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Evaluation of Gazella subgutturosa Habitat and Presentation of its Utility Model at Mouteh Wildlife Refuge

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Extended Abstract

Introduction: Effective management and protection of wildlife populations depends on human understanding of the relationship between wildlife populations and habitats. The destruction and fragmentation of habitats reduces the living area of local communities, limits them to small habitats, and isolates wildlife populations, leading to increased intra-reproductions, reduced genetic diversity, and eventually the increased risk of extinction in the long run. Therefore, habitat optimization modeling techniques have been developed based on the analysis of the relationship between species and habitat to determine the range of species' distribution and habitat suitability which is required for the preservation and management of populations, especially the endangered species.

The *Gazella subgutturosa* is currently protected by the Iranian organization for environmental protection and placed as the vulnerable class in the Red List of IUCN. Characterized by special natural features, Monteh Wildlife Refuge is regarded as one of the best protected habitats for *Gazella Subgutturosa*. In fact, it is considered as one of the richest habitats in the Middle East in terms of wildlife diversity and the high number of animal species living there, making this biologic field seem much more

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important.

This study sought to evaluate the *Gazella subguruttosa's* habitat in Moteh Wildlife and present a desirability model in this regard, trying to identify optimal habitats for *Gazella subgutturosa* in the region, determine the factors involved in the desirability of such habitats, and discover its limiting and threatening factors. The *Gazella subgutturosa* habitat threatened the area. Thus, to reduce the interference of human activities with the wildlife activities, it is necessary to identify and preserve areas that are more important in terms of preservation by preparing a map of habitat desirability. This helps identify the most destructive and threatening factors to the habitat and target species, and prevent the reduction of the target population by controlling and eliminating such factors.

Materials and Methods: with an area of 205,000 hectares, the Moteh Wildlife Refuge is located in the northwest of Isfahan province, having a cold or semi-arid cold climate. Having surveyed the region in spring, summer and autumn of 2018, this study recorded the presence points of *Gazella subgutturosa* species in Moteh Wildlife Refuge via direct and indirect observation (the dung and footprints), using the Global Positioning System. Following the review of the related literature and interviews with experts and Moteh Wildlife Refuge's park rangers, 12 variables were identified, all of which were analyzed in terms of correlation with each other before starting modeling. As for analyzing the data correlation, six environmental variables including maps of distance from rangelands, slop, distance from waterways, distance from agricultural lands, distance from main roads, and distance from mines were selected. The map the desirability of *Gazella subgutturosa* habitat was, then, developed based on the presence points of the *Gazella* and environmental variables, presented in two classes of desirable and undesirable. Moreover, the MaxEnt model was validated via the area below the curve which shows the probability of discernment between the points of presence and absence of a model.

Results: According to the results of the response curves, *Gazella subgutturosa* prefers areas far from mines and agricultural lands which are near water resources and rangelands, and areas with low slope. The level below the curve was found to be 0.92, indicating that the model worked well. According to the table obtained from MaxEnt, the most important factor in selecting the Monteh wildlife Refuge as the *Gazella subgutturosa* habitat is its distance from the rangelands, with 33.3% contribution and 36.3% effect coefficient, with the habitat's desirability considerably decreasing with an increase in distance from the rangelands, followed by slope, waterways, agricultural lands, roads, and mines as other variables involved in this regard. The Jack Naif's chart shows that distance from wetlands alone greatly contributed to modeling. The results of the classification of the habitat's desirability model show that 40240 hectares, equivalent to 19.7% of Monteh Wildlife Refuge are classifies as desirable in terms of the *Gazella subgutturosa* habitat's desirability, and 164102 hectares, equivalent to 80.3%, are placed in the undesirable class.

Discussion and Conclusion: In this study, the AUC value was found to be 0.92, indicating a very good performance of the model. Moreover, distance from the rangelands was identified as the most important factor in the desirability of the *Gazella subgutturosa* habitat, with the habitat's desirability considerably decreasing with an increase in distance from the rangelands. The findings also suggested that *Gazella subguruttosa* prefers areas near the rivers. The results of other studies also indicate the high

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importance of water resources for *Gazella subgutturosa* species. In general, monitoring and careful management of water resources, preventing the advancement of mines, and controlling the entry of domestic livestock to prevent the destruction of regional vegetation are some important measures that should be carried out in managing the habitat of this species.

Keywords: Habitat Utility, *Gazella subgutturosa*, Mouteh Wildlife Refuge, Species Management.