Wildlife Habitats Suitability Modelling using Fuzzy Inference System: A Case Study of Persian Leopard (*Panthera pardus saxicolor*) in Shimbar Protected Area

Z. Obeidavi[1*], K. Rangzan[1], R. Mirzaei[2], M. Kabolizade[1] and A. Amini[3]

(Received: Dec. 21-2015; Accepted: Apr. 9-2017)

Abstract

Several modelling techniques have been developed for habitat suitability modelling. In the meantime, the Fuzzy Inference System (FIS) with ability to model uncertainty of input variables is an effective method to model wildlife species habitat suitability. So, Persian Leopard habitat suitability was predicted in Shimbar Protected Area using FIS. Therefore, the effective environmental variables were determined. We also defined and determined the linguistic variables, linguistic values, and range of them. Then, we designed the membership functions of the fuzzy sets of the input and output variables. Also, the definition of the fuzzy rules in the system was performed. Finally, the defuzzification of output was carried out. The accuracy of the predictive model was tested using AUC. Also, 11 FISs were developed to determine sensitivity of the models and important variables in modelling. The results showed that the predictive model was more efficient than the random model (AUC=0.960). In addition, the 'distance to capra' was the most important predictor. According to the success of FIS in Persian Leopard habitat suitability modelling, we suggest this method to improve and complete the existing spatial information of wildlife habitats in Iran, especially about regions and species that have been less studied.

Keywords: Fuzzy inference system, Habitat suitability modelling, *Panthera pardus saxicolor*.

1. Dept. of Remote Sensing and Geographic Information System, Faculty of Earth Sci, Shahid Chamran Univ. of Ahvaz, Ahvaz, Iran.
2. Dept. of Environ., Faculty of Natur. Resour. and Earth Sci., Univ. of Kashan, Kashan, Iran.
3. Wildlife Monitoring Natur. Environ. Group, Dept. of Environ. Khuzestan Province, Iran.
*: Corresponding Author, Email: z.obeidavi@gmail.com