.81
4	Southern(S)	113.68	26.16
5	Western(W)	108.47	24.95

Elevation level was provided in 5 groups (Fig. 3).

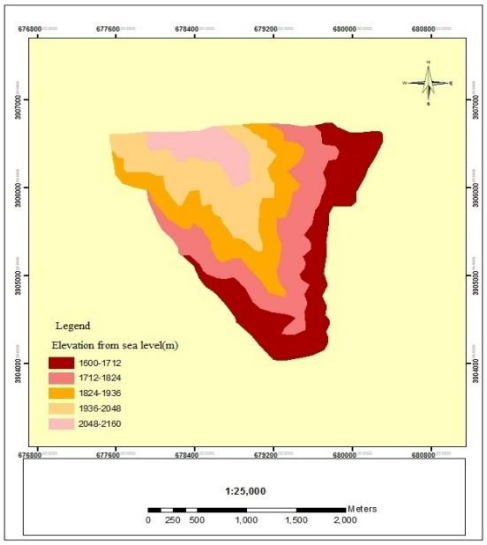

Fig. 3: Map of elevation floors of the park

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Table 3: Elevation floors of the park

Floors	Elevation from sea level (m)	Area(ha)	Area (%)
1	1600-1712	113.95	26.22
2	1712-1824	103.82	23.89
3	1824-1936	89.32	20.55
4	1936-2048	91.09	20.69
5	2048-2160	36.42	8.38

The map of soil floors was provided in three groups (Fig 4) and the map of vegetation density of the area was provided in four groups (Fig. 5)

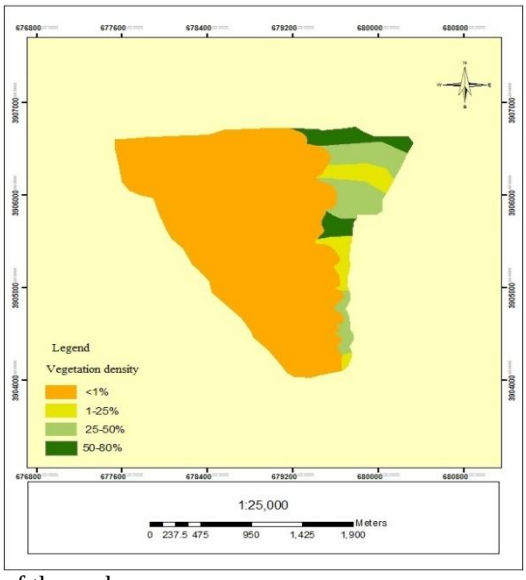

Fig. 4: Map of vegetation density of the park

Table 4: Density of park vegetation classes

Floors	Vegetation density	Area(ha)	Area (%)
1	Dense	20.29	4.9
2	Semi dense	41.253	9.5
3	Sparse	22.07	5.08
4	Lack of vegetation	351.25	80.82
Total		434.6	100

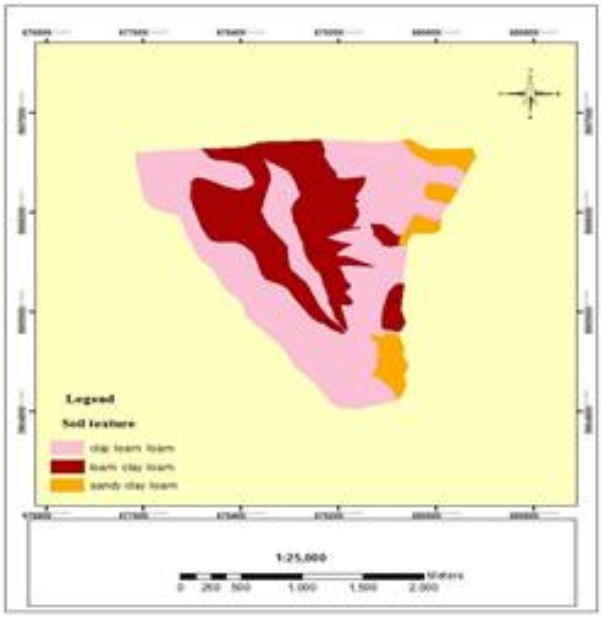

Fig. 5: Map of soil floors of the park

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Table 5: Levels of Hassanabad forest park soil texture

Floors	Soil texture	Area(ha)	Area (%)
1	Torres loamy – loamy Depth 80-120 cm	31.07	7.15
2	Clay - loam loamy 20-80	260.9	60.03
3	Sandy - clay loam 0-20 cm	32.82	32.82
Total		434.6	100

After collecting the maps of the land form, soil and vegetation, the map of land units was provided. Then, the park recreation capacity was assessed regarding the present criteria in Makhduom model (Fig. 6)

