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## Soil Organic Carbon Dynamics in Northwestern Viet Nam

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### Abstract

The majority of people in the northwest of Viet Nam live in poor conditions and depend on lowly modernized slash-and-burn agriculture. Thus, reduced yields as a consequence of soil degradation are a serious threat. For quantification of the dramatic soil fertility decline and the potential carbon sequestration in the steep slope lands of northwestern Viet Nam we investigated soil organic carbon (SOC) dynamics. SOC content and  $^{13}\text{C}$  abundance were measured in soils with varying ages of maize cultivation since deforestation of primary forest. Our aims were to quantify (1) the SOC loss due to cultivation, (2) the newly established SOC as well as (3) carbon turnover rates of both functional SOC pools and bulk SOC. Three chronosequences (each including one reference site under primary forest) have been established in slopes on limestone, clayey shale and marl. Three functional SOC pools (labile, intermediary and passive), with varying turnover times and varying stability against decomposition, were analysed using physical SOC fractionation methods. Soils have been sampled in 0–10, 10–20 and 20–30 cm depth, as well as horizon wise in soil pits. The results suggest that the maize derived SOC is low (<2% per year), while soil erosion by water leads to high losses of SOC derived from both maize as well as forest. With increasing soil depth bulk SOC declines, while  $^{13}\text{C}$  increases. Compared to forest soils, SOC pools are expected to be enriched in  $^{13}\text{C}$  due to maize cultivation, with the labile pool is expected to show the highest enrichment.

**Keywords:**  $^{13}\text{C}$  abundance, C pools, chronosequence, erosion, land use change