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Can mangrove blue carbon help counteract climate change? A case study in Rekawa, Sri Lanka

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Blue carbon to assist climate change has gained recent attention with increasing nature-based mitigation methods. Mangrove ecosystems with their high primary productivity, efficiently sequester carbon in their anaerobic sediment. Carbon sink function of mangrove ecosystems has been acknowledged as a potential tool in climate change mitigation. However, achieving full potential of blue carbon services of mangrove ecosystems requires evidence-based research and reporting to bridge the knowledge gaps. The present study aimed to report the blue carbon potential of mangrove ecosystems in Rekawa lagoon and its' potential contribution to mitigate climate change. Field work was conducted in December 2019, with 10m wide belt transects (n=6) laid across water-land gradient to collect data on mangrove vegetation structure and sediment organic carbon content. Mangrove species along the transect were identified, enumerated, and measured Diameter at Breast Height (DBH) for overstory trees with DBH >5cm. Sediment cores were taken along the same transect to 45cm depths and subsampled to three portions representing sediment in 15 cm intervals. Carbon in above ground plant biomass was estimated with the use of biomass based allometric equations. One portion of sediment samples with known volume was oven dried and measured for bulk density while the rest was measured for total organic carbon (TOC %) with elemental analyzer, which were later used for the calculation of sediment organic carbon (SOC). Organic carbon in plant biomass and SOC together represent total ecosystem carbon (TEC) pool. We identified 10 true mangrove species with DBH ranging from 6.0 to 13.5 cm. The site showed high plant density (18911 no. ha^{-1}) with high diversity (H'=2.03). TEC pool of the site was 209.30 ± 45.40 MgC ha^{-1}. The aboveground, belowground and SOC of the mangroves were (mean ± SD) 33.64 ± 1.05 MgC ha^{-1}, 13.12 ± 0.41 MgC ha^{-1}, and 162.50 ± 45.20 MgC ha^{-1}. SOC accounted for nearly 78% of the TEC stock. There was gradual increment in SOC stock with increasing depth. If disturbed the site can emit an average of 768.10 ± 67.90 Mg CO_2 ha^{-1}. The site is highly vulnerable to tourism development and urbanization, yet carries relatively higher amounts of carbon in their sediments. This demands for an enhanced awareness and scientific understanding for developing strategies for conservation and restoration of blue carbon pool of this mangrove ecosystem.

Keywords: Mangroves, Blue carbon, Climate change, Mitigation, Conservation

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