



Deutscher Tropentag, October 8-10, 2003, Göttingen

“Technological and Institutional Innovations  
for Sustainable Rural Development”

## Scenarios of a Potential Landscape Development Regarding Factors of Forest Conversion and Soil Degradation in Eastern Bolivia

JENS-PETER KRUEGER, GERHARD GEROLD

*Georg-August-Universität Göttingen, Department of Landscape Ecology, Germany*

### Abstract

The eastern Bolivian lowland is located in an ecological transition zone between the dry tropical Chaco forests, the Brazilian Cerrado-Savannah complex and the humid tropical rainforests of the Amazon basin. Due to the intersection of different bio-geographical zones, tropical deciduous forests with a high biological diversity emerged. Since the agrarian reform in 1953, these forests were gradually cleared for agriculture, principally cash-crop farms. The highest deforestation rates occurred in the 90's with clearing of wide plots for soy bean cultivation. According to the land-use plan of Santa Cruz a significant proportion of the deforestation area is part of a landscape not suitable for agriculture. The combination of the natural environmental conditions (climate, vegetation) as well as soil-types that are susceptible to degradation (compaction, loss of organic material) led to the classification as an ecological risk zone, which responds very sensitively to human impacts. This effect can be observed a few years after clearing and intensive agriculture in numerous abandoned fields or pastures. However, the economic basic conditions force the Bolivian government to maintain the pressure on the natural resources on a high level. As a consequence the region has been identified as one of the most endangered areas in the Neo-tropics.

Our study examines the potential landscape development in the main cultivation zone east of the city of Santa Cruz regarding factors of soil degradation and forest conversion. The main objective is the development of a system, which is capable to identify potential landscape changes in the future. The system development is based on the principles of the scenario formation and uses particularly fuzzy logic methods. Remote sensing data will be analysed in order to show the conversion of forest areas into agriculture since the 80's (change detection). The results are compiled together with soil, climatic and infrastructure data in a GIS data base. With respect to relevant parameters related to people - environment interactions (driving forces) practical decision rules will be deduced, tested and evaluated. The results are to be of service to national non-governmental organisations (FAN, FCBC) as decision support in regional land use planning.

**Keywords:** Bolivia, decision support, deforestation, GIS, land use planning, soil degradation