Potential Assessment of Nature-Based Tourism Destinations Using MCA Techniques (Case Study: Lavasan-e Koochak)

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Introduction

Nature has always offered a variety of resources for tourism in different areas. Proper understanding of the nature, significance and importance of these resources are essential for decision makers at all levels to make appropriate plans for improving the ecotourism in the regions. These plans should consider the compatibility of tourism developments to ecological potentials of land. The aim of this research is to evaluate the potentials of tourism development in Lavasan-e Kouchak region based on an integrated evaluation of resources offered in the area. Lavasan-e Kouchak is a rural region located in the north eastern side of Tehran. It is extended on the basins of Lar and Latian lakes, consisting of 6 sub watersheds or hydrological units; Khoskeh-Rood, Khersang, Barge Jahan, Kond, Afjeh and Ghoochak. The three preserved National Parks of Varjin, Jajrood and Lar has increased the ecotourism attraction of the region. Moreover, along with interesting rural visions, the rich biodiversity of plants and animals, abundance of natural springs, 3500m high peak, waterfalls, possibilities of sport ecotourism such as skiing, water sports, climbing and geotourism, provide a high potential for natural tourism in the region. At lower altitudes (1400-1800m), the city of Lavasan and the Latian dam reservoir are located. The mid-level areas (1800-2500m) involve all villages and agricultural lands and gardens while climbing and preserved zones are the only tourism potentials of the high and completely mountainous areas (2500-4000m).

Materials and Methods

In order to achieve the objectives of the research, first, several evaluation criteria were established based on the natural and environmental characteristics of the study area. Then fifteen main indicators were selected among these criteria for the evaluations. These include eight for natural and cultural attraction, one for access, two for facilities, three for local communities, and two for the risk of natural disasters. The selected evaluation criteria should be simultaneously investigated for each of the six sub watersheds. For this purpose, the weighted linear combination method (WLC) of Malczewski (1385) was applied. At the next step, the relative importance of each criterion was weighted and prioritized. In addition, the magnitude of each criterion was also measured in each watershed. Then the weighted criteria were multiplied by its contradictory measure in each sub watershed. To obtain a more detailed answer, the most effective criteria for managing ecotourism potentials of the region were determined through the principal component analysis (PCA). PCA involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components.

The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible.

In the next step, the similarity of sub watersheds, regarding to the evaluation criteria, were investigated through the cluster analysis.

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Discussion of Results

The total score or value of each sub watershed indicated their relative land capability and priority for ecotourism development based on the defined criteria. Analysis results showed that Ghoochak had the highest score and therefore it should have the first priority for the development of ecotourism in Lavasan-e kouchak region. Following that, Afjeh and Kond equally stand in the second place. Barge Jahan was in the third place, while Khoskeh-Rood and Khersang watersheds were respectively in the fourth and fifth priorities (fig. 1).
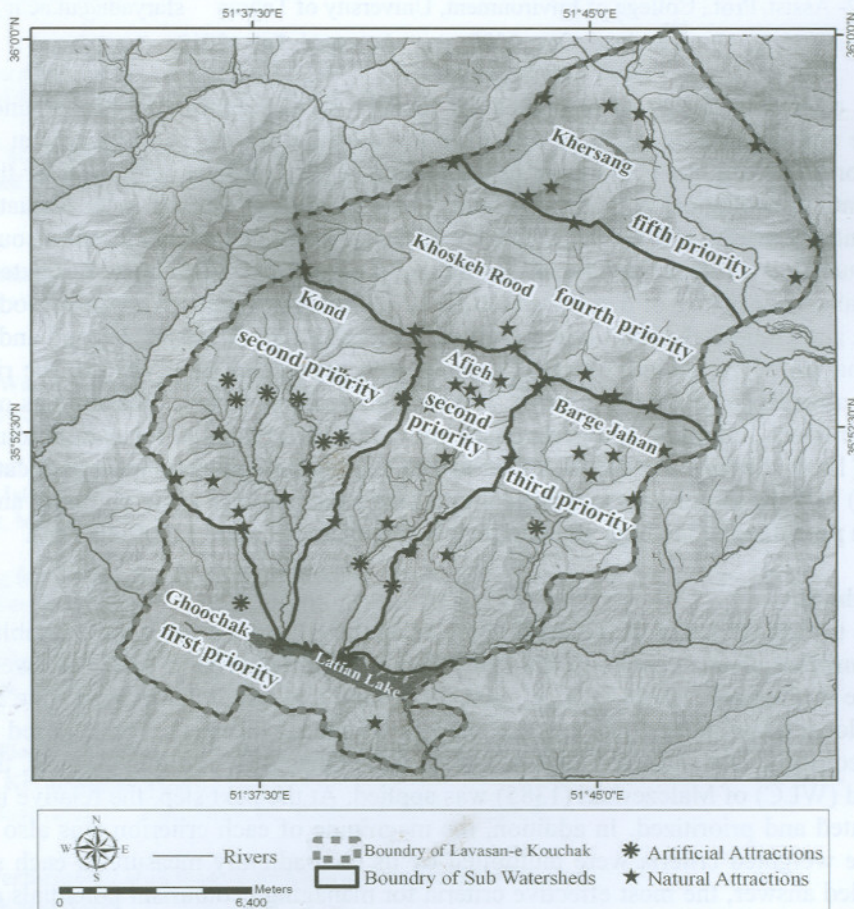

