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Wings Over Wetlands: Diversity, Habitat Utilization, and Risk Assessment of Migratory Shorebirds in Wilpattu National Park

**Gunarathna, D.K.G.N.U.¹, Rodrigo, B.K.P.D.^{1,2}, Gunathilaka, W.D.C.N.^{1,2},
Dasanayake, D.M.T.^{1,2}, Jayasekara, E.G.D.P.¹, Mahaulpatha, W.A.D.^{1*}**

¹*Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura,
Nugegoda, Sri Lanka*

²*Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
**mahaulpatha@sjp.ac.lk*

Abstract

The island nation of Sri Lanka serves as one of the final terrestrial stopover for migratory shorebirds of the order Charadriiformes along the Central Asian Flyway. The most migratory shorebirds arrive in Sri Lanka via north-western route, where Villu ecosystems serve as available habitats, specially in Wilpattu National Park. This study aims to investigate the species diversity, relative abundance, habitat utilization, influence of anthropogenic interventions on migratory shorebirds to identify conservation measures. Satellite imagery between 2023-2025 were used to create a supervised classification for selected Villus to determine the habitat availability with use of NDVI and NDWI indices. To quantify anthropogenic interventions weighted maps were created using Raster Calculator in ArcGIS Pro based on weights determined using Analytical Hierarchy Process (AHP), within a 5 km buffer from the study areas. Pairwise comparisons in AHP were used to assign ordinal values to selected factors based on their relative importance using the 9 point scale. A total of 470 migratory shorebirds of order Charadriiformes belonging to 18 species and 3 families were recorded in the selected Villu ecosystems during the migratory season. The highest species diversity was recorded in Mahapatassa Villu which is Shannon's Diversity Index (H)=1.803 followed by Kokkara (H=1.532) and Panikkar Villu (H=1.290). In the park, although dense forest represents the dominant habitat, shorebirds predominantly utilized grasslands and mudflats (86.56%), while open water habitats were least used. The all selected Villu sites are in the low risk level according to the risk assessment map account for 74.95% of the landscape, indicating that the majority of the area is subject to relatively low levels of anthropogenic disturbance. Among the contributing factors, agricultural lands and the road networks are the primary sources of risk. Kentish Plover (*Charadrius alexandrinus*) and Little ringed Plover (*Charadrius dubius*) were also recorded, which are listed as Endangered, and Common Tern (*Sterna hirundo*) is listed as Critically Endangered at the national level. The findings highlight the Villu ecosystem in the Wilpattu National Park provide vital yet limited habitats for migratory shorebirds. Although anthropogenic risk levels remain relatively low, continued monitoring and sustainable land management are essential to ensure the long-term conservation of these critical stopover habitats.

Keywords: *Migratory shorebirds, Risk assessment, Habitat utilization, Central asian flyway, Wilpattu national park*