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## Effects of Land Use Change on Soil Organic Carbon: A Pan-tropic Study

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### Abstract

Tropical forest deforestation is recognised as one of the major contributors to anthropogenic greenhouse gas emissions. In contrast to aboveground carbon stocks, comparatively little is known on deforestation's affect on the magnitude and the factors affecting soil organic carbon (SOC). In this regional scale study we focused on tropical sites with deeply weathered, low-activity clays soils in three countries: Indonesia, Cameroon and Peru. Using a clustered sampling design we compared SOC stocks in the top three meters of soil in undisturbed forests (the reference) with converted land uses that had been deforested. The most predominant land use trajectories relevant for each region were investigated. These included (a) conversions from forest to cash-crop plantations (rubber, oil palm, cacao), (b) conversions from forest to cattle grazing pastures and (c) conversion from forest to shifting cultivation. Preliminary results from the three case study regions found that the conversion of forests to intensively managed land uses such as oil palm, rubber and cattle pastures caused significant losses of SOC in the top soil. In contrast, the extensively managed shifting cultivation land use trajectory in Peru showed no significant change in SOC stocks. In all land use trajectories there are indications that SOC may be translocated to deeper depths in the soil profile.

Additionally, regional scale constraints such as soil physical and chemical characteristics (soil texture, soil pH) and climatic variables (precipitation, temperature) effect on SOC stocks and the changes in SOC stocks associated with land use change have been identified using multivariate statistical methods.

**Keywords:** Cacao, deforestation, oil palm, plantations, rubber, shifting cultivation, soil carbon