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Remote Sensing Based Mapping of Land Use Systems and Land Cover Change in the Rain Forest Margin of Central Sulawesi

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Abstract

The SFB-552 “Stability of rainforest margins” examines the processes of destabilisation at the forest border and analyses factors and processes that may conserve forest systems. Within this framework, remote sensing data analysis provides a spatial coverage of the landscape pattern. Earth observing satellite sensors are able to deliver spatial and temporal data for the assessment and observation of land use change at the rain forest margin.

At the Institute of Geography, processing and analysis techniques are evaluated and developed to supply a reliable and operational processing chain for the exploitation of (optical) remote sensing data and to monitor land use and cover change (LUCC) in tropical regions. One aspect of the ongoing research is the routinely land cover classification at the regional scale based on Landsat-data. A time series ranging from 1972 to 2002 is available for the project area. Landsat-data analysis is a well known procedure but has also often shown to be limited by the number of land use units that can be differentiated. The diversity of land use systems in the tropics and the resulting variability of the physiognomy of annual and perennial crops constitutes a problem in the classification process of optical remote sensing data. In most cases, only one data take per year is available and thus the temporal dynamic and spectral behaviour of land use types can not be detected successfully by the use of conventional (pixel-based) classification techniques.

For this reason, additional information has to be considered during the classification process. This is done by a context-based method that integrates spatial properties (shape, distance, location) of the objects and their relations as well as historical data and logical functions in the classification process. The result is an improved thematic map showing the status and the changes in the distribution of the major land cover types within the past 30 years for the Lore Lindu National Park area and its surroundings. Thus, the work presents a basis for socio-economical and ecological analysis and modelling of land use scenarios within the SFB.

Keywords: Land cover, land use change, rain forest, remote sensing