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Soil organic carbon in mixed mangroves and monospecific stands; A case study from Rekawa and Kalametiya lagoons in Southern, Sri Lanka

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Abstract

The carbon sequestered and stored in mangrove ecosystems is a major component of "Blue Carbon" which is referred to carbon stored naturally in marine and coastal habitats, and it attracted a higher attention as it is more stable that other carbon pools. Therefore, this study investigated the influence of soil physicochemical properties i.e., pH, soil salinity, conductivity, soil moisture content (%), soil bulk density, soil porosity, phosphate content and nitrate content, on the stability of soil organic carbon (SOC) in mixed mangroves and monospecific stands. The study was carried out in Rekawa (mixed) and Kalametiya (monospecific) mangrove forests on the southern coast of Sri Lanka. The effect of soil properties on SOC along randomly selected line transects was measured and the influence was assessed by correlation analysis. According to the results, SOC contents of mixed mangroves and monospecific stands were significantly different, ranging from 0.026 to 0.722 gm^{-2} in mixed mangroves while it differed from 0.034 to 0.454 gm^{-2} in monospecific stands. The SOC was positively correlated with soil porosity and soil moisture content and negatively correlated with soil bulk density. Although salinity and conductivity were positively correlated with SOC in mixed mangroves, it turned to negative correlations in monospecific stands. Nitrate content was negatively correlated with SOC in mixed mangroves whereas it shows a positive correlation in monospecific stand. The pH and phosphate content showed no correlation with SOC in mixed mangroves, while pH was negatively, and phosphate content was positively correlated with SOC in monospecific stand. The finalized model which had the lowest Akaike Information Criterion (AIC) value in GLM analysis explained SOC, as a function of soil salinity, soil porosity and bulk density in mixed mangroves, in addition to those properties, pH, soil moisture content, soil phosphate content and nitrate content were significant properties for SOC in the monospecific stand. Further, it is recommended to investigate, SOC content/stability under different mangrove species densities and influence of other soil physico-chemical factors which are not discussed in this study in the future. The outcomes will be highly beneficial for mangrove replanting practitioners.

Keywords: Kalametiya, Mangroves, Physico- chemical, Rekawa, Soil organic carbon

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