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Zoning the Potential Areas for Nature-based Tourism Using GIS: A Case Study of Isfahan Province

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Abstract
The present study intended to determine the priority areas for nature-based tourism in Isfahan province, Iran. Considering the components in question, this study was applied-developmental in nature and its methodology was descriptive-survey based on a systematic analysis of the potentials utilization, potential assessment and identification of priority areas and their combination. To carry out the assessment, the natural tourism attractions were ranked in terms of three variables, namely number of attractions, level of performance (national, local and international) and level of access (pedestrian vs. car). As the findings of the study indicated, the Southern and Western regions of Isfahan Province were of the greatest potential for natural tourism. For ranking purpose, Isfahan Province was divided into 5 categories and it was found that Semirom, Chadegan, Fereydunshahr and Fereydan counties scored the highest; hence, these counties can be considered as the priority areas for nature-based tourism development. The study on the potential assessment of Isfahan Province in terms of nature-based tourism development revealed that based on the assigned scores, approximately up to %15.18 and %11.78 of the natural tourism attractions existing in this province are located in the Semirom and Fereydunshahr counties, respectively. Accordingly, it can be claimed that these two counties are of paramount significance as the two axial nature-based tourism priority areas in Isfahan Province. As a result, nature-based tourism can be considered as one of the most important development areas for these two counties.

Key Words: *nature-based tourism, Geography Information System (GIS), Isfahan province*

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1- Introduction

Tourism is the world's third greatest economy (ICOM, WFFM/FMAM, 2007). Due to its productive practices and hence, its role in increasing employment opportunities directly and indirectly, this industry is economically significant (Coccossis, 2008, Constantin and Mitrut, 2008). Furthermore, tourism brings some social benefits for both the tourists and the local residents while tourist mobility promotes cultural exchange (Besculides et al., 2002, Craik, 1995). Tourism places some secondary effects on the social-economic sections promoting the development of the infrastructures and public services (Fletcher, 2000, Gibson et al, 2003).

Generally, the demand side for nature-based tourism is exceeding its supply side; hence, it has created new challenges for tourism planning and research authorities (Juric et al., 2002). As some researchers argue, the amount of growth of the nature-based tourism is estimated to be annually %10-20 exceeding the growth level of tourism on the whole (Mehmetoglu, 2007; Juric et al, 2002). The real rate of growth in this area is uncertain with the estimations varied between 5% and 33% of the total number of the world passengers (Juric et al, 2002). Although natural tourism and ecotourism have been transformed into domains with a high growth rate in the tourism industry, these sections still account for a small portion of the total number of visitors (Ziffer, 1989; Juric et al., 2002).

Nature-based tourism refers to a form of tourism which mainly relies on the relatively undeveloped natural environments for their attractions (Goodwin, 1996 as cited in Wurzinger and Johansen, 2006; Ceballous-Lascurain, 1996). This category of tourism is mainly related to the direct pleasure derived from intact natural phenomena (Valentine, 1992).

As a sub-category of nature-based tourism, eco-tourism (ecology-based tourism) can be defined as a responsible travel to the natural areas with the aim of lowering the tourism negative environmental impacts and providing significant economic opportunities for the local residents (Wurzinger and Johansson, 2006; Khan, 1997, TIES, 2006, Wunder, 2000).

Nature-based tourism can positively contribute to the development of the local community economy bringing considerable benefits for the host economies (Hill et al., 2006, Mehmetoglu, 2007). The economic advantages resulting from nature-based tourism include: providing employment opportunities at the local level, the revenues resulting from tourism, the improvement of the infrastructures and finally, foreign exchange (Lai and Nepal, 2006). Nature-based tourism acts as the link factor between wildlife protection and economic development. A number of researchers believe that nature-based tourism makes the efficient use of all the resources a day-to-day process providing some incentives for protecting relatively intact natural systems especially in the developing countries (Cater, 1994; Khan, 1997; Tsar, Lin & Lin, 2005; Campbell, 2002, Wunder, 2000, Kiss, 2004). The profits resulting from nature-based tourism protection depend on the substitution of the productive activities with the aim of decreasing the pressure placed on the resources through creating a reliable and sustainable income resource (Wunder, 2000). Despite this, some individuals require multiple income resources for satisfying their requirements, while some others can earn their livelihood only by the incomes obtained from nature-based tourism business. In locations where just a few number of the society members have access to the nature-based tourism revenues, hindering the local people from involving in heavy exploitation of the resources in a small-scale is not enough for environment protection (Daffi, 2000 as cited in Pretty and Smith, 2004; Langholz, 1999).

