



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

Trade-Off Analysis between Single Ecosystem Services – State of the Art

INGA HÄUSER, REZA GOLBON, MARC COTTER, JOACHIM SAUERBORN

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

Abstract

There is a broad consensus that feeding the predicted nine billion people in 2050 remains a major global challenge for the next decades. Increasing agricultural production is therefore essential. Irrespective of how this increase is realised, whether by taking new areas under production or by increasing productivity of existing farmland, sustainability aspects should always be considered.

Studying ecosystem services (ESS) for different land use scenarios and analysing resulting trade-offs is one of the possibilities to gain a holistic view of how agro-ecosystems perform. The ESS approach comprises several thematic fields, ranging from provisioning services (not only agricultural production but also provision of clean water for drinking and irrigation) over regulating and maintaining services (erosion control, regulating greenhouse gases) to cultural services (sense of place, recreation opportunities). By analysing these services the aspects of economic, environmental and social sustainability are taken into account.

The next step is to analyse trade-offs between single ESS for different land use scenarios. Converting forests into rubber plantations increases the income of local farmers, but negatively affects the water cycle, water quality, might impact pollination services and so forth. Methods exist to analyse and visualise these trade-offs. For a detailed picture, results for single ESS can be displayed using different visualisation techniques like green (increase) and red (decrease) arrows or sustainability polygons. Another method is to analyse biophysical values relatively. Two (or more) land use scenarios are compared for each single ESS separately. After normalising the results of each service it is possible to aggregate them into a single value indicating areas of the landscape that provide the highest or lowest percentage of combined ESS. Absolute values for ESS also allow a monetary trade-off analysis if prices are available for the assessed ESS. Thereby it is possible to calculate the net gain or loss of a land use change in monetary terms and to include discount rates for future scenarios.

The aim of this paper is to demonstrate these methods using the example of rubber production in the Greater Mekong Subregion and to discuss the pros and cons of the different approaches.

Keywords: Conflict of goals, integrated valuation, environmental performance, *Hevea brasiliensis*, plantation, SE-Asia

Contact Address: Inga Häuser, University of Hohenheim, Institute of Plant Production and Agroecology in the Tropics and Subtropics, Garbenstrasse 13, 70599 Stuttgart, Germany, e-mail: haeuser@uni-hohenheim.de