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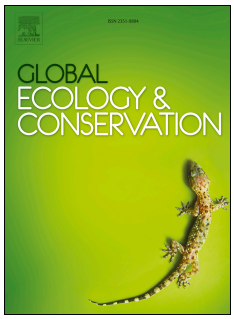

Quantification of carbon stocks in Mt. Marsabit forest Reserve, a sub-humid Montane forest in northern Kenya under anthropogenic disturbance

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QUANTIFICATION OF CARBON STOCKS IN MT. MARSABIT FOREST RESERVE, A SUB-HUMID MONTANE FOREST IN NORTHERN KENYA UNDER ANTHROPOGENIC DISTURBANCE.

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Abstract

The quantification of carbon stocks is vital for decision making in forest management, carbon stock change assessment and scientific applications. We applied the land degradation surveillance framework (LDSF) method with a sentinel site of (10 km ×10 km) to assess carbon stock levels and tree diversity in Marsabit Forest Reserve (MFR). The above ground (ABG) carbon stock was estimated at 12.42 t/ha, while soil organic carbon (SOC) was 12.51 t/ha across the forest, with SOC densities increasing with increasing depth. The mean ABG carbon and SOC densities were higher for the least disturbed strata than the disturbed strata. The estimated ABG carbon and SOC stocks were significantly lower than the range observed in a typical dry tropical forest. Twenty-one tree species were recorded belonging to twelve families with the disturbed areas recording nine tree species while the least disturbed recording twelve species. Rubiaceae and Rutaceae were the richest families with four species each while Boraginaceae, Capparaceae, Flacourtiaceae, Tiliaceae, Violaceae, and Ochnaceae the least frequent with one species each. The most common tree species were, *Croton megalocarpus, Drypetes gerrardii, Ochna insculpta, Strychnos henningsii* and *Vangueria madagascariensis.* The forest recorded a basal diameter of 14.09 ± 12.15 cm, basal area of 0.016 m 2 /ha with a mean height of 8.69 meters. The basal size class distribution declined monotonically indicative of a stable population. Livestock grazing, selective logging, and honey harvesting were the primary forms of anthropogenic activities found in the forest despite the moratorium imposed on consumptive forest utilisation. The Pearson correlation coefficient returned an inverse relationship between forest disturbance with SOC and ABG carbon in the disturbed strata suggesting that anthropogenic activities reduced carbon stocks in MFR. Concerted efforts to mitigate anthropogenic impacts on the forest could significantly increase its terrestrial carbon sequestration potential and provision of other ecosystem goods and services.