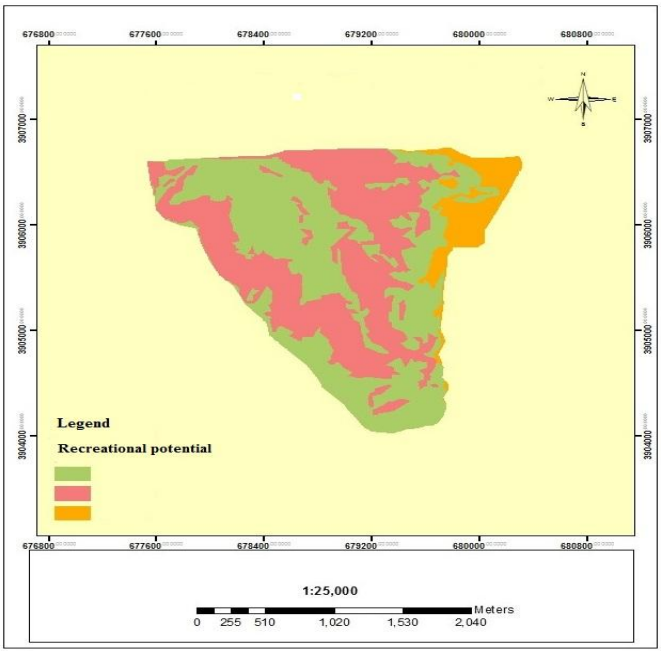

Fig. 6: Map of Recreational potential of Hassanabad forest park

Table 6: Recreational potential of Hassanabad forest park

Floors	Recreational potential	Area(ha)	Area (%)
1	Intensive recreation capacity of the first class	-	-
2	Intensive recreation capacity of the second class	37.5	8.64
3	Extensive recreation capacity of the first class	211.4	48.65
4	Extensive recreation capacity of the second class	185.7	42.71
Total		434.6	100

Discussion and Conclusion:

Ecological evaluation of a land includes assessment of ecological capability of a land for a specific use and determining the managerial requirements. This assessment results from comparing ecological attributes of an area with ecological models of applications. Assessing the ecological capacity of ecotourism application based on ecotourism ecological model for Iran (Makhduom, 1991) lead to providing a map for recreation segmentation of the studied area. According to the results of recreation capacity assessment of Hassanabad forest reserve, it was determined that the park which lacks zone has intensive recreation capacity of the first class and a few percentage, about 8/64 (37/51ha) of the park includes intensive recreation capacity of the second class. Extensive recreation is mostly located in those parts of the park which includes low percentage of vegetation, because about 80 percent of the park includes less than 1 percent vegetation. One of the other reasons of low intensive recreation zone in the area is the lack of loamy soil. In similar studies, PirMohammadi (2007) assessed the ecological capacity of Kaka Reza forest located in Lorestan province by Traditional Section of Cham Hajji for applying ecotourism, and then the whole area was segmentation for different types of recreation. TekyeKhah(2008) in his study assessed the recreation capacity of Abidar forest reserve located in Sanandaj city by applying GIS and factors like slope, elevation, slope direction, soil, vegetation and aquatic sources. The

results of park recreation capacity assessment based on Makhduom tourism model showed that the park has intensive recreation capacity of the second class, extensive recreation capacity of the first class and extensive recreation of the second class.

This research confirmed the high practicality of GIS in quality of working with spatial data, the compound statistics and digits of different maps and providing maps along with new data. It was such that Austin and Meyers (1996) stated that the ability to work with spatial data and descriptive information and compounding different data with high pace which is not possible with by traditional methods is one of the worthwhile qualities of geographical information system. Besides, it makes possible the complex analysis with spatial and non-spatial collected data.

REFERENCES

Austin, M.P. & J.A. Meyers, 1996. Current approaches to modeling the environmental niche of eucalypts: implications for management of forest biodiversity. Forest Ecology and Management., 85: 95-106.

Barzekar, Gh., 2005. Placing Design of the Parks and Forest Sources. Forests and parks offices.

Gul, A.M., K. Orucu, K. Oznur, 2006. An approach for recreation suitability analysis to recreationplanning in Gulcuk Nature Park. Journal of Environmental Management., 1: 606-625.

Irani Behbahani, H., N. Razi Moftakhar, 2005. Developing Sustainable Designing of Ouromieh- Sheikh Tapeh Forest Reserve. Ecology, 37: 89-104.

Jahdi1, R. and M. Khanmohamadi, 2013. Residents and urban green spaces: A case study in Rasht (North of Iran), African Journal of Agricultural Research, 8(23): 2918-2923.

Mahmoudi, B., 2007. Assessing recreational potential of Traditional Section of Mondje in Lordegan. MSc thesis. Agroforestry course of Natural sources Faculty. Mazandaran University, pp: 121.

Majnunyan, H.,1998. Guidance for preparing National Park and protected areas for tourism. International Union for Conservation of Nature., pp: 104.

Makhduom, M., 2006. Fundamental of Landuse Planning. Tehran University Press. pp: 289.

Makhduom, M., 1991. Assessing Ecological Capacity of Gilan and Mazandaran Cities for Developing Urban and Industrial Tourism. Ecology, 99: 16-18.

PirMohammadi, Z., 2007. Assessing ecological potential and preparing forestry plan based on tourism approach (ecotourism) in Zagros Forests (case study: Kaka Reza Forests in Lorestan province*)*. MScthesis, Forestry Department, Tehran University, pp: 100.

Rashidi, A., 2008. Ecotourism Assessment in Surrounding Forests of Zarzibar Pools by Applying GIS, MSc thesis, Forestry Department, Tehran University, pp: 127.

Rezvanfar, M., 2007. The Study of Recreation Capacity of Chitgar Forest Reserve by Applying GIS and RS Technology.MSc thesis.Forestry Department. Mazandaran University, pp: 82.

SaiediAshtiani, H., 1984. Iran's Forest Reserves and Parks, Karaj publication., pp: 154.

Sepahvand, A., B. Majnonian, M. Makhduom, A. DarvishSefat, 2009. Investigating the Possibility of Multiple Using (Forestry and park keeping) in KheiroodKenar Forest by Applying Geographic Information System. Forest and Grassland Journal, 82(83): 100.

TekyeKhah, J., 2008. Investigating recreational power of Abidar Forest Park using GIS. MSc thesis, Faculty of Natural sources, Sari, Mazandaran University, pp: 112.

Zanin, E., J. Santos, C. Oliveria, 2005. Environmental Analyze andZoning for an Urban Park Management Purpose. Bralizian Archives ofBiology and Technology, 48(4): 647-655.