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Assessing Mangrove Forest Cover Dynamics in the Northern Part of Negombo Lagoon, Sri Lanka, from 2006 to 2024 Using Remote Sensing and GIS Technology

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Abstract

The Mangrove ecosystem is one of the critical and highly productive coastal habitats found in Sri Lanka's coastal zone. However, this ecosystem is increasingly under threat due to anthropogenic activities. The study area for this research is the Northern part of Negombo Lagoon, located on the West coast of the Gampaha district in Sri Lanka. This study aims to assess the dynamics of mangrove and associated mangrove forest cover in the Negombo Lagoon from 2006 to 2024 using RS and GIS technology, identifying patterns of mangrove diversity. The study used Landsat satellite images, 2006 (Landsat 4-5 TM C2 L2), 2015 (Landsat 8-9 OLI/TIRS C2 L2), and 2024 (Landsat 8-9 OLI/TIRS C2 L2) to calculate the entire area in the Northern part of Negombo Lagoon with mangroves and mangrove associates. The total area of the study area is 0.467 Km² in 2024. The Normalized Difference Vegetation Index (NDVI) was used after the atmospheric corrections for monitoring the changes in vegetation. To obtain accuracy metrics, used the kappa coefficient, user accuracy, and production accuracy. Vegetation cover maps classification results presented major six classes according to the NDVI classification and land use classification. In 2006, the overall classification accuracy was 66.00%. In 2015, the overall accuracy was 71.00% and the overall accuracy increased to 80.00% in 2024. There was a 30.39% positive change in mangroves in the study area and also 0.72% negative change and other area change of 9.95% and there were no changes in the study area is 58.92% between 2006 to 2024. The primary drivers of change in the examined region between 2006 and 2024 were agricultural operations, urbanization, and exceptionally severe weather events, which resulted in deforestation and vegetation loss. As a result of this study, it was found that the area of vegetation is increasing rather than decreasing. The study's conclusions may serve as a guide for further research on changes in vegetation cover in comparable regions.

Keywords: *Mangrove vegetation, NDVI, Negombo lagoon, Accuracy*