

**University of Hohenheim**  
**Institute for Plant Production and Agroecology in the Tropics and Subtropics**  
**Department of Biodiversity and Land Rehabilitation**  
**Prof. Dr. Rainer Schultze-Kraft**



**VEGETATION AND SOIL ASSESSMENT ALONG A  
LAND USE GRADIENT HILLSIDE IN THE UPLANDS  
OF NORTHERN VIETNAM**

**M.Sc. Thesis**

**Nina Nikolić**

Stuttgart-Hohenheim,  
December 2002

This work was funded by Vater und Sohn Eiselen Stiftung, Ulm

---

## 7 Summary

The alarming spreading of degraded, low-productivity land on the former forest land in the mountainous areas of Northern Vietnam where the livelihood of more than 90% of the population depends on agriculture urges the need for a more appropriate land use strategy. However, very little is known about the ecological characteristics of this land.

The work presented here is a pilot study with the objective of providing preliminary information about vegetation, soil and related land use histories of one selected hillside in the province of Bac Kan, Cho Don district, Northern Vietnam. The findings of this work are to be used as the basis for the subsequent establishment of the long-term vegetation dynamics study.

The physiognomic description of the encountered vegetation was based on the principles of Braun-Blanquet school; the species composition, stratification, and abundance-dominance indices of species were recorded in each unit. Additionally, trees and tree saplings in the forest stands were quantitatively assessed by the point centered quarter method (PCQ). Soil pH, organic matter content, CEC, N, P and K concentrations, Al saturation and bulk density were analysed. Three soil profiles were opened, described and sampled at the selected hillside. Land use history and local land use strategies were assessed with the aid of PRA tools.

On the selected hillside of the length of 1.35 km the total of 351 plant species belonging to 244 genera of 80 families were identified within the 13 distinguished physiognomic units, conditioned by the series of consecutive land uses that followed the conversion of forest to cropping land and eventually pasture. On the basis of the importance values of the tree species obtained by PCQ it was possible to assess the degree of disturbance and the direction of regeneration of the forest communities. The described physiognomic units represent a sequence of seral stages in a regressive succession of the climax laurel forest (dominated by Lauraceae, Fagaceae and Magnoliaceae) towards the degraded pasture dominated by *Paspalum conjugatum*, *Axonopus compressus* and *Chrysopogon aciculatus*. The disturbance by buffaloes is recognised as the major factor influencing the ordination of physiognomic units along the hillside. The cyclical repetitions of an

apparently regular pattern of disturbance condition the vegetation type, which, over the time span of a fallow length of about 20 years, causes the differences in soil properties of physiognomic units. The soil was determined as Dystric Cambisol, with the main constraints of low base and high Al saturation and high skeleton percentage. The information on land use histories of the surveyed plots obtained from the local land users was essential for explaining the origin of the differences among the physiognomic units.

The results of this study document the present floristic composition, the morphology of plant communities and the species dominance relations along the hillside of the selected locality and indicate the major soil constraints for plant production. From bringing together the information about the plants, the soil properties and the land use histories of the plots surveyed in this work, a hypothesis arose about the possible regeneration scenarios that had conditioned the appearance of seral stages of bamboo community, *Melastoma* complex, secondary woody complex, Asteraceae complex, pasture and bushy savannah at the research locality. This hypothesis is to be checked in the future.