The analysis of ecotourism potential in Boujagh wetland with AHP method

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Abstract: Analysis of ecotourism potential can be the first step in identifying the potentials and limitations for the usage of deliberate and rational planning and tourism development of opportunities to create good atmosphere and one of the best ways for preventing the destruction of natural environments and helping their conservation. Boujagh wetlands which is located in Guilan and in the estuaries of Sefidrud, due to it's impressive variety of birds, beautiful landscapes, desirable climate, proximity to population centers and convenient access is hosted too many tourists annually. The research aims to identify opportunities and ecotourism potentials of Boujagh using AHP for the development of widespread and centralized tourism and helping to preserve the environment. Method based on hybrid methods, descriptive and analytical –and the AHP model. The results show that due to the preference criteria in the development of centralized ecotourism, 713/58 hectares of area equal to approximately 21% have desired power, 237/38 hectares,equivalent to approximately 7 percent have average power, and 2329 hectares, equivalent to approximately 67 percent have unfavorable power for development of centralized ecotourism. whole area according to the studying index has usability for widespread ecotourism.

[Bahman Ramezani Gourabi, Tayabeh Ghaeme Rad. **The analysis of ecotourism potential in Boujagh wetland with AHP method.** *Life Sci J* 2013;10(2s):251-258] (ISSN:1097-8135). http://www.lifesciencesite.com. 44

Key word: Ecotourism, Geographical information system (GIS), Analytical Hierarchy Process AHP, Boujagh wetlands

Introduction

Ecotourism which derives from two words ,ecology and tourism, is the kind of tourism that is related with natural and untouched environment and protected areas. Ecotourism is helping to preserve the ecosystem and respect to natural resources and indigenous values of local communities (Zahedi, 2006, p 25). Ecotourism has a non-consumption usage of wild life and natural resources, and indirectly is helping to protect the area and improve the economic situation of local people. However ,development of this type of tourism, regardless of their natural environment will be a factor for destruction of the environment .In this regard ,Seyyed Ali Joziin year 2009 in an article entitled: Assessing the ecological potential of Buolhasan area in Dezful used AHP and GIS method in order to establish User tourism By a multi-criteria decision making method, and with the help of hierarchical analysis and geographical information system evaluation criteria applied, and by using this method and transmission of data, status of ecological potential was shown on the map and the results of this study showed Which about 74/18% of the area have very good potential for widespread tourism, 18/21% with good power and 7/7% have unfavorable power and 32/87% with very good potential for centralized tourism, 15/6% with optimal power and 51/61% of the area have undesirable power (Jozi, 2009, p 71). Amino Mansir in year 2007, in an article entitled:"GIS and multi-criteria analysis" for proper planning of tourism has used AHP,MCDM and the MCA method with GIS and the region'Johorramsar' in Malaysia is examined. This article has reviewed the value and biodiversity wetland for conservation and development. Evaluation criteria included: age classes of trees, harvest season, the amount of plants exposure of danger of habitat in the vicinity in use of natural area/vegetation, habitat areas and water quality (Mansir, 2007, p1). Behnyafrin2010 in the article named zoning spatial planning in order to evaluate multi-agent and using AHP model to develop tourism in GIS environment based on variety data of the outside ,has provided a model for zoning spatial planning of tourism development based on the approach of multi-agent with the weighting parametric in AHP and spatial analysis in GIS for the Golmakan which according to its results12 percent of the basin possesses the ability for tourism development, 46 percent of the basin have the capability for development with respect to ecological aspects and 42 percent has diagnosed without the ability to tourism development (Behnyafar, 2010, p 3). Ahmad Sani's paper examined the possibility of ecological ecotourism activities in the northern Zagros forests using multi-criteria decision making, GIS and remote sensing in2011, according to the following criteria and ecological criteria that influence the widespread ecotourism and weightening them using hierarchical analysis method ,indicates appropriate areas for wide ecotourism, and finally concluded that from total area

