



University of Hohenheim

Institute for Plant Production and Agroecology in the Tropics and
Subtropics

Institute of Soil Science and Land Evaluation

Charcoal in sediment layers: A way to estimate land use intensification on reservoir siltation?

Masterthesis

Anne Margarethe Weiss

Supervisors

Professor Dr. Georg Cadisch

PD Dr. Sabine Fiedler

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Abstract

Worldwide erosion and runoff are filling up reservoirs rapidly, decreasing their buffer capacity and resulting in irrigation water deficiency or flooding. The degree of sedimentation, however, is not only depending on rainfall patterns and topography but also on the land use around the reservoir. Therefore land use changes, soil erosion and sediment transport studies in regions with intensive agricultural practices are essential for reservoir protection. The objective of this study is to understand the impact of land use intensification on sedimentation using charcoal as an indicator. It is hypothesized that charcoal, resulting from slash and burn practices, is eroded and transported to the water body, and by its occurrence in sediment layers can be used as an indicator to reveal the contribution of each land use systems to the silting up of the reservoir. Seven profiles which were influenced by different land use systems (maize/cassava intercropped, agroforestry and secondary forest) have been dug in the dry lake bottom of Chieng Khoi Lake, Son La province, North West Vietnam. Visible distinguishable layers were investigated regarding thickness, colour, particle size distribution, and total organic carbon (TOC) to examine sediment transport capacity. Charcoal composition was analysed by using differential scanning calorimetry (DSC). For measuring erosion and runoff throughout the rainy season of 2008, Gerlach troughs were installed in upper, middle and lower slope position at all three fields above the profiles. A bathymetric survey of the lake was performed to calculate the lake volume. With the annual sediment yield, the lake volume and the trap efficiency (TE) the future decrease in buffer capacity of the lake can be estimated. These findings can be used for sensitization of the local population and policy makers and in decision making processes to develop a more sustainable land use system that is still economically attractive.

Key words: *charcoal, lake sedimentation, land use history*