



Deutscher Tropentag, October 8-10, 2003, Göttingen

“Technological and Institutional Innovations
for Sustainable Rural Development”

The Taï Region Project on Hydrology — Input and Pathways of Nutrients in a Watershed in Western Côte d’Ivoire — A Comparison between Forest and Cocoa Plantations

ELKE FISCHER

Georg-August-Universität Göttingen, Landscape Ecology, Germany

Abstract

The Taï region project on hydrology was initiated in April 2001. Within an active cooperation between the Landscape Ecology unit of the University of Göttingen and CURAT of the University of Abidjan two main aims are pursued: 1. The characterization of nutrient pathways of the agricultural dominated part of the watershed in Western Côte d’Ivoire and 2. the development of a new method to evaluate water quality in the tropics. The investigation site and instrumentation covers three investigation plots (forest and two cocoa plantations) at the Eastern border of Taï National Park.

On each plot inputs and pathways of nutrient ions, organic carbon and nitrogen species are recorded, encompassing precipitation and throughfall concentrations, as well as measurements of the soil water (in 25, 65 and 105 cm depth), the ground water and the surface water export.

In addition to the soil investigations, surrounding land use is classified using satellite imagery. Besides, local people were interviewed giving a survey over crops and agricultural practices. Preliminary results concerning nutrient inputs and characteristic pathways within the ecosystem are presented, as for example following the pathway of magnesium (Mg) at the forest plot giving mean values. A significant increase of Mg occurred from precipitation (0.07 ppm) to throughfall (0.59 ppm) (leaching) up to the upper soil horizons (0.81 to 1.14 ppm). The passage of the rooting zone (0.42 ppm) led to a significant decrease which is likely due to root uptake. Resulting from mineral weathering processes and superficial input a further increasing step is detected between groundwater (0.06 ppm) and river water (1.91 ppm). These effects may also be responsible for the very high concentrations of sodium (up to a mean value of 80.5 ppm in 65 cm depth) found in soil solutions of all depths for both forest and cocoa plots. Potassium significantly shows an increase due to leaf leaching (e.g. cocoa 1) from precipitation (0.35 ppm) to throughfall (3.85 ppm). The high concentrations of potassium within river water (1.27 ppm) is considered to result mainly from direct input of organic material by dense river bank vegetation.

Keywords: Cocoa, Côte d’Ivoire, nutrient pathways, tropical rain forest , water and nutrient cycle