of450.7883hectares,816 hectares for use of widespread ecotourism is in the first ,second and third priority. (Ahmady Sani, 2011 , p45).Erfani in year2011 in an article focused on the positioning for focused outing in the region named “Chah nimeh” (city of Zabol) using multivariate decision system, tried to zoning this region by Multivariate assessment method and based on the ecological criteria and some socio-economic criteria, including soil stability of geological formation, distance from surface water sources, slope, direction, vegetation cover, proximity to wetlands, distance from roads, distance from urban rural centers, distance from historical places, distance from political boundaries and distance from welfare facilities that at the end, 4 zones were identified for the outing in this area. (Erfani, 2011, p 41). Maghsudi in the year1390,in an article entitled ”potential assessment of Optimal development areas for Geo morphotorism” (case study: the region Maranjab at the area of theSaltLake)tried to accurately identify geomorphologic attractions for the development of geotourism and ecotourism in the area and in this regard,10questionnaires,by the Delphi method or expert questioner, was filled and achieved weights were entered into the layers of GIS to determine suitable locations by using Hierarchical analysis method ,so as a result, from 32000 hectares of the study area,32/1hectares have high potential, 8/3hectares have relative high potential, 8/5hectares have average potential, 46/1hectares have relatively low potential and 10/7hectares have low potential(Maghsudi, 2011, p 1).

Ecotourism offers a management approach to the country or region which can be mobilized for the conservation areas, participation of local residents, proper marketing places and etc .according to the Association ecotourism report ,today the 30 percent of all tourists are ecotourism .Thus the annual income of ecotourism in recent years have been the equivalent of $ 100 billion (Jozi, 2009, p 72).So the issue of ecotourism in terms of ,income generation , creating jobs, understanding cultures, build relationships and to protect the natural environment is impressive. In this regard, the use of proper planning with regard to the power of natural environment can improve the quality of tourism and its profit and prevent from any social, economic and environmental negative effects. Identifying the potential of ecotourism in the province Guilan where there is a set of different natural and landscapes, is important and development of this part of tourism sector cannot succeed without proper planning to achieve optimum use and lead to environmental degradation. In this case, wetlands because of their unparalleled beauty and the need for extensive protection are appropriate places for ecotourism development, because this way can prevent from the destruction of this important habitat and their power also can be used for tourism development and achieving these goals is possible only with the power assessment of these areas. This paper reviews the AHP model and also presents the ecotourism power of wetland Bujagh using this model.

Study area

”Boujagh National Park” is located in Guilan ,Astaneh Ashrafieh city and Kiashahr rural district .In terms of weather is placed in a very wet condition, with influences from the Caspian Sea.

It’s area is 3266/83hectares, and it’s geographical position is located between east longitude from 42 51 49 to 50 00 03and North latitude from 37 24 58 to 37 28 59.It’s distance from Astaneh is17 km (Figure 1). One of the important features of the park is including different ecosystems such as sea, rivers, estuaries, wetlands and pasture plain. In addition to the land ecosystems ,the national park area continues into the depth of 6 meters of the sea from the Coast fringes about a kilometer away(modified by Arabani, 2005, Volume IV, p 741).In the year 1998,according to the official ad number 123357,the wetland area located in the east of Sefidrud with an area of 800 hectares based on the environmental protection and improving law in order to supply the security of habitat and improve living condition, has been under the Environmental Protection organization for 5 years entitled as" no hunting zone". In 1381 the region including Sefidrud, Boujagh wetlands in the east and lagoons at Kiashahr in the west including some parts of the Caspian sea water area with an area of 3266/83hectares was approved as Boujagh national parks .This area is the coastal marine area with fresh water to brackish with forested land covered with aquatic and pasture plants and is the appropriate place for about 50 types of migratory birds for spending winter and breeding of native aquatic birds, the impressive variety Of birds, beautiful landscapes, respective climate, proximity to population centers and appropriate access are considerable ecotourism potential for this area (Figure 2).

Data and Methods

Data relating to the Climate about Boujagh national park area was extracted through the weather yearbooks, environmental resources maps were used in decision-making process. To determine the optimal capacity of natural areas for centralized and widespread ecotourism, Analytical Hierarchy Process AHP, software named ”Expert choice 11” and geographic information systems GIS have been used. The process of Hierarchy analyses, convert difficult and complex issues to a simple form then solve them. The AHP process begins by placing the desired components in a hierarchical structure, and then the

paired comparisons of the components of each level based on higher level criteria will be done. These comparisons continue till finding the appropriate weights and combining them. Then the compatibility and relationship of these variables are measured. Generally the AHP method has certain steps. However, in the various issues are different. AHP process is as follows: 1. Define the problem, specify the desired options and solutions.

