

THE ECOLOGICAL AND ECONOMIC VALUE OF NATURAL FORESTS IN RELATION TO THE SRI LANKAN LEOPARD

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The Sri Lankan leopard (*Panthera pardus kotiya*) is an endangered, endemic sub-species and the island's only apex predator. As a probable keystone species the leopard's ecological value in Sri Lanka is likely high. To best predict leopard presence in Sri Lanka we used multi-scale maximum entropy modelling to investigate the influence of a suite of relevant ecological, climatic and anthropogenic variables on observed leopard presence across the island.

Leopard presence was determined from >15 years of surveys, observations and verified reports. Independent variables emerged from known leopard ecology and previous research. Ecological factors included class- and landscape-level metrics of land cover composition and configuration; climatic metrics included altitude, rainfall and temperature; and anthropogenic metrics included road densities, landscape protection level and a selection of land use categorizations. All variables were derived from global and Sri Lankan GIS layers. We created 200 unique models, each composed of a random selection of 5 of the 31 appropriately scaled independent variables. Models were compared using Area Under Curve (AUC) values, and individual variables further evaluated by averaging the AUC values of all models which included each variable.

The most influential variable predicting leopard presence across Sri Lanka was the landscape proportion encompassed by level 1 Protected Areas (National Parks, Strict Natural Reserves and Sinharaja Forest Reserve). This variable was top ranked in all 9 analyses (no bias correction; bias correction using spatial rarefaction at 4 spatial scales; and bias correction using Gaussian kernels at 4 spatial scales). The three forest composition and configuration metrics (Area weighted mean, Patch density and Cohesion of forest) were consistently ranked within the top 10 variables across analyses. Overall, area weighted mean of forest cover was the 2nd highest ranked variable, forest cohesion 3rd and patch density of forest 5th. This clearly indicates the influence of natural forest on Sri Lankan leopard distribution and underlines the value of these forests in ensuring the ecological integrity of the island's faunal assemblages. In addition to ecological value, the leopard represents considerable economic value with local non-use value (leopard tourism from local sources) estimated at >16 billion rupees. Overall this study highlights, through the lens of the island's top predator, the ecological and economic value of Sri Lanka's natural forests.