

THE EFFECTS OF NATURAL AND ANTHROPOGENIC DISTURBANCE ON A NEOTROPICAL OXISOL.

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This study examines the effects of swidden farming on the soils of a neotropical forest. Three lowland wet forest oxisols from the San Pedrillo region of Corcovado National Park, on the Osa Peninsula, Costa Rica, were analyzed for variations in grain size, pH, and mineralogy. The study area consisted of undisturbed primary forest, secondary forest with 26 years of unperturbed regrowth, and a third site chosen to examine the difference between natural and anthropogenic disturbance with a section of primary forest which had approximately 75% of its large trees blown down from a hurricane in 1972 and since has experienced regrowth. All sites overlie a Plio-Pleistocene melange. Soil was sampled from six plots within each forest type. Grain size analysis was done with a silt mesh sieve after sodium acetate cleansing. The pH was analyzed with a hand held pH meter. Clay mineralogy was determined through x-ray diffraction with ethylene glycol expansion. The primary forest had significantly lower pH, higher levels of clay, and less sand than the disturbed primary and secondary forests. The mineralogy of the clays reveals a change in the soil integrity. The two primary forest sections had a vermiculite and halloysite base that signifies a high layer charge within the clay particles. The secondary forest had a different base of smectite that signifies a low layer charge within the clay molecules. Clay crystals grow in a time span of ~10 years. The growth of different clays in the forest types signifies a fundamental alteration of the soils. The secondary forest was exposed to more weathering than the primary forests and a different initial state for regrowth of tree species. The disturbed primary forest has intermediary soil characteristics between the primary forest and secondary forest. This gradient shows that although forest disturbance alters the soil characteristics, the magnitude of the change increases with swidden farming.