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The determination of soil organic carbon stocks in Salt Marshes at Northwest coast of Sri Lanka

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Salt marshes combined with mangroves and seagrasses are important coastal wetlands that can act as natural carbon sinks with a promising potential in climate change mitigation. The unique capacity of the wetland soil to capture and retain greater stocks of Blue Carbon, has widened the global research interest in incorporating coastal wetlands into carbon crediting frameworks. However, the Blue Carbon literature in South Asia undermines salt marshes due to the lack of scientific studies on these ecosystems. The present study focuses on quantification of belowground carbon stocks of salt marshes in Wedithalathive Nature Reserve to investigate the carbon storage potential in salt marsh soil. A total of 36 soil cores were sampled from vegetated and non-vegetated plots at the 4 study sites of Vellankulam, Illuppaikadavai, Wedithalathive and Adampan. Sediment characteristics such as dry bulk density (DBD) and soil moisture content were assessed during the analysis of samples and Loss-on-Ignition technique was applied collectively with a carbon conversion factor to determine the soil organic carbon (SOC) stock over 5 depth intervals (0–5 cm, 6–15 cm, 16–30 cm, 31–45 cm and 46 cm belowground). The organic carbon stocks in belowground biomass and sediments in 50 cm depth varied from 48.18 ± 5.6 Mg C ha^{-1} to 108.08 ± 8.51 Mg C ha^{-1} across the observed four sites. The %SOC content displayed a gradual decrease over the depth profile, and the surface layer was found to have a significantly high SOC density with the lowest DBD value compared to the deeper intervals. The percentage soil moisture positively correlated with percentage SOC values. In site-wise analysis, Wedithalathive demonstrated a significantly greater SOC stock out of the 4 study sites. As the first comprehensive analysis, current findings shed light on the scarcely available national level salt marsh carbon literature, and it emphasizes the capacity of salt marshes as a valuable carbon sink. Furthermore, it will serve as baseline information to promote future research to mobilize conservation efforts and to improve blue carbon storage estimates in coastal wetlands of Sri Lanka.

Keywords: Wetlands, blue carbon, salt marshes, soil organic carbon

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