2.Arrange Hierarchy of problem from the highest level up to anywhere which solution is possible.

3.Form a matrix structure for comparison weights of each component than others. In this matrix, the components of the pair are compared to the higher level. This matrix is such that when a component compares to the other and its weight's determined than other criteria in terms of numbers (quality), the inverse of the number is entered into this matrix. This inverse number is the result of paired comparisons of the two criteria, but unlike the previous case has been compared. Judgments needed to create third step matrices are determined in this process. In these comparisons, the decision makers will use orally judgment, so that if the element with element be compared decision maker states that the importance of i than j is one of the matters in table1 which converted to a quality value between 1 to 9 by Saaty.(Ghodsy Poor, 2010, pp.13) 4.After doing paired comparisons and extract the desired data and entering their inverse into the matrix, the priorities fully achieved and their compatibility is calculated.

5.The final weight will be calculated through the composition of the weights of hierarchy of elements with that weights for the criteria. 6.Examine the compatibility of the results for the hierarchy and the adaptation rate is calculated that this rate should be10 percent or less. If this ratio is more than ten percent, the data must be re-examined. (December,2007, pp.135). Software named" Expert choice11" is one of the powerful and reliable software for multi-criteria assessment that is endorsed and supported by Thomas L. (The founder of AHP method)and has many features including sensitivity analysis, a group decision and etc. (Nykmardan, 2007, page1).GIS were used to provide maps related to the region's environmental resources and digital maps such as slope, direction, vegetation, water resources and soil texture were provided using basic 1:25000 maps with the same coordinate system in UTM in the environment of Arc GIS 9.2 software. Also this software was used for integration of plans by method of Analysis Tools> Overlay> Union and separating areas based on environmental capabilities by combining layers with using" Field Calculator" tools.

Table 1: values of preferences for paired Comparison (Ghodsy Poor, 2010, pp.14)

Preferences(oral judgments)	Value
Extremely Preferred	9
Very Strongly Preferred	7
Strongly Preferred	5
Moderately Preferred	3
Equally Preferred	1
Preferences between the above intervals	2,4,6,8

Figure 1: The National Park area Boujagh Kiashahr-Guilan

Figure 2: View of wetlands Boujagh Kiashahr-Guilan

Table 2: Hierarchical structure of centralized ecotourism

Goal	Criteria	Following criteria	Option
Suitable location for development of centralized ecotourism	Number of sunny days	Favorable:> 15 days at month	Favorable
		Intermediate: 7-15 days at month	
		Unfavorable: Less than 7 days at month	
	Average of daily temperature	Favorable: 21-25 degree	
		Intermediate: 21-30 degree	
		Unfavorable: less than 21 and more than 30 degree	
	Relative humidity	Favorable:50-70%	
		Intermediate:30-50%	
		Unfavorable:<30%	Intermediate
	slope	Favorable:0-5%	
		Intermediate:5-15%	
		Unfavorable:>15%	
	Direction	Favorable: eastern (summer), southern (winter)	
		Intermediate: northern (summer), western (winter)	
		Unfavorable: southern and western (summer and spring), eastern and northern(winter)	
	Soil texture	Favorable: loam	
		Intermediate: sandy, sandy loam, loam sandy	Unfavorable
		Unfavorable: Heavy clay- soils Hydromoref	
	Water resources	Favorable:40-150 liters a day per person	
		Intermediate:12-40 liters a day per person	
		Unfavorable: >5 liters a day per person	
	Vegetation density	Favorable:40-80%	
		Intermediate:20-40%	
		Unfavorable:>80%	

Table 3: Hierarchical structure of widespread Ecotourism

Goal	Criteria	Following criteria	Option
Suitable location for development of Widespread ecotourism	The number of sunny days	Favorable:>15 days at month	Favorable
		Intermediate:7-15 days at month	
		Unfavorable: Less than 7 days at month	
	Average of daily temperature	Favorable:21-25 degree	
		Intermediate:21-30 degree	
		Unfavorable: less than 21 and more than 30 degree	Intermediate
	Relative Humidity	Favorable:50-70%	
		Intermediate:30-50%	
		Unfavorable:<30%	
	slope	Favorable:0-25%	
		Intermediate:25-50%	Unfavorable
		Unfavorable:>50%	
	Water resources	Favorable:5-12 liters a day per person	

