Advances
in
Bioresearch

ORIGINAL ARTICLE

Determining the potential of Bistoon Forest Park and locating Tourism Activities

Ali Sarvazad[1], Jafar Oladi Qadykolayy[2], Seyed Mohammad Hosseini Nasr[3]
[1] Department of Forestry, Sari Agricultural Sciences and Natural Resources University
[2] Department of Forestry, Sari Agricultural Sciences and Natural Resources University
[3] Department of Forestry, Sari Agricultural Sciences and Natural Resources University
Corresponding Author Email:ali.sar1886@gmail.com

ABSTRACT
This study aimed to assess the recreational potential of Bistoon forest park and identity the areas with intensive and extensive recreational potential with different levels and locate tourism activities. To evaluate the recreational potential of the forest park the system analysis method was used which is the most common method for recognition, evaluation and planning the land use. First, maps of slope, elevation and geographical directions were prepared using 1/25000digital topographic maps. Then, the map of environmental units was prepared by overlapping maps of slope, geographical directions, elevation, vegetation density and soil texture. The third step was to assess the ecological potential. Based on identified ecological characteristic, each unit was compared with the model of Makhdoom ecological tourism. Finally, the potential map of Bistoon forest park was prepared by comparison of all units with the model of Makhdoom ecological tourism and given the areas with intensive and extensive recreational potential, various kinds of activities were located on this map. The results showed that 15 percent of Bistoon forest park area has intensive recreational potential level 1, 50 percent has intensive recreational potential level 2, 18 percent has extensive recreational potential level 1, 9 percent has extensive recreational potential level 2 and 8 percent is considered conservation area. Based on these results half of Bistoon forest park area has intensive recreational potential level 2.
Key words :*Bistoon, Forest park, GIS, locating, potential identifying.*

INTRODUCTION

Housing and work space uniformity has increased the tendency of nature walking. Given the problems associated with today's mechanized life it can be said that today communities need more mental relaxation than ever. One of the most suitable environments to meet this need is forest parks. Then, the need to develop and create forest parks and natural resorts to attract tourists, increase revenue and preserve a resource is required [14].Today development of green spaces within and at the edges of the cities is considered one the best strategy which can play an important role in solving social and environmental problems through a long-term plan [26]. One of the important resources that can enhance the quality of recreation in a city is natural areas with few changes including forest parks [12]. For a continuum use of natural resources we need to identify the ecological potential. Evaluation of ecological potential means the recognition of the land potential in terms of possible and expected usages [1]. Assessment of ecological potential for different usages can be an effective step to evaluate the environmental and land use. However, natural forest parks are complex ecosystems which using dual and simultaneous goals of conservation and tourism in these parks are possible through a balanced relationship between human activities and the nature. Ecological potential assessment is a way of establishing this balance [15]. Importance of studying the capacity and facilities of development in terms of recreational, tourism and implementation of short-term and long-term programs in order to promote the physical, structure land environmental sufficiency and reduce the negative impacts of tourism

activities in the area and create economic- social benefits in local communities using the area facilities, capabilities and potentials are the necessities of this research.

The evaluation process of ecological power has been done manually without the use of powerful tools, which was very difficult, costly, time consuming with error. Today, the Geographic Information System(GIS) is considered as a powerful tool with high precision in identifying the resources and optimal analysis of usage. Today, by using GIS the combining of different ecological, economic and social data considering various conditions, time and cost is possible [18]. There are several studies in this field including [25] in Kslyan district, [23] in preserved area of Eshtarankoh, [21] in Abbasabad-Veresk, [11] in Sardasht, Dezfool, [15] in forest surrounding Zrybarpond. [7] in forest area of Eros Pine Grovein northeast of Turkey using weighted combination method, [9] in Hungary, Romania using GIS, [3] in mountainous region of midnapore to west Bengal using GIS and RS, [6] in Golcuk natural park using weighted combination method, [2] in national park of Askotysh using GIS, in Armenia using GIS evaluated the positive and negative recreation locations.

