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The Implication of Landscape Composition, Landscape Configuration, and Climatic Factors on the Variation of *Pavo cristatus* (Indian Peafowl) Density in the Southern Province of Sri Lanka

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Abstract

Indian peafowl (*Pavo cristatus*) which was predominantly found in the arid regions of the country, have been observed venturing into the wetter zones in recent times, raising significant concerns on potential threats to crops in the Southern Province. In the present study landscape composition, landscape configuration and climatic variables were recognized as potential contributing factors to the variation of Indian peafowl density and were investigated in croplands of the Southern Province of Sri Lanka, which encompasses the wet, dry and intermediate zones, characterized by diverse landscapes and unique ecological features. The density of Indian peafowl was determined using fixed-width strip-transect surveys conducted between September 2023 to February 2024 in 25 sampling plots (4×4 km). Sentinel-2 L2A satellite images of the study area acquired from Landviewer were classified into six land use and land cover (LULC) classes using Maximum Likelihood (ML) classification in ArcMap 10.8. Landscape composition factors including percentages of forest cover, natural vegetation cover, crop cover, built-up areas, and patch diversity were assessed, alongside landscape configuration factors such as forest patch density, largest patch index for forest cover, and forest patch cohesion for each sampling plot to examine their influence on peafowl density. The associations of the Indian peafowl density with landscape composition and configuration data obtained from the ML classification and climatic data acquired from Chelsa V2.1 were assessed using Generalized Linear Mixed Models (*glmmTMB* package in R). Among the landscape composition factors examined, the percentage croplands related positively (GLMM: $\beta \pm SE = 0.066 \pm 0.01$, $p = 0.001$), while the percentage built-up areas showed a negative relationship with the peafowl density (GLMM: $\beta \pm SE = -0.111 \pm 0.01$, $p = 0.018$). From the landscape configuration attributes tested, forest patch density showed a significant positive relationship with peafowl density (GLMM: $\beta \pm SE = 7.111 \pm 2.83$, $p = 0.012$). A significant negative relationship was found between annual average precipitation and peafowl density (GLMM: $\beta \pm SE = -0.003 \pm 0.01$, $p = 0.006$). The landscape changes in the Southern Province, particularly the reduction in forest patch density and the increase in built-up areas, appear to be key drivers influencing shifts in peafowl populations towards wet zone areas. The findings of this study suggest the relevance of land-use planning and management in controlling peafowl populations for mitigating conflicts between peafowl and humans.

Keywords: *Indian peafowl, Landscape composition, Landscape configuration, Climate, Southern province*