		Intermediate: 5 liters a day per person	
		Unfavorable:<5 liter a day per person	

Results

First of all the basic criteria with respect to the important indicators in ecotourism and also Makhdoom ecological model, were determined in both groups of physical and chemical criteria such as :the number of sunny days, the mean daily temperature, relative humidity, slope , direction, soil texture, water resources and ecological criteria of vegetation density for centralized ecotourism and average temperature ,number of sunny days, slope, water resources and the determination of relative humidity for Widespread ecotourism ,and according to the options and following criteria which were defined in three level of favorable, intermediate and unfavorable, the hierarchical structure for both widespread and centralized ecotourism was formed (table 2.3), then weighting and paired comparisons based on oral judgments were done.Weighting here is relative and it's to determine the degree of importance of criteria. Weighting was taken based on the paired comparisons and the 9 spectrum of Saaty, and finally the final weight of the options was set so more weight for each the incompatibility of the matrix during their formation was considered less than 0/1option shows more importance of it(Figure 3 and4). All these steps were performed using 11 Expert choice software and After determining the final weights for criteria ,these weights were given to the information layers of the region's maps and with integration method a unit map was obtained then combined weighted was done and the regions were classified to the three area named favorable , intermediate and unfavorable based on the assigned weights, for the spread and centralized ecotourism focused. Because wetlands Boujagh has slope less than 5 percent and according to the slope it should classified in to the flat areas ,so usage of slope maps and consequently geographic ones has no scientific justification.

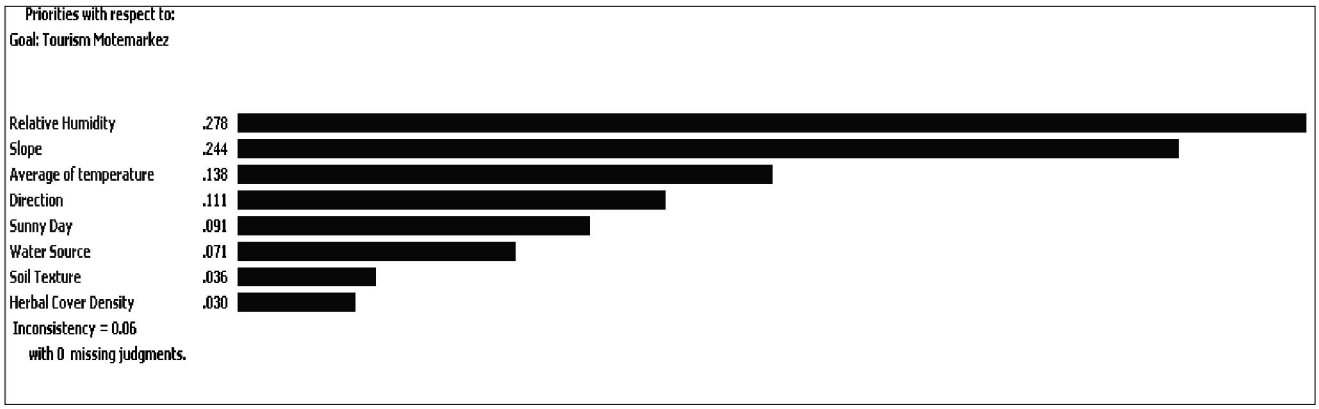

Figure 3: prioritization widespread ecotourism criteria based on the weight of each criterion in the EC software environment

