A Study on the Feasibility of Establishing a Habitat Corridor for Large Herbivores between Mooteh and Ghameshloo Wildlife Refuges, Esfahan Province, Iran

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ABSTRACT

The objective of this study was to identify migration routes of Esfahan Wild Sheep (*Ovis ommon esfahanica*) ,Persian Gazelle (*Gazella subgutturosa*),and Mountain Goat (*Capra aegagrus*) between Mooteh and Ghameshloo wildlife refuges in order to establish a protected corridor. We hoped that this task would assist us in filling up the existing gaps in protected area-system and conserve metapopulation of these umbrella species. We profited by concepts and methods of Landscape Ecology in this study. We began the preliminary work by collecting vegetation and topographic information of the study area, and observed the movement of large mammals in several stations along the corridor. We then entered the data into the Geographical Information System (GIS) for mapping purposes. The results show that the lack of a protected corridor has reduced the connectivity of populations. We found that wild sheep were more migratory than gazelles, and that the mountain goats did not migrate between the areas. Furthermore, a small resident population was also observed. So the boundaries of the corridor were identified to enable animal migrations, as well as supporting the local populations. We recommend that the area should be considered as Population Assisting Link (PAL) and protected as free hunting zone.

Key-Words: Corridor, Migration Routes, Metapopulation, Population Assisting Links, Large Herbivores, Landscape Ecology.

INTRODUCTION

Nowadays biodiversity is threatened even in protected areas; long-term protection of many natural habitats is threatened due to isolation and segregation. Seasonal migration of different species makes it difficult to protect all areas needed by these species. Therefore, it seems necessary to protect the corridors between the protected areas These corridors ease the protection, migration and free pass of animals, and decrease inbreeding and genetic drift; hence increasing the stability of populations and ecosystems.

This study aims at identifying the migration routes of large herbivores, between Mooteh and Ghameshloo wildlife refuges in order to create a protected corridor to control the migration routes and as a result protecting the metapopulations ,and also expansion and completion of protected areas of Esfahan province. Mooteh wildlife

refuge (220,000 ha) in the north of Esfahan, and *Ghameshloo* wildlife refuge:(85,750 ha) in the north west of Esfahan, are among the best protected habitats for Persian Gazelle *(Gazella subguttorosa)* and Esfahan Wild Sheep *(Ovis ommon esfahanica)* respectively.

METHODS

In this study following long walks in the field, and Full day Observation of different herds, suitable habitats for Mountain Goat, Wild Sheep, And Persian Gazelle were specified i.e. in various stations all the observations of wildlife were recorded.

The stations were chosen based on reasonable dispersion and the capacity to cover the habitat for the three species of our concern. The field study continued during all seasons, yet the major part of it was during winter when heavy snowfall and cold made herbivores to migrate to areas with moderate weather conditions. In this study, herds were observed directly and their position was determined with GPS (Global Positioning System). Also geographical location of human activities in the regions such as industrial areas, agricultural areas, residential areas, etc. were determined with GPS and were used in specifying the boundaries.

The boundaries of the recommended area as a protected corridor for large herbivores was determined based on ecological, economic, social, and other considerations. Ecologically speaking, the boundaries of the recommended area were determined in a way to have a large enough area to guarantee the integrity and unity of the ecosystem. Consi-dering the fact that a major reason for the migration of big herbivores is climate, specially temperature and snowfall, Mooteh and Ghameshloo were compared in this respect by t-test using SPSS Software. Further, we used "Vortex" software to investigated the viability of Esfahan wild sheep populations in Mooteh and Ghameshloo regions.

RESULTS AND DISCUSSION

Our data show that Mooteh has a lower temperature regime than Ghameshloo. Also Mooteh has more frosty days than Ghameshloo (significant difference at 95% confidence interval) but the rainfall in the two areas has no significant difference.

According to extensive field studies, also, opinions and experience of experts and guards in the regions, it is now clear that Esfahan Wild Sheep and Persian Gazelle migrate from Mooteh to Ghameshloo in the winter and back to Mooteh in the summer. But the Mountain Goats do not migrate between the two regions, though some inhabit the region half way between the two wildlife refuges. Among these three species, the Persian Gazelle used corridor more than others, which has to do with the physiographic characteristics of the region inasmuch as more than 80% of the recommended area as a protected corridor for large herbivores has a slope of 0-30%, i.e. Gazelle habitat. It is noteworthy that the migration of Gazelle occurs with a change in environmental conditions; their migration is not instinctive and organized, but in case of Wild Sheep it is internal and instinctive.

The field studies identified three routes for Gazelle migration, and two routes for Wild Sheep migration between the two areas (Mooteh and Ghameshloo). The recommended area halfway between Mooteh and Ghameshloo Wildlife refuges is vast enough not only to protect migration routes of animals but also to provide their habitation needs. The recommended area for protection is not just like a protected corridor; rather, it is a Population Assisting Link (PAL) which which facilitates not only the migration process of species but also their stay. The recommended patch of the corridor has an area of 170,131 ha with a patch perimeter of 207,152 m. A circular patch of land increases the habitat suitability and reduces predatory risk. In designing protected areas, circular habitats are preferable to rectangular ones. The shape of a protection area is determined by the R Index:

$$R = \frac{\rho}{2(\pi A)^{1/2}}$$

For a complete circle , R =1. The more stretched the habitat is, the higher is the R Index. The R-Index for the recommended area is 1.4.

ACKNOWLEDGMENTS

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