



Research Paper

## Evaluation of the ecological capability of Haftad-Gholleh protected area in order to upgrade higher level of conservation to National Park and Biosphere Reserve

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### ABSTRACT

Evaluation of land ecological capability to achieve the planned objectives according to the IUCN, protected areas must be zoned in the process of evaluation of environmental capabilities. This study was done to determine the ecological capability of Haftad-Gholleh protected area in order to upgrade higher level of conservation to National Park and Biosphere Reserve by compilation of systemic analysis and MCDA methods. In this regard, we used Analytical Network Process (ANP) method by using Super Decisions software, with 11 alternatives, 3 criteria, and 10 sub-criteria. In order to achieve it, 508 environment units in the area were achieved with preparing the map of stable and unstable ecological resources, and socioeconomic resources of the area and its analysis and concluding by GIS (scale 1: 25,000). The maps of ecological potential were prepared by comparing the homogeneous units with the special ecological model of the area, and then, with the integration of units with the same usage, a first base map of zoning and eventually the final zoning map with prioritizing and organizing the primary zones as the units of planning was prepared. The results showed that the percentages of the restricted nature zones, the protected zone, the extensive recreation zone, the concentrated recreation zone, the recovery zone, the other uses zone and the special use zone, also the percentages of the core zone, buffer zone and transition zone are 53.63% (62884.5hectares), 27.10% (31764.42 hectares), 4% (4697.28 hectares), 0.27% (326.04 hectares), 0.10% (114.6 hectares), 14.98% (17565.17 hectares), 15.67%, 39.84 %, and 44.57%, respectively. Accordingly, the Haftad-Gholleh area has the minimum zone required to upgrade to a national park and biosphere reserve.

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## Extended Abstract

### Introduction

Evaluation of land ecological capability to achieve the planned objectives according to the IUCN, protected areas must be zoned in the process of evaluation of environmental capabilities. For this purpose, it is also necessary to consider the land potential. In order to comply with the sustainable development goal, it is worth using the capabilities of GIS to increase the speed and accuracy of the environmental assessment. In this study, the capabilities of Haftad-Gholleh protected area are processed to determine the National Park and Biosphere Reserve. This research used ANP as a powerful multicriteria decision-making method.

### Methodology

Haftad-Gholleh National Park, with an area of 117252.27 ha, is situated 25 km east of the city of Arak and 15 km to southwest of Mahallat. It fits within the latitudinal and longitudinal bounds of 37° to 38° N and 40° to 44° 20' E, respectively. The mean annual precipitation is 349 mm, and temperature fluctuations range from -30°C to 38°C. The park was designated as a hunting-prohibited area in 1974 under the protection of the Department of Environment. The most important mountain range in the area is the Haftad-Gholleh Mountains. Barfshah Mountain, with a height of 2993m, is the highest summit. Chekab and Sibak are among the most important valleys having springs used as water sources by wild animals. Haftad-Gholleh National Park is the only main protected territory in Markazi Province, which has been declared as a conservation area for the protection of wild goats and wild sheep. This area's most important wildlife includes wild goats, sheep, cats, caracals, Persian leopards, grey wolves, badgers, and hedgehogs. In Haftad-Gholleh National Park, the wild goat is one of the species with considerable conservation importance; the wild goat of Haftad-Gholleh is known as a symbol of the biodiversity of Markazi Province. This study determined the ecological capability of Haftad-Gholleh protected area to

upgrade a higher level of conservation to the National Park and Biosphere Reserve by compiling systemic analysis and MCDA methods. In this regard, we used Analytical Network Process (ANP) method by using Super Decisions software, with 11 alternatives, 3 criteria, and 10 sub-criteria. In order to achieve it, 508 environment units in the area were achieved by preparing the map of stable and unstable ecological resources and socioeconomic resources of the area and its analysis and concluding by GIS (scale 1: 25,000). First, all the necessary information and essential maps were collected. After that, based on Makhdoom's ecological model for Iran, all the layers were evaluated. Then, the maps of ecological potential were prepared by comparing the homogeneous units with special ecological model of the area, and then with the integration of units with the same usage, a first base map of zoning, and eventually the final zoning map with prioritizing and organizing the primary zones as the units of planning was prepared.

### Results and discussion

Haftad-Gholleh area is due to the diversity of animals and plants and the dispersion of valuable species of different subspecies of wild sheep, goat, Persian leopard, houbara, Persian gazelle, and Fritillaria. The area percentage of severe protection restriction (core 1) is 53.63%, and the protection area (core 2) 27.10% should be considered one of the four national park categories. The total of the above two zones is 80.73% of the total area in the Haftad-Gholleh protected area. This amount is even higher than the total safe and protective zones of Kavir National Park, which is equivalent to 49.6% in terms of percentage. and having the minimum area required for national parks 1, 2, 3, 4, and 3 areas of the biosphere reserve, so there is a need to upgrade the area to a national park and biosphere reserve. There are 7 zones (1, 2, 3, 4, 5, 6, and 8). The largest area is for zone 1 (53.63%) and zone 5 (0.10%). According to the results, the percentages of the restricted nature zones, the protected zone, the extensive recreation zone, the concentrated recreation zone, the recovery zone, the

other uses zone, and the special use zone, also the percentages of the core zone, buffer zone and transition zone are 53.63% (62884.5hectares), 27.10% (31764.42 hectares), 4% (4697.28 hectares), 0.27% (326.04 hectares), 0.10% (114.6 hectares), 14.98% (17565.17 hectares), 15.67%, 39.84 %, and 44.57%, respectively.

### **Conclusion**

Accordingly, due to the large extent of the protection zone, Haftad-Gholleh area has a high conservation value. The Haftad-Gholleh area has the minimum zone required to upgrade to a national park and biosphere reserve.

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### **Authors' Contribution**

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### **Conflict of Interest**

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