

Carbon stocks in different carbon pools of a tropical lowland forest and a montane forest with varying topography

Abstract

Increasing atmospheric carbon dioxide concentrations at alarming rates have triggered the need to revisit potential opportunities in conserving and monitoring carbon (C) stocks for climate change mitigation. The dynamic nature of tropical forests based on topographic variations and biomass components needs reliable estimation of forest C to support conservation and forest monitoring strategies. This study was aimed to determine C stocks of varying components (i.e. litter, soil, aboveground biomass and roots) in a tropical lowland forest and a tropical montane forest at varying topographic positions. Systematically designed 10 m × 10 m plots were established for soil (0–15 cm depth), litter and aboveground biomass sampling along three slope positions at the montane forest and one plot in the lowland forest due to minimal topographic variability. Basic soil characteristics and botanical distribution of both forest sites were determined. Carbon stocks were significantly higher in the tropical montane forest, where litter and soil C stocks at the summit were three and five folds significantly higher compared with the lowland forest. No significant differences were found in vegetation structure (mean diameter at breast height, mean height and stand basal area) but the aboveground biomass ranged from 100 to 120 Mg C ha⁻¹ and was the most dominant pool (> 40%) for all sites. Soil C pools were comparable (100 to 120 Mg C ha⁻¹) with aboveground biomass pools at the summit and toeslope position of the montane forest.

Keyword: Biomass; Carbon storage; Components; Elevation; Temperature; Topographical diversity; Tropics