

Soil Organic Carbon and Interdependencies among Soil Physio-Chemical Parameters of Mangrove Dominated Ecosystem at Palakaimunai in Mannar Region, Sri Lanka

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Palakaimunai, positioned at North Western coast of Sri Lanka, has been shaped and influenced by oceanic, terrestrial and anthropogenic activities to varying extent. The natural vegetation in this deltatic system is dominated with mangroves with intermittently spreading saltmarsh patches at the foreground and littoral woodland species at the back. The extent which the mangroves in such seasonally dry tropical climates would provide sediment-grounds for soil carbon and other nutrients is yet to be revealed. Therefore, spatial variation of soil carbon and carbon fractions, and the associations of these to available nutrients in Palakaimunai mangals were examined in this study. Stratified random sampling adhering to 10 m × 10 m grids based on ArcGIS were laid and soil sampling (n=30) was done from the layer of 0-15 cm from surface. Samples were analyzed for available nitrate, phosphate and ammonium, microbial biomass carbon (MBC), permanganate oxidizable carbon (POC), water soluble carbon (WSC) and soil organic carbon (SOC), soil macro and micro nutrient cations. Principal component (PC) analysis and agglomerative hierarchical clustering based on geometric positioning under PCs revealed five clusters indendogram, despite there was a high spatial heterogeneity examined soil parameters over the area. Interdependencies were unreciprocated among pH (+) to SOC (-) and WSC (-) and ammonium (-) and zinc (-) to MBC (+). The samples in the clusters with the highest mean SOC content of 11.3%- 14.0% and was associated with low MBC ($0.005\% \pm 0.007$), high POC (712.23 ± 6.97 mg/kg), high WSC (0.15% - 0.16%) and high ammonium (14.2 ± 8.5 mg/kg) contents. Nevertheless, the samples in the cluster with the lowest SOC content of 1.99 ± 1.54 was found to be associated with the highest availability of nitrate (2.90 ± 0.78) and lowest of phosphate (14.98 ± 6.02 mg/kg) contents. These highest SOC contents were recorded at proximate substratum with *Avicenia* and *Rhizophora* species and within frequently saturated substratum. Simultaneously, low MBC content was related with the above prevailing anoxic condition. Thereby, generalization over in-site SOC may not verify the carbon sink potentiality thus varied by geomorphological traits.

Keywords: Blue carbon ecosystems; MBC; WSC; Cluster analysis; SOC