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Optimized Habitat Modeling for Punjab Urial in the Diverse Landscapes, Pakistan

Mohsin Ali[1], Irfan Raza[2], Sahar Suleman[1], Misbah Sarwar[1], Perveiz Khalid[2], Mudasser Hasan[1], Muhammad Irfan Ehsan[2], Sidra Allah Wasaya[1]

[1]Punjab Wildlife and Parks Department, Lahore, Pakistan
[2]Institute of Geology, University of the Punjab, Lahore-54590, Pakistan
[3] University of Veterinary and Animal Sciences, Lahore, Pakistan.
Corresponding author: syedirfanraza.geo@gmail.com

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ABSTRACT

The Punjab Urial is an indigenous wild ungulate species of Pakistan, which encounters dangers from illegal hunting, together with fragmented environments and expanding human settlements and changing climatic conditions. The research evaluated the habitat potential of this species throughout five regions in Pakistan, including Jhelum, Chakwal, Mianwali, Khushab and Attock. The study utilized the MaxEnt model with GIS technology and field data to identify and display suitable habitats for the species. The study revealed temperature, slope and vegetation cover as primary factors that determine Urial habitat suitability, while the species preferred steep terrain areas. The study used AUC evaluations to confirm its results, which demonstrated strong prediction accuracy in determining appropriate habitats. The species will experience a 6% reduction in its most suitable habitats by the year 2050 based on future habitat suitability models. The results from this study show that protecting habitats with high suitability levels is crucial for both ecological stability and genetic diversity conservation and these findings provide actionable recommendations for saving the Punjab Urial. The maps function as essential tools for conservation planning and protected area creation because they direct efforts to protect the long-term survival of Urial populations across Pakistan's diverse environments.

Key words: HSI, *Ovis vignei*, GIS, Punjab Urial, Arc GIS