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Role of Mangrove Forests in Blue carbon in Climate Change Mitigation: A Case Study in Sri Lanka

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Abstract: In order to promote conservation, it is essential to comprehend the fundamental interaction between ecological components and mangrove carbon sequestration. The goal of the study is to estimate the blue carbon potential of eight natural mangrove stands along the Sri Lankan coast and look into the impact of the environment on their capacity to store carbon. For the measurement of the carbon in the sediment, we combined allometry with sediment core extraction. Mangrove stands' diameter at breast height was measured along a 10 m wide belt transect at six sites in each site (n = 48), and at least three water samples were collected from the nearby estuary to determine edaphic effect. At the survey locations, sediment cores were taken at 45 cm depth and subsampled to 15 cm apiece. While sediment organic carbon was measured and evaluated using an elemental analyzer, floral carbon was computed using allometry. Whole ecosystem carbon stocks varied significantly ($p<0.05$) between sites and climatic zones, with Rekawa having the highest carbon content (1247.28 MgC ha^{-1}) and Mannar having the lowest (307.82 MgC ha^{-1}). The intermediate zone has the highest mean carbon content (180.36 ± 46.20 MgC ha^{-1}). The carbon store in sediments made up 89% of the total, whereas aboveground biomass made up a larger portion of the remaining carbon. The results of a correlation analysis showed that ecological factors including dissolved oxygen, salinity, and precipitation had a significant impact on ecosystem carbon stores. They could emit (mean ± SD) 2584.13 ± 1061.23 Mg ha^{-1} of carbon dioxide if they were removed. The results of this study will enable plans to be better adapted to the national climate change agenda, support efforts to study carbon cycles in mangrove ecosystems, and serve as a baseline for the establishment of long-term management programs for Sri Lanka's mangrove blue carbon.

Keywords: Mangroves; Blue carbon; Climate Change Mitigation; Conservation; Sri Lanka