MATERIALS AND METHODS
Geographical location of the study area
study area
Bistoon is one of the parts of Harsin, Kermanshah. Minimum and maximum altitude above the sea is 1320 and 3358 m, respectively. Bistoon is in the center of this zone, about 30km northeast of the city of Harsin and is located between 47° 29' 45" east longitude and 34° 25' 35" north latitude, between Bistoon mountain and Gamasiab river, in the main way of center to west of the country. Bistoon is limited to historical part of Dinawar from north, to center part of Sahne city from east and to center part of Harsin city from south and west.
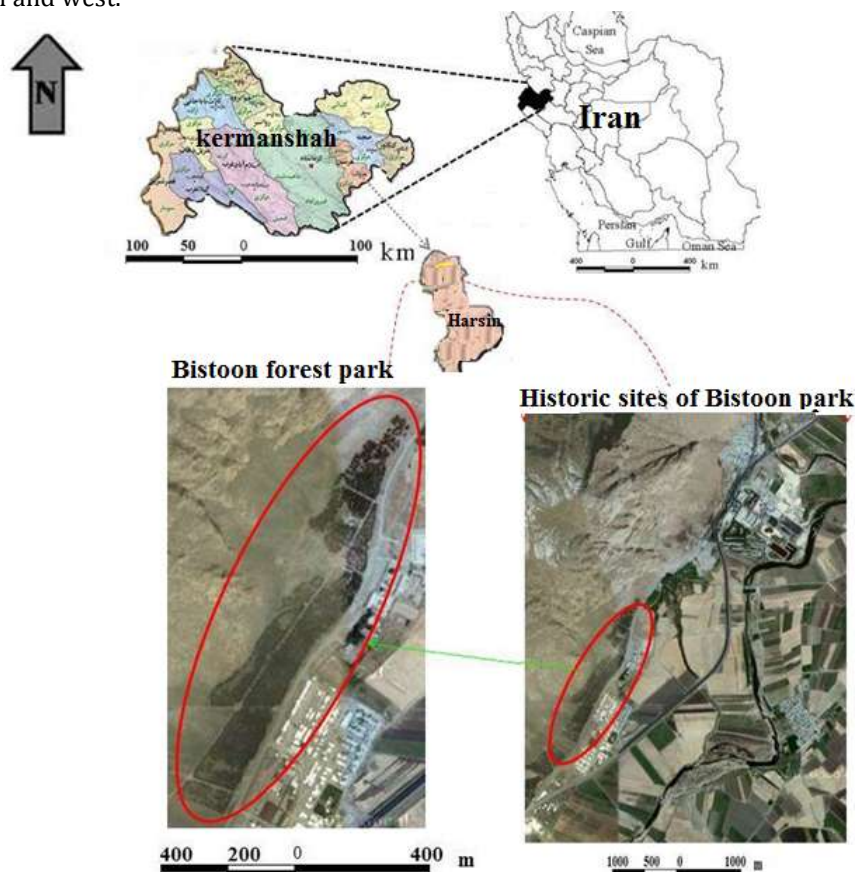
Figure 1. Overview of the position of Bistoon forest park

Methods
determining the potential of Bistoon forest park using system analysis
To evaluate the recreational potential of the forest park the system analysis method was used which is the most common method for recognition, evaluation and planning the land use. The first step was to identify the ecological resources. Ecological resources include physical resources(slope, aspect, elevation,

soil) and biological resources(vegetation). Maps of slope, elevation and geographical directions were prepared using 1/25000 digital to pographic maps. The second step was to analyze and summarize the resources which were done by overlapping maps of slope, geographical directions, elevation, vegetation density and soil texture and the map of environmental units was prepared. Based on identified ecological characteristic, each unit was compared with the model of Makhdoom ecological tourism [13].

Used maps
Forthis study, maps of 1/25000digital topographic, pedology and vegetation which were prepared form Natural Resources administration of Kermanshah, was used.

Used Software
To prepare, combine and overlap the maps, ArcGIS 9.3 software was used.

Potential map of Bistoon forest park
After overlapping maps of slope, aspect, elevation, soil texture, and vegetation according to the criteria of Makhdoom model, the recreational potential of Bistoon forest park was evaluated and the result was presented in Potential map of the park.

Determining method of the potential of Bistoon forest park
The assessment of recreational potential of the park has been done by comparison of existent resources in the study area(environmental unit characteristics) with Makhdoom ecological tourism model [13]. The characteristic of each unit of recreational potential map was compared with ecological model of intensive recreational level 1, intensive recreational level 2, extensive recreational level 1 and extensive recreational level 2. Each unit was assigned to the appropriate classes after identifying.

