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Assessment of the Blue Carbon Stocks Including Mangroves, Sea Grasses and Salt Marshes in Puttalam, North West Sri Lanka

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Abstract

Blue Carbon is the carbon stored in mangroves, tidal salt marshes, and seagrass meadows within the soil, the living biomass above ground (leaves, branches, stems), the living biomass below ground (roots), an the non-living biomass (litter and dead wood). These ecosystems remove carbon from the atmosphere and oceans, storing it in plants and sediment, where it is known as "blue carbon." In fact, coastal ecosystems are some of the most carbon-rich ecosystems on Earth. But they are also the most threatened. And once they are degraded or destroyed, their blue carbon stores are released as carbon dioxide and contribute to global climate change. Therefore, the main objective of the study is the assessment of the blue carbon stocks including mangroves, sea grass beds and salt marshes. Puttalam Lagoon and the Ocean in North West Sri Lanka were selected for the study as all three ecosystems are available in this area. This area is located in the dry zone having average temperature of 29-32^{o} C and average annual rainfall 100-110 cm.With regards to the mangroves, both naturally grown mangroves and planted mangroves of 25 years age were sampled in Soththupitya and Anawasala areas located surrounding the Puttalam Lagoon. Sea grass beds and salt marshes were sampled in Anawasala area. With regards to the mangroves, belt transects from the shore towards the land were taken. Nested circular plots having 7 m radius were established, large trees were sampled for diameter and height. Small trees (<5 cm dbh) were sampled in 2 m radius. Litter, pneumatophores and seedlings were sampled in plots of 30×30 cm area. Soil samples were taken at depths; 0-30 cm, 30-60 cm, 60-100 cm for the measurement of bulk density and carbon content. In total 13 plots were sampled for natural mangroves while 8 plots were sampled for planted ones. With regards to sea grass beds and salt marshes, belt transects were set up along the coastline and 1×1 m plots sampled. 15 plots were sampled for sea grasses while 37 plots were sampled for salt marshes using destructive sampling. The collected soil and vegetation samples were taken to the laboratory in clean polythene bags, oven dried to a constant weight. Based on published literature, the carbon content of the plant matter taken as 35% of the dry weight. In mangroves, allometric equations developed in the published literature were used to assess the aboveground and below ground biomass using diameter as the variable. The total organic carbon in the collected soil samples were done using Loss on Ignition Method. According to the results, the carbon content of the natural mangrove ecosystem including plant parts and the soil is 377.17 t/ha. The planted mangroves recorded a lesser amount of 228.66 t/ha. The carbon content in the salt marshes was 18.24 t/ha while the figure for sea grasses was 65.87 t/ha.

***Keywords**:* Blue carbon, Salt marshes, Sea grasses, Mangroves, Carbon content