



Tropentag, September 19-21, 2012, Göttingen -
Kassel/Witzenhausen

“Resilience of agricultural systems against crises”

The Environmental Impact on Carbon Balance of Rubber Plantations - A Case Study on Nabanhe National Nature Reserve in Xishuangbanna, China

CLAUDIA AMELIA HUBER MÉNDEZ, SERGEY BLAGODATSKIY, GEORG CADISCH

University of Hohenheim, Inst. of Plant Production and Agroecology in the Tropics and Subtropics, Germany

Abstract

Rubber plantations in the Nabanhe National Nature Reserve (NNNR) keep expanding at an accelerated rate since the 1970s, displacing primary and secondary tropical seasonal rainforests and change the land use in the buffer zones of the forest reserve. This conversion can revert ecosystem carbon sinks to sources due to burning and clearing, so that large amounts of carbon are emitted to the atmosphere. This contributes to the already constantly increasing atmospheric CO₂ concentration, which is considered to be one of the most important contributors to the present climatic variability and climate change. Nevertheless, it is not clear to what extent rubber plantations are able to store carbon under different environmental conditions compared to other land uses.

The aim of this research is to study the carbon balance of rubber plantations in the NNNR depending on different environmental and management conditions.

Rubber plantations in the NNNR are located at higher elevations than are usually recommended for rubber cultivation. The biomass and latex yield therefore decrease with increasing elevation and thus decreasing temperatures. As a consequence of a lower biomass production under such conditions, carbon sequestration potential of rubber plantations would be lower, thereby decreasing its mitigation potential concerning atmospheric carbon concentration.

The study is based on a literature review and application of the LUCIA model (Land Use Change Impact Assessment tool). The carbon sequestration potential of the area's different land uses (primary forest, secondary forest, rubber and rice) will be assessed using the LUCIA model, which will allow evaluating the impact of rubber cultivation compared to the other land uses. Primary forest has the highest capacity for sequestering carbon, while secondary forest and rubber plantations perform similarly, and rice contributes the least to carbon sequestration. Additionally, the carbon emissions of the changing land use in the area during the past 20 years will be computed, and different management options to enhance carbon sequestration in rubber plantations such as intercropping and appropriate fertilisation will be assessed. The results of different scenario runs will be presented at the conference.

Keywords: Carbon sequestration, China, land use change, rubber, Xishuangbanna