RESULTS
Environmental units map
Since in the system analysis method identifying the ecological resources ends to preparation of different ecological maps, the analysis is implemented on the map. After overlapping maps of slope, aspect, elevation, soil texture, and vegetation of the park according to the Makhdoom model criteria, the recreational potential had been evaluated and the result presented in potential map of the park. Each unit of this map has 5 parameters of slope, aspect, elevation, soil texture and vegetation. The results were prepared in potential map of the park in 5 classes (Figure2).
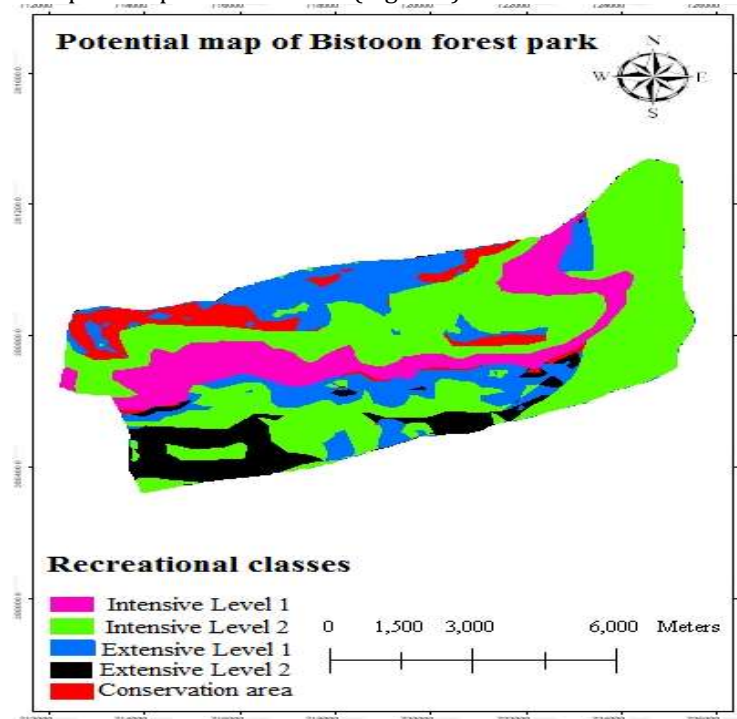

Figure 2: Potential map of Bistoon forest park

The results of figure 2 showed that 15 percent of Bistoon forest park area has intensive recreational potential level 1, 50 percent has intensive recreational potential level 2, 18 percent has extensive recreational potential level 1, 9 (%) has extensive recreational potential level 2 and 8 pe5rcent is

considered conservation area. Based on these results half of Bistoon forest park area has intensive recreational potential level 2 (Figure2).

Table1.Recreational classes of Bistoon forest park by systems analysis method

Classes	Area (%)	Area (ha)	Recreation
Class 1	15	1100	Intensive Level 1
Class 2	50	3570	Intensive Level 2
Class 3	18	1320	Extensive Level 1
Class 4	9	659	Extensive Level 2
Class 5	8	455	Conservation area
Total	100	7104	

