

## **Substantial labile carbon stocks and microbial activity in deeply weathered soils below a tropical wet forest**

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### **Abstract**

Contrary to large areas in Amazonia of tropical moist forests with a pronounced dry season, tropical wet forests in Costa Rica do not depend on deep roots to maintain an evergreen forest canopy through the year. At our Costa Rican tropical wet forest sites we found a large carbon stock in the subsoil of deeply weathered Oxisols, even though only 0.04% to 0.2% of the measured root biomass (> 2 mm diameter) to 3 m depth was below 2 m. In addition we demonstrate that 20% or more of this deep soil carbon (depending on soil type) can be mobilized after forest clearing for pasture establishment. Microbial activity between 0.3 m and 3 m depth contributed about 50% to the microbial activity in these soils, confirming the importance of the subsoil in C cycling. Depending on soil type, forest clearing for pasture establishment led from no change to a slight addition of carbon in the topsoil (0-0.3 m depth). However, this effect was countered by a substantial loss of C stocks in the subsoil (1-3 m depth). Our results show that large stocks of relatively labile carbon are not limited to areas with a prolonged dry season, but can be found also in deeply weathered soils below tropical wet forests. Forest clearing in such areas may produce unexpectedly high C losses from the subsoil.