

CARBON CYCLING IN A MIXED LAND USE WATERSHED OF THE EASTERN AMAZON.

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The effects of tropical deforestation on carbon stocks and fluxes were investigated in the Eastern Amazon. Carbon contents in bulk precipitation, throughfall, soil solutions, streamwaters, soils, litterfall and aboveground biomass were measured from 1996 to 1998 in a 3500 ha ranch that included primary and secondary forest, and degraded and managed pastures. After forest clearing on these Oxisols there has been no dramatic increase in soil C, indicating a loss of the original 133-Mg ha⁻¹ of C stored in aboveground forest biomass. In the secondary forests and pastures, aboveground C re-accumulation per hectare accounts for 26 and 3 %, respectively, of the original aboveground forest carbon. Internal cycles of C in secondary forest throughfall and litterfall, 4.7-Mg ha⁻¹ yr⁻¹, are the same as in mature forests while C storage in woody biomass, 1.5-Mg ha⁻¹ yr⁻¹, is greater for this successional ecosystem. The pastures cycle similar amounts of C through grass turnover, ~3.0-Mg ha⁻¹ yr⁻¹, but are not re-accumulating C in woody tissues. Solution fluxes of dissolved organic carbon (DOC) to the soil surface are small, ~0.15-Mg ha⁻¹ yr⁻¹, in relation to the total C flux. DOC fluxes were similar among the different land uses with most DOC being retained or decomposed in mineral soils. Streamwater discharge-weighted mean annual DOC concentration was low, ~1.4 mg L⁻¹, but there was a positive discharge-concentration relationship indicating possible surface soil flushing of C during periods of high flow. A mass balance for DOC indicated net watershed retention with 123 kg-C ha⁻¹ yr⁻¹ in precipitation input and 4 kg-C ha⁻¹ yr⁻¹ in streamwater output.