In addition to man-made capital (i.e. built infrastructures) and natural capital (i.e. natural resources and valuable species) reservoirs, re-

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gional development is also dependent on the human resources (professional skills, training and education) and social capital (Hall and Boyd, 2005: 4). Human and social capitals are among the critical requirements of the sustainable nature-based tourism. They are not the consequence of the development but in fact its prerequisite (Hall and Boyd, 200: 4) contributing positively to the formation of other kinds of capitals like particular aspects of transformation of natural environment into tourist services (Hall and Boyd, 2005: 4).

Nature-based tourism planning is deemed as the first step for the natural resources management enterprise on the base of tourism perspective in which the priority areas for tourist planning are identified (Habibi et al, 2011: 13). Natural and land resources are taken into account for the extensive types of tourism (Maqsudi et al, 2010: 2).

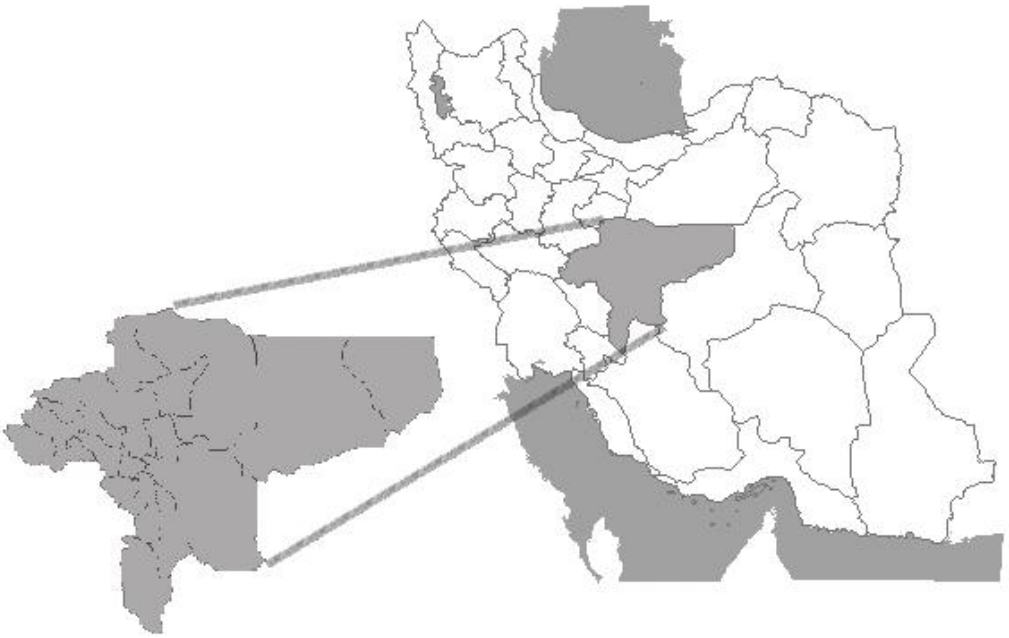
Without recognizing and identifying the potentiality in every region, tourism planning will be impossible. In fact, recognizing the potentiality of every region enables the researcher to identify the areas appropriate for development as well as its direction based on the existing status and potential of the region (Taghvaei et al, 2011:151). The first step in putting the economic wheels in motion is to identify and introduce the existing potentials through an all-encompassing recognition and planning. In this way, it is possible to make the necessary arrangements for the economic productivity (Sayyed Alipour and Eghbali, 2010: 43).

