Landscape structure analyses using remote sensing data to support sustainable catchment management

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The project "Water retention by land use" (WaReLa) is a European Interreg III B – NWE programme, granted within the frame of priority 3 (water retention and flood protection). 11 partners from four states are involved to develop a decision support system (DSS) and to implement tangible retention measures in the test sides. The aim of the project is to optimize water retention in micro- and meso-scaled catchments of low mountain ranges in Central Europe as a method of precautionary flood protection.

One component of the DSS will be a multi-sensor remote sensing approach to map and analyse landscape structures. This will provide information on two categories of timescales. First will be used to provide base data to gather regional retention potentials and to support sustainable and efficient planning of measures for water retention. The second is a retrospective one. With the analysis of steadiness and alteration of landscape structures in the study areas, an assessment of temporal dynamics and the compilation of future scenarios will be enabled.

For the realisation of the landscape structure analysis the two test regions "Bitburger-Gutland" and the "Saar-Nahe-Bergland" have been chosen. Both regions differ in their socioeconomic and physical properties. For these regions and nested subregions remote sensing data of different spatial and spectral resolution were acquired and pre-processed. For year 2000 an unsupervised classification based on Landsat data was performed to generate land cover maps of seven classes. In a following step the land cover map was transformed into a map of structural indicators (e.g. landscape metrics like patch size, edge metrics and domination of a single land cover class), which are assumed to be correlated with hydrological processes. On the base of these maps a spatial classification of catchments (as reference units) followed. For smaller ar-

eas, nested in the mentioned regions, high spatial resolution Quickbird data will be acquired during spring 2005 to supplement the archive date used so far. Using this data investigations are focused on the derivation of line structures (roads, drain lines, hedges) sealed areas and smaller scaled alternates within the landscape. In addition the dependence of landscape structures on the spatial resolution of remote sensing data is assessed. Finally the possible added benefit of maps of rapid saturated areas to the landscape analysis is also under investigation.

The investigation of temporal landscape dynamics is performed using Landsat data for the years 1975, 1984 and 2000 was acquired and pre-processed. For these three dates land cover maps of seven classes were generated. After a validation with ATKIS and census data, a change detection analysis was accomplished. To allow a more detailed classification and to detect seasonal land cover dynamics five images of the satellites Spot 4 and 5 were acquired and used to generate a land cover map for the year 2003.