

Neotropical Ecosystems



WAVES
Water Availability, Vulnerability
of Ecosystems and Society
in the Northeast of Brazil

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Effects of Slash & Burn vs. Slash & Mulch on Water, Solute and Sediment Dynamics at the Watershed Level

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1 Introduction

Building on the results of previous studies (HÖLSCHER, '95, '97a,b; KLINGE, '98; SOMMER, '00), an intensive study of the water and nutrient fluxes at watershed scale has been started in the summer of 2000 in the Eastern Amazon region.

In order to assess the effects of slash-and-burn and slash-and-mulch, the hydrology and hydrochemistry of a series of nested micro-catchments will be monitored at various spatial levels over period of 2 years. The study will concentrate on

the Cumarú watershed, which is located southeast of the town Igarapé Açu, and 100 km northeast of Belém, Brazil.

In order to assess the effects of land-cover change of small farm holdings on water and nutrient dynamics, a detailed knowledge of the hydrological balance components is required. Fig. 1 schematically depicts the main components of this balance and their main direction of movement. Water flow is the main mechanism transporting nutrients through a system. Fig. 2 indicates the main components of the nutrient flux for the study area.

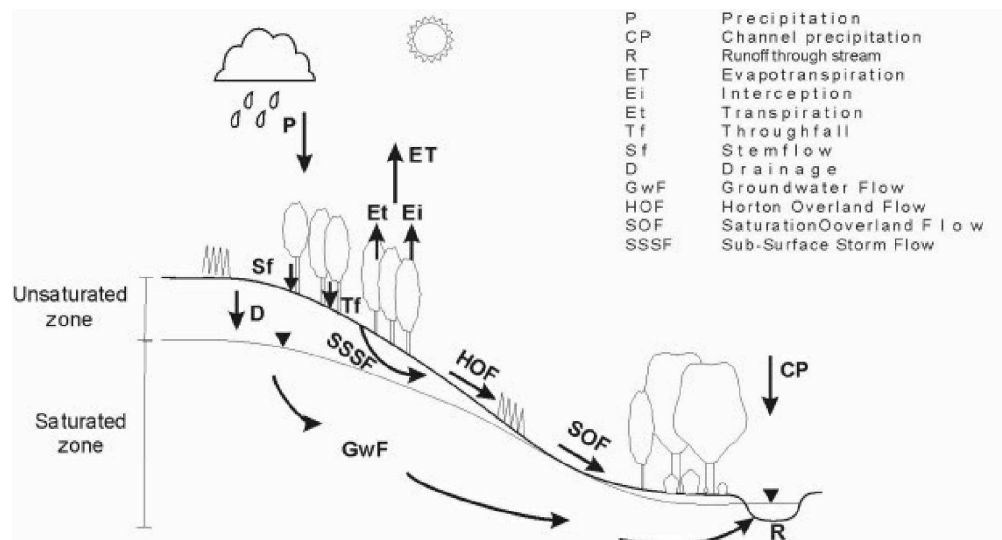


Fig. 1: The main components of the hydrological cycle of a hill slope with vegetation (Modified from PROCTOR, '87)

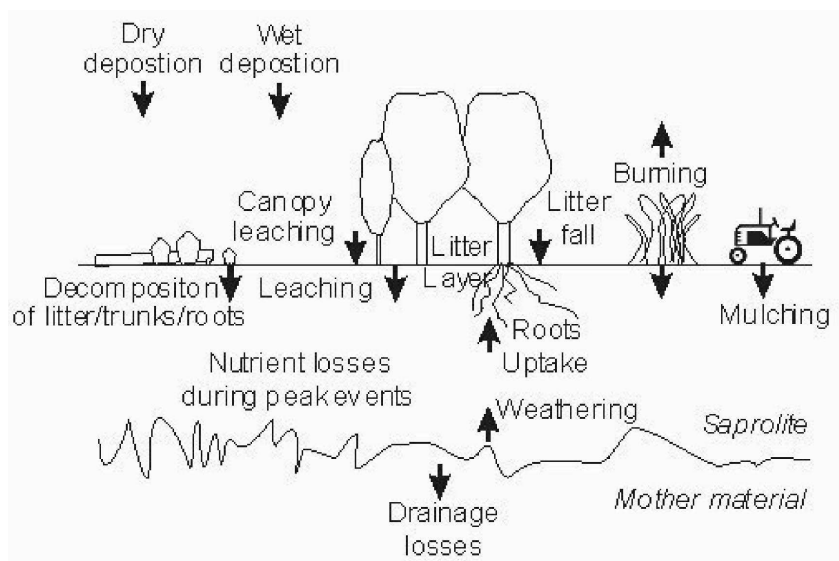


Fig. 2: Overview of the main nutrient fluxes (Modified from PROCTOR, '87)

2 Approach

To get to an estimate of dynamics and scaling effects of water and nutrient movement throughout the watershed, water fluxes and chemistry will be measured on samples from the four distinct hydrological units, being: groundwater, runoff, soil water and precipitation/throughfall. In practice this means that an attempt will be made to capture all the components of the hydrological balance and the nutrient balance as indicated in Figs. 1 and 2. In separate source areas of two sub-catchments, the two distinct types of clearing of secondary vegetation will be performed (slash-and-mulch and slash-and-burn).

Detailed information of the topography, geology and land cover will be gathered in order to allow modeling of groundwater and runoff.

In the first stage of this project a detailed topographical survey was made with GPS measurements. The generated Digital Elevation Model (DEM) will be used as a base for the groundwater-, and runoff -modeling.

Vegetation, land cover, and soil characteristics acquired by other studies in the SHIFT project will serve as a base for the extended GIS layers that will be made for this study.

3 References

- HÖLSCHER, D. 1995. PhD Thesis, Göttingen
HÖLSCHER, ET AL., 1997A. Journal of Hydrology 193: 293-305
HÖLSCHER, ET AL., 1997B. Nutrient Cycling in Agroecosystems, 47: 49-57
KLINGE, R., 1998. PhD Thesis, Uni-Göttingen
PROCTOR, J., 1987. Applied Geography, 7: 135-152
SOMMER, R., 2000, PhD Thesis (in press)