Methodology

Considering the components in question, this research was applied-developmental in nature and its methodology was descriptive-field study based on a systematic analysis on potential exploitation, potential assessment, determining priority areas and their combining and integration. To carry out the assessment, the nature-based tourism attractions were ranked based on three variables i.e. the number of attractions, the level of performance (national, local and international) and level of access (pedestrian vs. car).

Introducing the region under research

Covering an area of 107019 square km, Isfahan Province lies between 30 degree 43' to 43 degree 34' N and 49 degree 38' to 55 degree 32' E of Greenwich Meridian. This province is located in the center of Iran and To



Map no.1. Geographical Location of Isfahan Province

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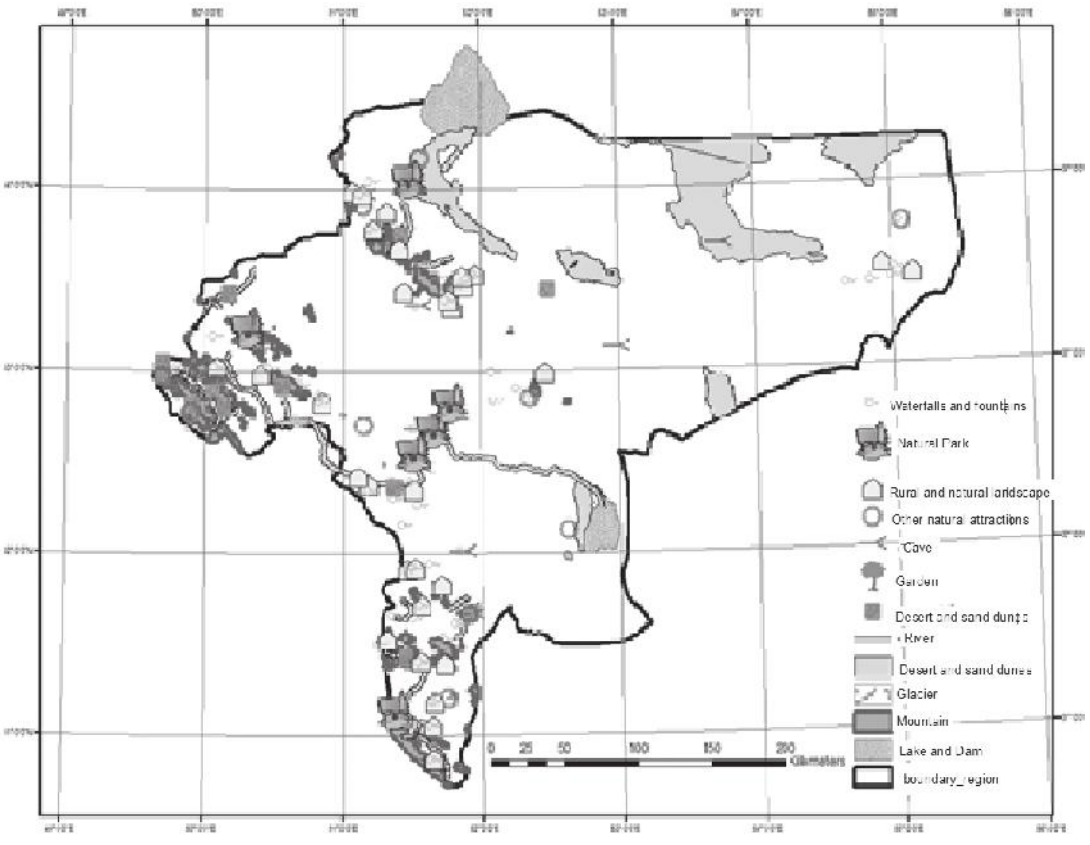
its north, it is bordered by Markazi, Qom and Semnan provinces, to its south, by the provinces of Fars, and Kohgiluyeh and Boyer-Ahmad, to the east, by the province of Yazd and finally, to the west, by the provinces of Lurestan and Chahar Mahal and Bakhtiyari. Based on the newest national land division of Iran in 2011, this Province consists of 23 counties, 104 cities, 45 districts and 124 villages with its capital the city of Isfahan (Isfahan Statistical Yearbook).