Locating different tourism activities in Bistoon forest park
In recent decades rapid development of urbanization and urban common cities need to visit recreation areas cause the increasing in visitors to these area and forest parks. Due to Bistoon forest park location which is located near the historical area of Bistoon, it is considered one of the beautiful locations and tourist attractions in Kermanshah province. Regarding to the extensive visit, the park has no facilities for tourists. Since the necessary facilities for tourists need to establish at a place with high efficiency, therefore, the aim of this study to identify the best locations suitable for different recreational activities. According to the results of determining the recreational potential which were obtained using system analysis method, variety of recreational activities based on the study area condition were identified for different locations (Figure3).
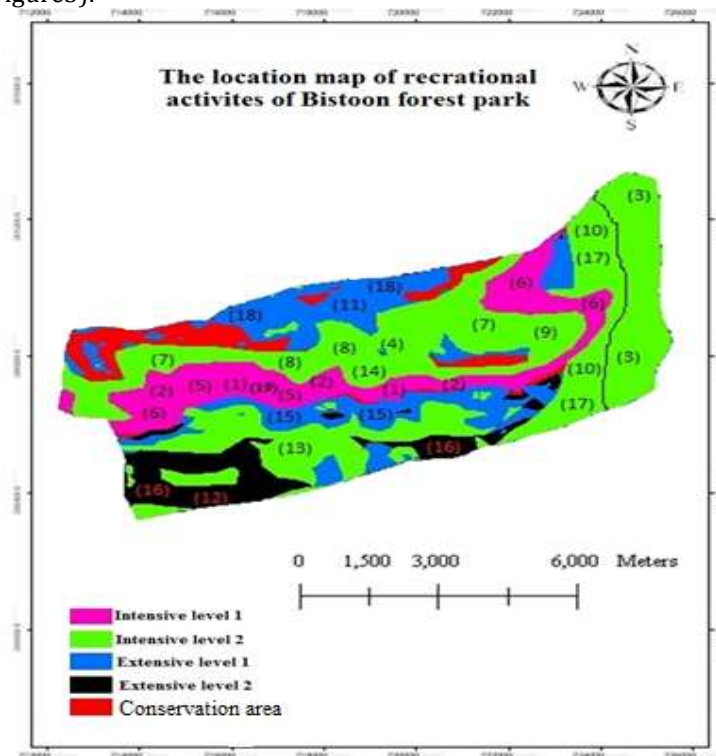

Figure3. The location map of different recreational activities in to Bistoon forest park

Various kinds of tourist activities according to the type and required area for Bistoon forest park are as following:
1- Create tree houses, alcoves, individual and group camping, rental rural house (Home stay) using close to nature structures. This could be done by determining physical structure of the paths and traditional houses and also using traditional materials. The area requiredfor such buildings is 15hectares.
2- 24hoursupermarket (hypermarket). Area required for this site is 3.5 ha.
3- Create commercial centers such as fuel stations, banks, agencies and organizations and manufacturing centers. Area required for this site is 7.5 ha.

4- Establish roofed amusement park that can be used in all seasons in an area which vegetation grow this very difficult or impossible. This amusement park is for children and adolescents who are interested in visiting these areas. The area required is 15hectares.
5- Considering that in the entire country particularly in Kermanshah, there are few winter recreational places therefore, a permanent place can be created for production and presentation and made services in Kermanshah and other provinces, so that in addition to represent making them visitors can also buy them. Such places are required 6 hectares.
6- Construct markets for traditional foods of Kermanshah and other provinces (variety of sweet, beverages and soups) and show the cooking way on traditional stoves and kitchen utensils served by people who have a traditional Kord covering. Also places for Fast Food and Slow Food. The area required is 5hectares.
7- Create a garden of native bird and wildlife habitat. Such places are required 10 hectares.
8- Establish places which are made of the close to nature structures for patients who want to spend the recovery time in a peaceful natural environment. An area of 2 hectares is required for these places.
9- Establish a cinematic town and three-dimensional shows (IMAX) for discharging the nonuse energy. Such places are required 2 hectares.
10- Establishment of building for exhibitions, meetings, traditional music, historical books, archaeology, anthropology at the provincial, national and international scale. An area of 5 hectares is required for these places.
11- Establishment of regional sport tourism, biking, four-wheeled, motorcycle-riding, parachuting, glider rides, balloon rides, golf, horse riding, car driving and play grounds. Such places are required 10 hectares.
12- Construction of a place as a park of people and nations and ancient monuments. An area of 4hectares is required for these places.
13- Establishment of a Botanical Garden, production and supply of medicinal plants, miniature plants(bonsai) and secondary products of forest, plants, fungi and bees. An area of 5 hectares is required for these places.
14- Construction of place to supply rural products such as animal products, horticultural and agricultural crops as well as a place to display agricultural instrument, spraying and environmental pollutant. The replaces are required 3 hectares.
15- Activities such as hiking, horseback riding, fishing
16- Rock and mountain climbing
17- Black tents erecting
18- Constructing a place for raising mushrooms, trees and honeybees
19- Construction of the cable car around the area and canopy walking, installation of powerful camera to observe remote areas and high altitudes. Length of 10,000 meters and a width of 6meters in an area of 6 hectares surrounding the area with intensive recreational potential level. By providing the required facilities by authorities and administrative organizations, economic prosperity and increasing tourism in the area can be seen.

