

Spatial variability of selected forest soil properties related to carbon management in tropical lowland and montane forests

ABSTRACT

A better understanding of spatial variability of forest soil properties related to carbon (C) sequestration will improve management strategies towards conserving forest areas that project higher C stocks. This study was aimed at determining spatial variability of soil C, C:N (nitrogen) and forest floor depth in tropical lowland and montane forests at varying topographic positions. Quadrants of 10 m × 10 m were established for soil (0-15 cm depth) and forest floor sampling along three slope positions. This amounted to 120 quadrants at the montane forest and 60, in the lowland forest. Soil and forest floor samples were geo-referenced using global positioning system. Univariate statistics, including normality check, non-spatial outlier detection and data transformation were performed on test variables, followed by variography and kriging analyses to quantify spatial variability. Results showed that spatial structure of test variables differed across topographic positions and within the lowland forest. Surface maps showed distinct spatial clustering and displayed acceptable accuracy of interpolated values. Soil C stocks were highest in the summit, followed by toeslope, sideslope and Jengka Virgin Jungle Reserve. Site specific management for carbon sequestration monitoring in tropical forest should be based on topographic delineation.

Keyword: Soil carbon; Spatial variability; Tropical forest; Topography; Management zoning