Materials and Method

This study was based on a systematic analysis on the environmental potential exploitation, potential assessment, priority areas identification and combination. The data aggregation and analysis and putting different data layers all together have been carried out by applying a systematic method in the Software ArcGIS.

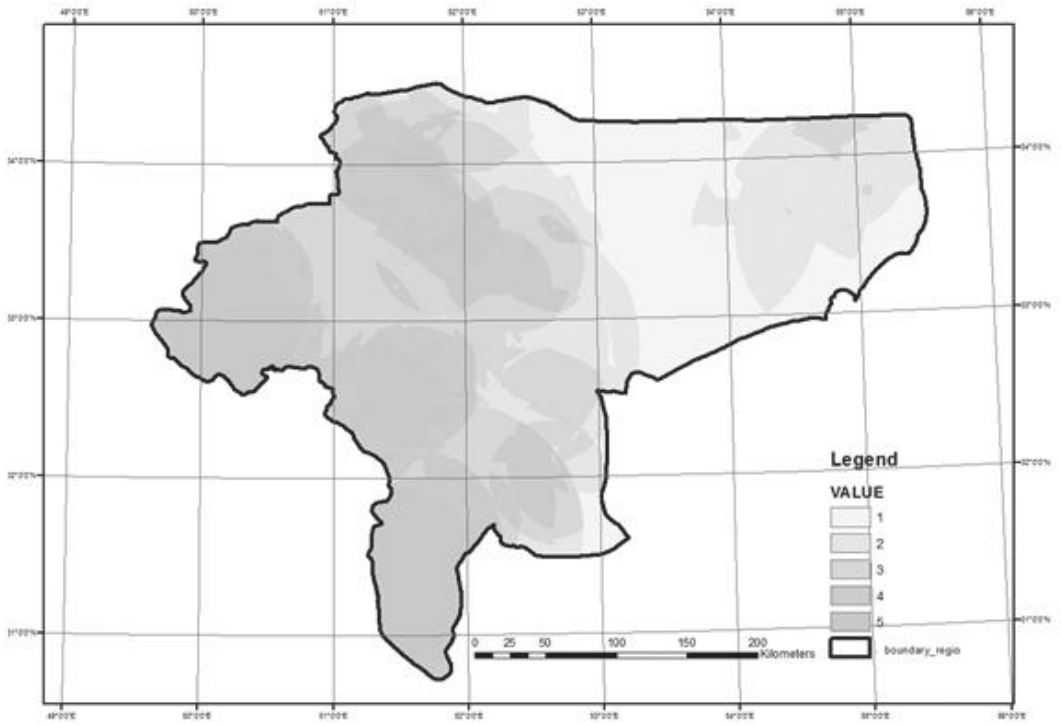
To conduct the research, firstly, the required relevant data about the region were extracted from Iran's Central Bureaus of Census & Statistics, Cultural Heritage Organization and Isfahan's Handcrafts and Tourism Organization. Secondly, identification of the tourist resources was done by producing the following maps: urban natural parks distribution, desert and sand hills distribution, the jungle and plain distribution, river, lake and dike distribution, waterfalls and spring distribution, strait, mountains and valley distribution, village and natural landscape distribution, cave distribution, garden and farm distribution, ice mountains distribution, other natural attractions distribution as well as the distribution map of the residential places located near to the natural attractions.

