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MAPPING AND CHANGE DETECTION OF MANGROVES ALONG THE COASTLINE OF AMPARA DISTRICT FROM 2004 TO 2019

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Abstract

Mangroves provide numerous ecological and biophysical services in the tropics and subtropics that support flood regulation, carbon sequestration, and reducing erosion from storm surges. Remote sensing satellite imagery provides valuable information for mangrove mapping and monitoring. The objective of this study is to detect the spatio-temporal changes in mangroves in Ampara District from 2004 to 2019 based on Landsat data. A semi-automated image classification technique was used to delineate and detect changes of mangrove vegetation in the Ampara District from 2004, 2009 and 2019 using Landsat 5 and 8 images. The multi-index approach was constructed using: (i) water masking using Normalized Difference Water Index (NDWI), (ii) mangrove detection using red and shortwave infrared (SWIR), SWIR and near-infrared (NIR) band ratios, Normalized Difference Vegetation Index (NDVI), (iii) mangrove classification using Principle Components Analysis (PCA) and an unsupervised classification. The historic Google Earth imagery was used to validate the classified mangrove habitats. The results estimated that the total mangroves in Ampara District were 424 ha in 2004, 355 ha in 2009, and 569 ha in 2019. The total mangrove habitat which was estimated through available land-use/cover maps was 770 ha. In addition, habitat suitability of mangroves for current and future (year 2050) climate change scenarios was mapped using a maximum entropy (MaxEnt) model and bioclimatic variables. The current MaxEnt was resulted in 11% area in high habitat suitability (H) and a moderately suitable (M) class in each. While the suitable habitat projection for the year 2050 was 11% (H) and 16% (M). In conclusion, a loss of mangrove was observed five years later in tsunami, and a gain of mangrove was occurred after 15 years resulting in best land management practices.

Keywords: mangrove, change detection, classification, MaxEnt

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