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Securing Protected Areas in Iran in the Face of Climate and Land use Change

Sima Fakheran[*1], Maryam Tondravan[1], Shima Malakoutikhah[1], Josef Senn[1,2]*

[1] Department of Natural Resources, Isfahan University of Technology, Isfahan 84156-83111, Iran.
fakheran@cc.iut.ac.ir
[2] Swiss Federal Research Institute WSL, Zürcherstrasse 111, 8903 Birmensdorf, Switzerland

Abstract

The protected areas system in Iran is faced with many challenges even without climate change. The combined effects of climate change and land use change is the most important conservation challenge we face. As a background to this work, we summarizes information on the current situation in Iran with respect to the distribution and efficacy of protected areas, and the ancillary threats facing biodiversity, such as habitat fragmentation and isolation, drought, and human activities. Climate change projections suggest generally warmer and drier conditions in Iran, and it will intensify the already significant water stress across the region and impact on biodiversity and human wellbeing. Consequently, many protected areas are likely to lose species through extinctions and migrations. Indigenous freshwater species and ecosystems are at risk from future drying. In this paper we present ecological impacts of climate and land use change on Lorestan newt (*Neurergus kaiseri*) as an endemic species to the southern Zagros Mountains in Iran, and critically endangered species in IUCN red list, and will provide climate change-integrated conservation strategies to help biodiversity survive climate change. As the first part of this study, habitat suitability of *Neurergus kaiseri* was evaluated using a MaxEnt modelling approach using environmental and climatic parameters such as elevation, slope, aspect, land cover, distance to the streams, village density, and 19 thermal and precipitation parameters. Based on the results derived from the MaxEnt model, the most important predictor parameters were related to Annual

Precipitation, Precipitation Seasonality, Annual Mean Temperature, Elevation and Land Cover. The results showed that climatic parameters is very importance for this species and according to upcoming climate change it is necessary to develop comprehensive conservation planning in the study area. Analysis of seven climatic parameters in 31 years (1980-2010) revealed that minimum temperature increased 2.2°C and relative humidity decreased 9%. This climate change might have direct and indirect impacts on Lorestan Newt populations. Direct consequences of climate change can be expected because amphibians are extremely sensitive to small changes in temperature and moisture due to their permeable skin, biphasic lifecycles and unshelled eggs, In addition, the indirect effects of climate change such as the availability of water, will likely be more deleterious than the effects of temperature alone.

In the second part of this paper, we consider the most recommended strategy for conserving species in onset of climate change which is maintaining connectivity. Improving connectivity is not only strategically smart, but a proven method to enable species to migrate with their climatic niche and move in response to environmental change. Individual sites should also be seen as part of an expanded network that can accommodate shifts in species' distributions. This network should improve the opportunities for dispersal of species. Due to the statistic boundaries for most protected areas, species may shift out of reserves where they are protected in response to climate change. Hence, the focus for new conservation reserves has dramatically shifted to increasing the connectivity between reserves through migration corridors, to enable species to migrate with their climatic niche. Conservation and management of wildlife populations in Iran have mostly relied on protection of areas where the species of interest occurs .This approach has resulted in delineating protected areas which include major proportions of wildlife populations and their main habitats, and little effort has been allocated to ensuring connectivity between appropriate habitat patches to support seasonal movements and movements in response to climate change in the future. In this study, we exemplify identifying migration corridors for two vulnerable ungulate species, the Isfahan wild sheep (*Ovis orientalis isphahanica*), and the goitered gazelle (*Gazella subguterrosa*) between Mooteh and Ghamishloo wildlife refuges in Isfahan province, using Least-Cost Corridor (LCC), and Circuit Theory. Although the identified corridors in this study are currently used for round migrations between Mooteh and Ghamishloo wildlife refuges, they are most likely to be served as one way migration corridors from Ghamishloo to Mooteh protected area assisting the species to shift their ranges in response to climate change in an

immediate future. Climatic conditions in Mooteh compared to Ghamishloo in terms of annual rainfall (249.16 mm in Mootieh in compared to 180.9 mm in Ghamishloo) and minimum average temperature (-8.5C in Mooteh compared to -1.6 C in Ghamishloo) indicates that Mooteh wildlife refuge will be used as a refugia to buffer these ungulates from the impacts of drought and climate change in this region.

We conclude that climate change as an integral factor in systematic conservation planning should be considered to ensure persistence of biodiversity.

Key words: Land use change, Climate changes, Drought, Wildlife corridor, Lorestan newt