In this research buffering method was used for determining the level of access. For pedestrian access, the buffer distance values were 1, 4 and 6 km, 1 km distance for the attractions located inside or outside a village or outside a



Map no.2- The Distribution of Natural Attractions in Isfahan Province

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Map no.3. Natural Attractions of Isfahan Province in Terms of the Number of Attractions and the Levels of Access and Performance

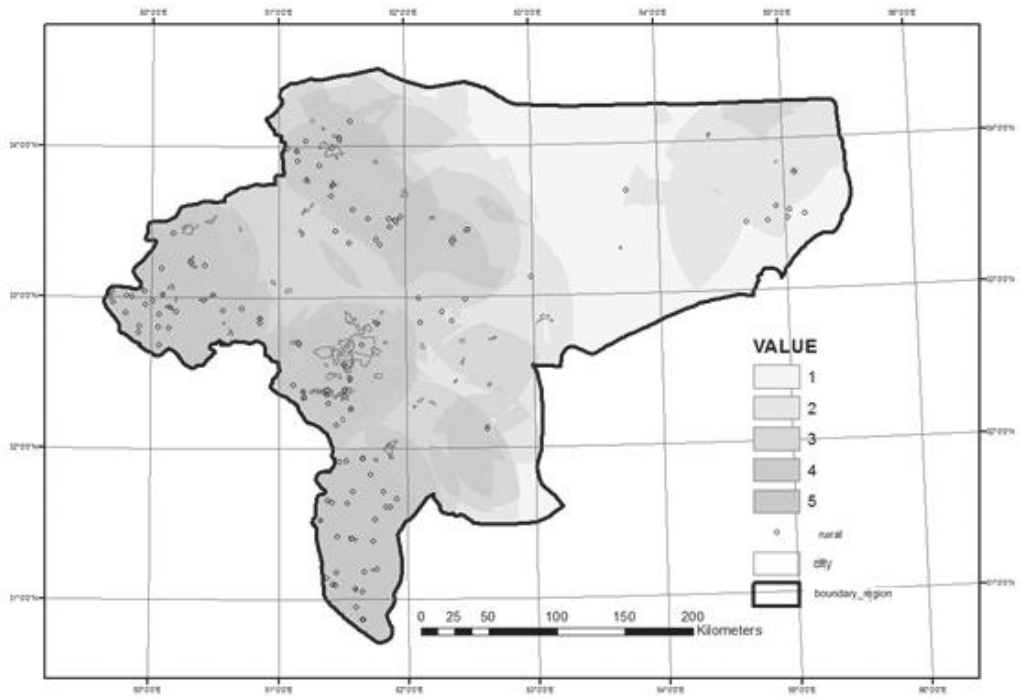
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city, 4 km distance for the attractions located inside small and medium-sized cities and 6 km distance for the attractions located inside big cities. The buffer distance measures used for car-based access were 50, 49 and 90 km. Again here, 90 km was for point attractions located inside a village or outside a village or city, 50 km for point attractions inside the small and medium-sized cities and 90 km for poly line and polygon attractions residing within the boundary of small and medium-sized cities or villages or outside a village or city and 40 km for point, poly line and polygon attractions located inside big cities. Afterwards, different data layers were scored and a map was created for them so as to prepare the gathered data for creating tourism potential map. In Software ArcGIS, each layer of the map has a table. These tables represent the characteristics of tourist attractions in order to make them ready for analysis. To do so, each natural attraction is ranked in terms of the number of attractions, the level of performance (national, local and international) and level of access (pedestrian vs. car). The natural attractions are displayed on the map in three ways i.e. point, poly-line and polygon. The scores for access level and performance level varied between 5 and 10 and between 1 and 5, respectively.

To produce the map for nature-based tourism capacity, it is necessary to combine the maps related to the urban natural parks, dessert and sand hills, jungle and plain, rivers, lakes and dams, waterfalls and fountains, strait, ice mountains, mountains and valleys, villages and natural landscapes, caves, gardens and fields, natural refrigerators and other natural attractive places which are in fact its analyzed constituents (figure no. 3). To integrate the forgoing maps, the Iranian researchers in the environment analysis field use overlay method.

Overlaying the maps is performed in two ways: 1) bi-combination method and 2) multi-combination method. In this study, the multi-

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Map no.4- The Overlapping of the prioritized layers of the natural attractions and urban and rural areas

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combination has been used. After overlaying the above created maps, the map for nature-based tourism potential has been created (figure no. 3). In software ArcGIS, the shared areas are automatically determined by the overlay of several maps. Of course, it is noteworthy that before maps overlay and analysis, the user must specify his/her conditions for the software so that the software can perform the analysis and determine the shared areas and create the map on the basis of these parameters.