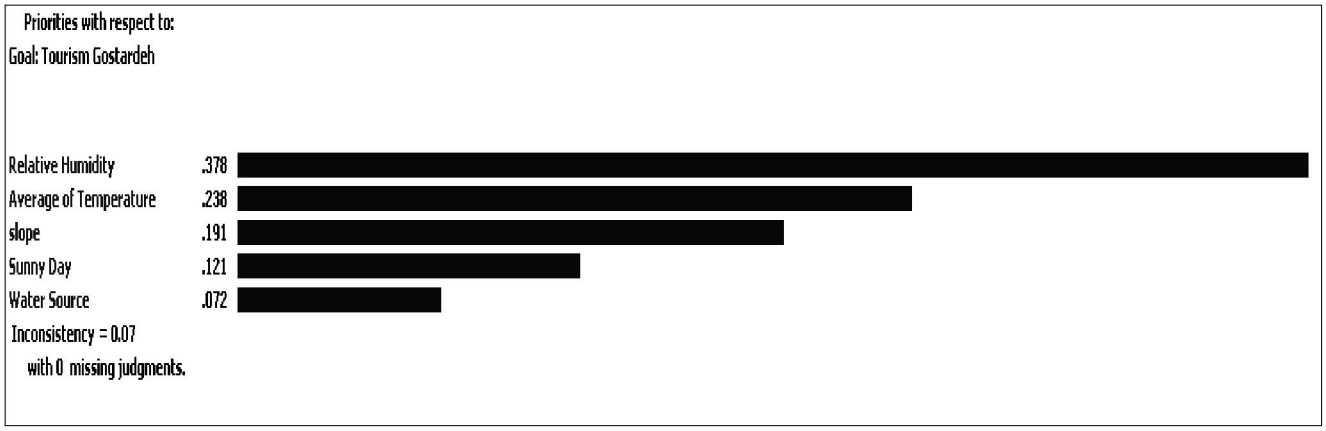

Figure 4: prioritization centralized ecotourism criteria based on the weight of each criterion in the EC software environment