Fig. 1: Prioritizing of Lavasan-e Kouchak's sub watersheds by application of MCA Technique

The results of principal component analysis showed that ecotourism attractions, facilities and local communities are the most important criteria for the formation of the first component with a variance of 64.7%. After that, access and risk of natural disasters with a variance of 26.9% are the most important measures for the formation of the second component (fig.2). It should also be specified that all of the defined criteria are essential for creating a successful tourism industry in the region. The results of cluster analysis showed that Ghoochak, Afjeh and Kond stand in one group, whereas Khoskeh-Rood and Khersang stand in the other group and finally the Barge Jahan stands alone in the next group (fig.3).

These results suggest that the six sub watersheds could not be managed and utilized through the same development program, and at least three different development programs are required to manage a sustainable ecotourism development in different areas of the region.
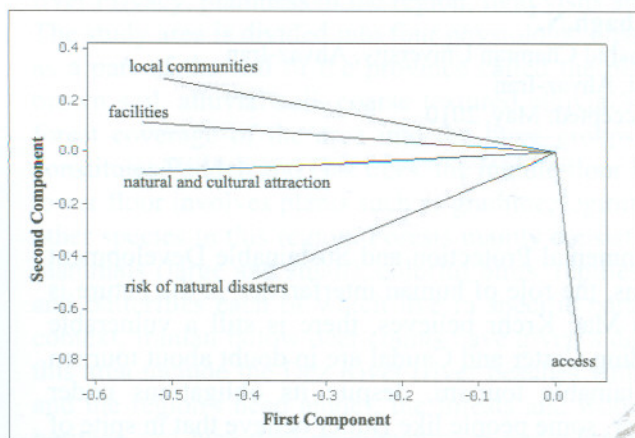

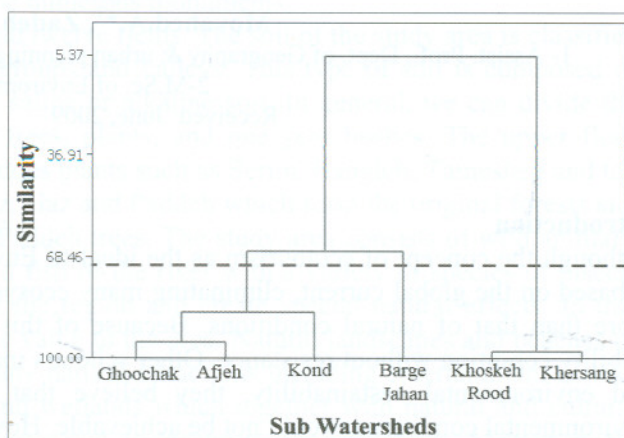Fig. 2: Impact of criteria in production of the first and second component

Fig. 3: Results of cluster analysis

Conclusions

Evaluation and prioritization of the environmental criteria are very elusive tasks which usually tag behind the qualified decision making methods. In this research, a number of simple and effective analytical techniques were applied in order to identify both the quality and quantity of natural resource of tourism in the case study area. Creating fractional gauges for environmental measurements and evaluations made the algebraic operation of data possible via linear and statistical methods. Simultaneously developing quantified criteria based on a logical comparison, such as the length of roads for each sub watershed compared to the total roads in the rural district, the total number of attractions in each sub watershed compared to the whole region, the old landslide areas in each sub watershed compared to the total area of vulnerable areas in rural district, and so on can lead to a more quantified reasoning in environmental evaluations. In a collective way, these methods and techniques were used to determine the most effective criteria for ecotourism developments in the region, and therefore increased the accuracy of decision making process for prioritizing the watersheds. Consequently these results may help optimize the allocations of tourism facilities and investigations within the region.

It is expected that the research methods and criteria suggested by this work can be easily applied to other case studies while some of the ecotourism development criteria may require alterations based on the differences between time and places of them.

Key words

Nature-based tourism, Multi Criteria Analysis, Weighted Linear Combination, Principal Component Analysis and Cluster Analysis.