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Hoda Akbari Qoochani[1]
Mahdi Fattahi Moghadam[2]
Hossein Aqajani[3]
Mohammad Reza Fattahi Moghadam[4]

Site Suitability Evaluation for Ecotourism Using GIS Fuzzy Multi-Criteria Decision A Case Study Of Mashhad County

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Introduction

The industry of tourism growth in countries like Iran, which has got a high power of tourism, can be an effective tool in improving economical and social condition in national and in further and fare distribution of national per capital income. Eco-tourism has got a powerful relationship with sustainable tourism. Sustainable eco-tourism is a positive method to reduce the tension and existent which has been evolved by the mutual effects of tourism industry and visitor, environment and host societies. This can be determined by criteria near indicators which basically is a concept of developed and sustainable eco-tourism management in the collection of principals, rules and indicators. The Geographical Information Systems are used to identify the appropriate place and availability of resources due to environmental concerns. GIS can play an important role to identify the areas which are original.

1- M.A of rural planning.
2- M.Sc of Remote Sensing and GIS.
3- Academic Stuff of urban planning.
4- Department of Horticulture and landscape design - Associate Professor-University Of Tehran.

However, a basic problem in decision making issues is that how to extract the relative weight of the criteria.

One popular method of estimating weight is AHP. This method consists of some levels such as the hierarchical structure, determining the relative weight of criteria and sub-criteria. Determining the resources weight of each option and the final weight.

Nowadays, eco-tourism is one of the fast developing parts of tourism industry. Because of the fact that people are travelling to natural places and they desire to enjoy the sceneries, wild life, plants, …. These actions had a little effect on the environment and the natural resources. The goal of this study is to identify the potential appropriate places of eco-tourism with the use of Fuzzy method in GIS environment and according to the sustainable developing goals in Mashhad.

Material and Methods

The research method in this study is descriptive analytical using quantitative models in which the socio-economic and environmental factors have been used as the effective criteria in the assessment of the suitable ecotourism sites. After the data (the maps and descriptive information) had been prepared, the information was rated for using in models with the help of Spatial Analyst in ArcGIS 10.1 by using vector to raster structure. In IDRISI software, the layers were standardized by the use of Fuzzy membership functions. Then the layers were integrated and combined according to computed weights in AHP and WLC methods.

Discussion and Conclusions

- Determining the factors and classifying the criteria

In this study, the factors such as natural landscape, wildlife, topography and access features were determined as the suitable indicator for Mashhad dry eco-system. Ecotourism sites assessment is done on the basis of eight criteria including: vision, land use, storage-treatment, elevation, slope, proximity to cultural areas, and

distance from roads and population density. The investigating and gaining the required information (the maps and biological data) and determining the classification of criteria is done by the use of experts' ideas related to Environmental Protection organization.

Achievements and discussion

The results of the evaluation of potential position of places of current situation for ecotourism (in the city of Mashhad) show that these places haven't had a balanced spatial distribution at the region. Based on the results obtained and in accordance with Figure 5, the area has been classified in four groups:

Table5. The extent of four classified groups in square kilometers

Area km^2	**classification**
0/09	(0.2-0.25) inappropriate
2508.35	(0.25-0.45) Quite Inappropriate
7237.23	(0.45-0.69) Quite appropriate
579.580	(0.69-1) Totally appropriate

It has to be said that a large part of the study area in terms of ecotourism is located in relatively good group which indicates the presence of the potential in the city of Mashhad in the field of tourism. In terms of priority and according to the considered parameters, the western half of the city in terms of tourism development has got a better position relative to its eastern half.

Conclusion

This study presents a comprehensive approach to the development of ecotourism by identifying ecotourism sites and useful method for assessing the sustainability of ecotourism in accordance with regional characteristics with appropriate features for

ecotourism. Given the nature of this place, having fuzzy nature of the parameters affecting the positioning and dealing with many factors it is possible to use GIS and fuzzy logic for decision making with the multi-criteria decision-making methods to gain optimal decisions. This practical paper provides using fuzzy multi-criteria assessment and AHP in GIS environment to evaluate suitable sites for ecotourism in the city of Mashhad. The results show that the goal of this method is not only to find an optimal solution. Another strong point of this method includes the ability to unify homogenous data sets, such as qualitative and quantitative criteria using specialized knowledge, to implement a decision. It should be noted that this method of exploitation of natural resources and mapping is also used by recreational tourism that can provide a basic step in sustainable environment development in relation to tourism.