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Spatio-Temporal Integration of Socio-Economic Factors Related to the Land-Cover Changes in the Blue Nile Region, Sudan

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Abstract

Considering the dramatic loss of natural resources occurred in the Blue-Nile region of Sudan, this study is of great value of developing a method for monitoring the changes over time and its driving forces. Moreover, especially when we deal with communities a high dependency on natural resources for their everyday needs and income generation that has to be considered. The study utilised three consecutive optical multispectral images to evaluate the land-cover dynamics during the period 1990 to 2009. The method adopted in this research uses cross operation of multi-temporal classified images and subsequent reclassification of the overlaid images to be compared for change detection. New layers of segments were created representing the change areas (from-to) as well as the overlapped areas (no change) of each pair of classified images. Aggregated to the community-level, social survey of household data provides a comprehensive perspective additionally to earth observation data for predetermining hot spots of degraded and successfully recovered areas. Hence, the study utilised a well designed questionnaire to address the factors affecting land-cover dynamics and the possible solutions based on local community's perception. Population Proportional to Size (PPS) sampling technique was applied to collect 120 questionnaires distributed among six villages. The data was analysed based on descriptive statistic analysis using SPSS Software. Randomly selected sites mentioned by the respondents were visited and spatially allocated. Subsequently, these data were introduced to develop rule sets for the change analysis based on object-based approach. The present study exhibits a great potential for accurate land-cover change detection, when utilising object-based post-classification technique with optical multispectral satellite imagery. It also shows the strong capability of the adopted method for gaining knowledge of the change dynamics and its driving forces. At the community level, the study indicates that due to the disregarding of customary land laws the local community no more look at the forest as their own, and thus have commenced to practice all their activities in the forests as illegal. Moreover, the results of the combined analysis indicate that the mechanised rain-fed agriculture was the major force of forest cover loss.

Keywords: Land tenure, land-cover dynamics, natural resources, object-based, optical multispectral imagery

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