Discussion

Based on the assigned scores (map no.4), Isfahan Province has been divided into 5 categories with Semirom, Fereydunshahr, Fereydan, Khansar,Chadegan and Dehaghan counties scored the highest. These counties widely lie as two concentrated points to the Southwestern and West of Isfahan Province. The Southwestern area covers Semirom county especially Dangezlu, Noghl, Khefer, Sivar, Mandegan, Sarbaz Kifte Govisin, Ghale Sangi, Roud Abad, Bi bi Seydan, Ab Malakh, Ghabr Kikha, Garamuk, Aghdash, Kezen, Cheshmeh Sard, Shams Abad villages and cities including Semirom, Vanak and Komeh, the villages of Fereydunshahr county including Khosh Miveh, Chaghirut, Sibak, Meidanak Bozorg, Surshejan, Ghahshejan, Pashandegan, Gurab, Milajerd and Fereydunshahr city, the villages of Fereydan county including Noghan Olya and Ofus and its cities including Buein va Miyandasht, Daran and Damaneh, Khansar county's villages including Tidejan, Ghudejan, Hasan Abad and Lahijan and Khansar city gained the highest scores in these two areas.

The southern side of Dehaghan county including Hamgin, Dizaj and Surmandeh villages, the southern side of the Shahreza county including Esfarjan and Hunjan villages, the Mobarakeh county including its Arazi, Kushkijeh, Barchan, Baghmalek villages and Dizicheh city and the North of Mobarakeh city, Vanshan village in the Golpayegan county, Sahr and Firuzan and Bijgerd villages and Pirbakran and Falavarjan cities in the Falavarjan county, Ghale and Amiriyeh villages and Dorcheh and Khomeinishahr cities in the Khomeinishahr county, the western and

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southern areas of Isfahan city in the Isfahan county and the northern zone of Varnamkhast and the southern area of Zarrinshahr in the Lenjan county gained the highest scores as non-spread zones.

Aggregation of the data is in fact the most important and the most difficult stage in the assessment process, since after this stage, assessment process is easily performed. During assessment process, the potentiality for nature-based tourism, environment capabilities and priority rural and urban areas for nature-based tourism development purposes are displayed on the map. At the end of this stage, the assessor can measure the "potential capacity of the area".

Conclusion

Based on the data obtained in the analysis stage, the assessment results can be presented in a classified format. Each class possesses its own specific features. To get a better picture of the potential of the region and assess the rural and urban residential in terms of nature-based tourism using the maps created for natural attractions of Isfahan Province based on the level of access and combination of the layers related to the rural and urban areas on the foregoing maps, the status of natural attractions in terms of potential nature-based tourism was explored. As map no. 4 indicates, for assessment purpose, Isfahan province has been divided into five divisions and as it can be seen in the results, divisions 1 and 2 lack nature tourism capacity, divisions 3 and 4 are close to attractions and division 5 is of the highest potential for the development of nature-based tourism.

Based on the findings of the study, there is the possibility of developing nature-based tourism activities in Isfahan Province and consequently its towns and urban and rural areas. The research on the potential assessment of Isfahan Province in terms of natural tourism development revealed that the most common tourism potentials available in Semirom and Fereydunshahr are of nature-based tourism kind. In more detail, based on the given scores, %92.06 and %68.18 of the potential tourism of these two towns belong to the nature-based tourism. Accordingly, they enjoy the highest frequency and a good position in the Isfahan Province as far as nature-based tourism is concerned. On the other hand, Semirom and Fereydunshahr counties possessed %15.18 and %11.78 of the nature-based tourism attractions, although they accounted for only %14.38 of the total area of the Province.

Tourism potential assessment of the region and the association between this assessment and residencies resulted from the overlay of the maps related to this region's villages and priority areas map (figure 4) revealed that more than %90 of rural and urban regions in these two counties are of high potential, fit for tourism development or located near the regions with high nature-based tourism potential.

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