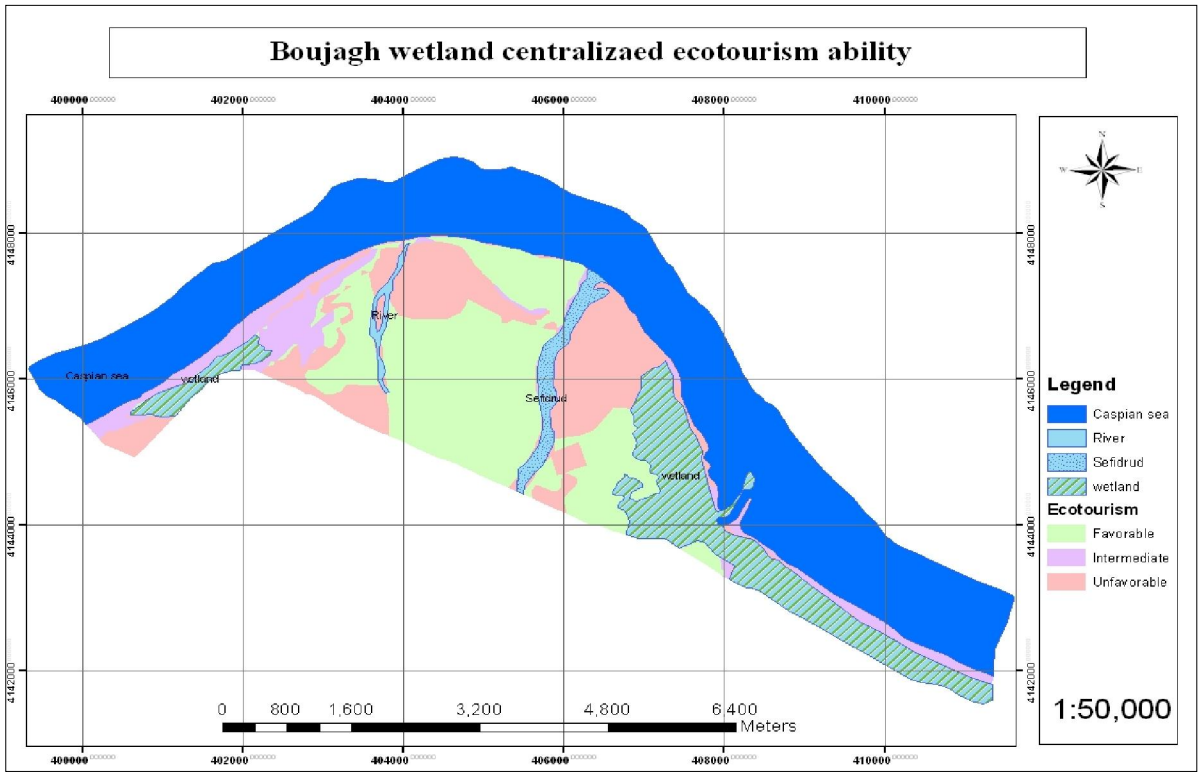

Figure 5: The wetland centralized ecotourism Boujagh –Kiashahr

This area due to a part of the Sefidrud river and underground water resources, has no limitation in order to supply water needed for widespread and centralized ecotourism. However, if these water resources are going to be used for drinking ,it needs some activities to reduce concentrations of some elements and improve quality. The area has been classified in three groups according to the soil unit, as follows:

1.The soil unit 1,is a deep soil which is made on the alluvial deposits of river Sefidrud with layers of different texture. horizon unit,A1,is dark brown with moderate texture and mass building which has set on the horizon textured loam sandy, loam and sandy loam and has moderate to good drainage capabilities.

2.The soil unit 2, is a deep soil which has a medium texture and weak structure in the surface horizon and is on the horizon with a very heavy texture and a cubic structure and has the ability to produce fairly highrunoff.

3.The soil unit3, This unit of deep soil, with coarse soil texture, with outbuilding is made up on the beach of Caspian coast. Profile of the soil below its horizon also has a coarse texture with no building .It has good drainage and high discharge.The vegetation cover of the area is separable into different kinds of grassland, tamarisk habitat, planting forests, plains vegetation areas, coastal wetlands, sandy beach, the marginal and open water. That can be used with respect to the status of the area and purpose of use with corrective actions. According to the weather statistics, “Boujagh” at the relative humidity over the range of different months are in the range 71 to 80 percent. And this value in the months of June, July are in the acceptable range. Average monthly temperatures in the months June, July, August and September is in the appropriate range about 21 to25°C and for the other months are located in an inappropriate range.The number of sunny days for the months June, July, August ,September ,October is appropriate. As a result, according to these three parameters mentioned, there is extensive usability and focus for ecotourism in the months of June and July. Finally, consolidated map obtained which shows the appropriate locations for development of Centralized ecotourism (Figure 5). In relation to widespread ecotourism because it was possible to use a map only to measure the slope and the slope of the region has been determined below 5 percent which will set in the plain floor, it is practically impossible to use consolidation of maps and obtain an unit map like centralized ecotourism and the whole area could be used for this type of tourism.

Conclusion

The results show that, respect to the preferences of criteria in the development of centralized ecotourism, 713/58 hectares of area equivalent to approximately21% have desired power, 237/38hectares equivalent to approximately 7 percent have average power, and 2329 hectares, equivalent to approximately 67%have undesired power in order to develop concentrated ecotourism .The total area ,respect to the Studying criteria in widespread ecotourism, has the usability in this purpose. It should be noted that this survey has been done with regard to the importance of bench marks in ecotourism and the conservation of flora and fauna considerations have not been specifically considered.

Suggestions

1. Effective advertising for introducing the region to people who are interested in ecotourism.
2. Creation of appropriate infrastructure facilities in order to prevented structure of the natural environment.
3. Local people's awareness to protect the area's natural features as a source of income through tourism development.
4. Provide brochures, maps and information about the importance of maintenance and conservation of the area for the continuing and appropriate usage.
5. Create special places to provide explanations and to familiarize tourists with the native animals and plants of the area and their health biological business benefits.
6. Establishing appropriate and equipped monitoring stations for tourists and researchers to see the bird and animals of the region.
7. Create one-way roads (one input and one output) to minimize traffic into the park and preserve peace and environmental health.
8. Continuous and effective monitoring for environment and tourists to prevent degradation of environment.
9. Create appropriate opportunities respect to the wetland environment for boating, so do not cause biological animals.
10. Create big models of the regions which are not accusable for the tourist because of the protection as attractive effectors in tourism.

Notes

1. Universal Transverse Mercator (UTM)
2. Analytical Hierarchy Process (AHP)
3. Geographic Information System (GIS)

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1/7/2013