DISCUSSION AND CONCLUSION
As explained earlier, to determine the potential of the study area with aim of determining different recreation (extensive and intensive) by overlapping maps of slope, aspect, elevation, soil texture, and vegetation, the final map of environmental units was obtained. Slope is one of the most important and limiting factors in recreational planning [13]. So areas with low slope are suitable for intensive recreation. Slope was the most important factor in this study as other ones which used Makhdoom model. Hence, form slope point Bistoon forest park is suitable for intensive recreation that is in agreement with [16], [24], [20].
Geographic aspects according to the conditions of different studies are one of the important parameters of decision-making for recreational activities indifferent seasons. The geographic aspects of the area were studied in four major aspects North-South-East and West. The results showed that the majority of the park area had southern aspect and given that Bistoon forest park is located at mountainous and relatively cold region then, is suitable for all types of winter recreation programs, which is in agreement with [10] that introduced southern and west as the dominant aspects at Ghorighaleh, Paveh.
The area topography is one of the factors aside from involving in initial assessment and site selection, should also be scrutinized in order to evaluate the potential of parks and recreation planning. 49 percent of the park area is located at the elevation of 1565 to 1193 m which is a proper height for intensive recreational level 1 and 2. The soil map of Bistoon forest park was prepared in 3 classes of sandyloam-

sandclay, clay and sandy–stone that majority of the park had sandy–stone texture (49%). As a result, Bistoon forest park has excellent conditions for a variety of extensive recreational programs. [19], [24]. Also stated that forests of Neka-Zalemrood and Shorab Khoramabad forest park were not suitable for intensive recreational due to lack of soil with proper texture and depth. While [20], notified that the study area was suitable for different recreational programs especially extensive ones due to the soil with proper texture and depth (deep loamy).

The results of the vegetation study indicated that 71% of the park area had medium and highdensity according to the tree species which were suitable for intensive recreational level 1 and 2 that were in agreement with [19], [20]. While [10] stated that intensive recreational level 1 was not possible due to the lack of suitable vegetation density. Final results of this study showed that Bistoon Forest Park has a high potential to develop and plan variety of recreational activities. The results of the system analysis indicated that 15 percent of Bistoon forest park area has intensive recreational potential level 1, 50 percent has intensive recreational potential level 2, 18 percent has extensive recreational potential level 1, 9 percent has extensive recreational potential level 2 and 8 percent is considered conservation area. Regarding to ecological tourism model of Makhdoom and the park conditions, Bistoon forest park is suitable for development of a variety of recreational programs considering physical parameters(slope, aspect, elevation) and biological parameters(vegetation density). Also, according to the results obtained from the final potential map and the area conditions almost all of the park area ecologically has a good potential for development of recreational activity. As the park is near to the historic area of Bistoon therefore, has the ability and potential to attract tourism. Nearly half of park area is proper for planning to deploy variety of intensive recreational activities. However, the application of this will be possible through a comprehensive plan.

Given that a wide area of the park has intensive recreational potential level 2, creating suitable places for camping using natural materials can be a desired goal hence, the intensive recreational region could be increased and attracted more tourists. Finally, we can conclude according to the results of the research and finding the right place we can achieve the most important objective of this study which is balanced distribution of tourists and preventing damage to the local park, thus introducing other unknown parts of the park that have the recreational and tourism potential.

According to the use of 5 ecological factors for determining potential of Bistoon forest park in this study, it is suggested to consider the factors of economic, social, noise pollution, access routes, neighboring villages and landscapes with ecological factors in evaluating of recreational potential of parks. It isalso recommended to prepare a questionnaire to learn the interests of local people for appropriate decision making and achieving better results in order to locate different tourism activities places.

