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The carbon sequestration potential in different land use types of Muthurajawela environmental protected area (EPA) and wildlife sanctuary

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Wetlands are considered biologically significant and productive ecosystems that support a variety of life forms, similar to natural rainforests and coral reef ecosystems. The Muthurajawela Environmental Protected Area (EPA) and Wildlife Sanctuary in Sri Lanka is renowned for its rich biodiversity, unique wetland ecosystems, and critical environmental services. This study aims to assess the carbon sequestration potential across different land use types within this protected area. Specifically, it examines the total organic carbon (TOC) in soil and soil organic carbon (SOC) stocks across two soil depth layers, Layer A (0-15 cm) and Layer B (15-30 cm). The land use types considered include coconut cultivations, home gardens, industrial sites, landfills, mangrove forest, marshy land, sand fill and solid waste dumping site. The TOC and SOC stocks were analyzed as an average for each land use type in both layers. Results indicate varying levels of TOC and SOC stocks among the different land use types, with coconut cultivations and marshy lands exhibiting the highest TOC in soil and SOC stocks, followed by solid waste dumping sites. Marshy lands show consistent high TOC in soil with 12.24% and 12.31% across both layers, indicating significant organic matter accumulation, while Coconut cultivations exhibit TOC in soil, with 12.00% in layer A and 9.52% in layer B. In the same way Marshy Land exhibits the highest SOC stocks in both layers, with values of 59.18 Mg/ha and 53.42 Mg/ha for layers A and B, respectively while Coconut Cultivations also demonstrate SOC stocks, with values of 47.56 Mg/ha and 51.71 Mg/ha for layers A and B, respectively. Home gardens and industrial establishments had relatively lower TOC content in soil and SOC stock, while landfills and sand fills showed the lowest TOC in soil percentages. The ANOVA test conducted shows significant difference between land use types for SOC stocks in both Layer A and Layer B, with p-values less than 0.001, while the Kruskal-Wallis tests reveal significant differences in TOC percentages across different land use types in both Layer A ($H = 44.78$, $p < 0.001$) and Layer B ($H = 45.47$, $p < 0.001$), indicating varying levels of organic carbon content among the different land uses. These findings highlight the importance of land use management in enhancing carbon sequestration potential of wetland ecosystems

Keywords: Carbon Sequestration, Total Organic Carbon, Soil Organic Carbon, Land use types, Wetland Ecosystem

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