SOIL CARBON POOL IN MANGROVES OF KENYA

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Mangroves are critical ecosystem providing numerous benefits and services essential for climate mitigation and adaptations. Mangroves have been reported to captures more carbon than any forested ecosystem. The highest proportion of this carbon (50% to 90%) is stored in the soil component. However, this carbon risks being released into the atmosphere if mangroves are degraded. Measurement of soil carbon pool is critical for determining long-term changes in carbon stocks particularly in the face of climate change. This study quantified the carbon storage in mangrove soils through intensive sampling along the Kenyan coast (Mida, Dabaso, Mtwapa, Kibokoni-Kilifi creeks and Gazi and Vanga bays). Sediment cores (up to 100 cm) were taken in different mangroves species formations (Rhizophora mucronata, Avicennia marina, Ceriops tagal and Sonneratia alba). Thermo elemental analyzer–isotope ratio mass spectrometer (EA-IRMS) system was used to determine organic carbon content (%OC). Overall, the (%OC) ranged from 0.15 to 13.11% with a mean of 3.99±0.24%. A consistent decrease in % organic carbon (%OC) with depth was observed within all mangrove species formations (Pearson correlation, p < 0.01). The carbon stock in mangrove soil ranged from 80.2 to 567.1 Mg C ha⁻¹ with a mean of 207±110 Mg C ha⁻¹. Mangrove soil within Gazi bay recorded the highest carbon pool (299.4±60.0 Mg C ha⁻¹) while Mtwapa Creek recorded the lowest mean (156.0±31.4 Mg C ha⁻¹). Rhizophora mucronata formations recorded the highest soil carbon pool (262.1±36.7 Mg C ha⁻¹) while Sonneratia alba formations recorded the lowest mean (145.9±16.2 Mg C ha⁻¹). Considering mangroves in Kenya are estimated to cover 61,271 ha, this study estimate mangrove soil stores ~12.7 Mt of carbon, equivalent to 46.5 Mt of CO₂e. This study forms a basis for enhancing mangrove conservation and restoration in Kenya and beyond particularly in relation to carbon offset projects.