REFERENCES

1. Al-Sheikh A, Jovzy S, Rezaeian S, (2006). The new model is designed to assess the cognitive ability of Iran to establish urban development land canvas and services. Geometrics Conference Proceedings, National Cartographic, p. 1-10.
2. Aminzadeh B, Ghorashi S, (2007). Scenic landscape quality and recreational activities in Natural Forest Park Iran.International Journal of Environment Research, 1(1):5-13.
3. Banerjee UK, kumaripaul SK, Sudhakar S, (2005). Remote sensing and GIS based ecotourism planning: A case study for western midnapore, west Bengal,India. Indian Institute of Technology, kharagpur, India, 11 pp.
4. BarzehkarGH, (2008). Guide toForestParkPlanning (The Thia practical buildings Management project Efficiency Natural parks). Ashkeghalam Publications, p.291.
5. Farajzadeh-Asl M, (2005). GIS and its application in tourism planning. Press Samt, Tehran, p. 147.
6. GulAM, Orucu K, Oznur K, (2006). An approach for recreation suitability analysis to recreation planning in Golcuk Nature Park.Journal of Environmental Management, 1: 606- 625.
7. Gülez S, Demirel O, (2004). An Evaluation method for the determination of forest recreation potential: A case study. Countryside Recreation, 12(3/4): 26-34.
8. Hathout S, (2002). The use of GIS for monitoring and predicting urban growth in East and West st Paul, Winnipeg, Manitoba, Canada. Journal Environment Management, 66: 229- 238.
9. Jolankai G, (2004). The Tisza River Project: Real-life scale integrated catchment models for supporting water- and environmental management decisions. Final report of the project for the overall duration, 01 January, December 2004, SECTION 6 report, p. 94.
10. Khalili Z, (2009). Determining the nature of the basin forest allotments teapot fortress city Paveh using GIS. MSc Thesis Sari Agricultural Science and Natural Resources University Faculty of Natural Resources, p.149.
11. Kia K, (2007). Assessing the ecological warfare Dezful region with emphasis on ecotourism attractions. MSc Thesis Assessment and land use planning, Islamic Azad University, Science and Research Branch, Ahvaz, p. 114.
12. Majnounian H, (1990). Treesand the Environment Publications Department of the Environment, Tehran, P.583.
13. Makhdoom M,(2006). Land use Foundation, Tehran University Publications, No. 2203, p.289.

14. Oladi J,(2006). Introduction to ecoturism.David A. Phenol. Publications University of Mazandaran, p. 382.
15. Rashidi A, Makhdoom M, Fedghi J, Sharifi M, (2010). Assessment Ecotourism in the forest around the pond Zrybar using geographical information system (GIS). Research environment, 1(2): 19-30.
16. Rezvanfar M, (2008). Recreational potential of GIS and RS technology using CHITGAR Forest Park, MSc Thesis university of Sari,p.94.
17. Samadi Z, FadzlinBakri A, Dom MM, Nikazhari NF, (2012). Spirit of Outdoor Spaces in between Urban Heritage Buildings, Procedia-Social and Behavioral Sciences, 42: 460–465.
18. Saroinsong F, Harass-hina M, Arifin K, Gandasasmita M, Sakamoto K, (2007). Practical application of a land resources information System for agricultural Langscape planning. Landscape and Urban Planning, 79(1): 38-52.
19. Shirvani Z, (2009). Ability of the great Forestry ProjectNeka-Zalemrood by using method analytical Hierarchy process (AHP).MSc Thesis Sari Agricultural Science and Natural Resources University, Faculty of Natural Resources, p.102.
20. Sohrab M, (2011). Zoning and Determining Spatial Preference Recreational Activity Using AHP Method, (Case study: Telar Forest Park in Qaemshahr).MSc Thesis Sari Agricultural Science and Natural Resources University Faculty of Natural Resources, p.130.
21. Taheri F, (2006). Polling places prone areas using GIS projects, hiking and RS. Case Study: Heather Abbasabad forest area. MSc Thesis Sari Agricultural Science and Natural Resources University Faculty of Natural Resources, p. 116.
22. Tahmorian F, (2007). Principles of Environmental Management. Printing. Press Isatis Fadak. Tehran, p. 212.
23. Torabi N, (2006). Planning the tourism development in conservation area of Eshtarankoh the model of ecology ecotourism for Iran with the help of RS, GIS and AHP. MSc Thesis, Environmental Faculty university of Tehran, p.94.
24. Yarahmadi M, (2010). Assessing recreational potential Khorram Abad Shorab forest park using GIS. MSc Thesis Sari Agricultural Science and Natural Resources University Faculty of Natural Resources, p. 102.
25. Yazdani-Prayy Z, (2003). Kslyan catchment land use planning with GIS. MSc Thesis Department of the Environment, Tehran, P. 161.
26. Yakhkshy A, (2003). Tehran Comprehensive Plan green belt. Tehran Parks and Green Space Organization, p. 139.