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Landscape Vulnerability Assessment in Data-Poor Regions: A Case Study in a River Basin, Central Vietnam

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Abstract

Landscapes worldwide undergo highly dynamic land use development to promote economic growth and thus human well-being. This causes conversion of forests and other natural areas of vegetation to agricultural land or settlement area, and is frequently accompanied by the expansion of road and electricity networks and an increased use of natural resources. Consequences, namely fragmentation of natural landscapes, deforestation, biodiversity loss, soil and water pollution, and soil erosion, add to landscape vulnerability, and in the long run will negatively affect human well-being.

The present study aims at identifying the spatial distribution of landscape vulnerability of the Vu Gia Thu Bon River Basin (VGTB) in Central Vietnam. The construction of such a vulnerability map is a first step to identify critical areas in large regions, where more detailed research is necessary. The study is conducted as part of LUCCi project (<http://www.lucci-vietnam.info>), which comprises a topographically heterogeneous area of > 12,000 km² for which hardly any spatial data are available.

The landscape vulnerability assessment focuses on four criteria relevant degradation in the study area: forest loss and degradation, contaminant input by rivers, illegal logging impact by roads (of firewood and non-timber forest products NTFPs), and soil erosion. The following spatial data are classified into vulnerability classes and transferred into a gridded map: forest classification data is based on LANDSAT satellite images and distinguishes between forest (low vulnerability) and degraded forest (high vulnerability). Buffer areas along rivers are classified based on distance ranging from very high (0–50 m) to low vulnerability (>200 m) to contaminant input. Illegal logging impact areas are classified based on distance from road, ranging from very high (0–200 m for firewood and NTFPs) to medium (200–1,000 m for firewood and NTFPs) to low (> 20 km, maximal range for illegal logging). Vulnerability to soil erosion is assessed on basis of the USLE-formula using primary and secondary data. By overlaying different criteria, a map is generated which shows areas which are particularly vulnerable and where further research is needed to find sustainable land use strategies.

Keywords: Landscape, vulnerability

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