Landcover Mapping of Badah Aceh, Indonesia, using Optical and SAR Satellite Imagery

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The Federal Institute for Geosciences and Natural Resources (BGR) in Hannover is presently engaged in a project of technical co-operation in Indonesia aiming at the geoscientific support of the safe reconstruction of the region Banda Aceh. Central topics of interest are thereby among others the apparaisal of building foundations, general risks and dangers (like Tsunami, landslides, seismic and volcanic risks, inundations, etc.), economical analyses of raw materials and hydrogeological works. Remote sensing is used to support the mentioned topics by delivering supporting relevant information. In the context of this paper it is investigated to what extent a land cover classification produced by a combined processing of optical and SAR data can improve more efficiently and and correctly a land use map, produced simply on the basis of pure optical data by conventional supervised and knowledge based classification.

For this purpose a methodological approach has been developed using a segmentation based on optical satellite imagery (SPOT and ASTER) and a classification using among others an analysis of the SAR backscatter (ENVISAT ASAR and RADARSAT) together with a Digital Elevation Model (DEM).

The necessary objects to be mapped by this approach have been defined in an interpretation specification taking into account the different sensor characteristics and thematic mapping requirements.

In the workflow of the segmentation the SAR backscatter data has been treated as additional band beside the optical bands. The texture information of the SAR data for the different objects has also been taking into account. A statistical and visual comparison of the absolute optical data and the additional data set with the SAR backscatter has been evaluated.

In a second, pixelbased approach several image fusion techniques for combining optical and SAR backscatter data are investigated and discussed.

A ground check using the derived thematic landcover map and partly existing orthophotos has been carried out and integrated into the final map.

The Work has been carried out within a diploma thesis which was supervised by the Institute of Photogrammetry, Leibniz University Hannover and BGR.