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Remote Sensing Based Study on Land Cover/ Land Use Dynamics in Agriculture of Semi-Arid Lands, Eastern Sudan

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Abstract

This study applied two different techniques of change detections: Matrix change detection of routine supervised classification and multivariate alteration detection (MAD). These techniques were used for mapping and assessing the land cover / land use dynamics of the semi arid lands in the Gash agricultural scheme, eastern Sudan, during the period 1972 to 2010. For that, four free cloud remote sensing data sets (multi temporal satellite images), were acquired for the years 1979 (MSS), 1987 (TM), 1999 (ETM+) and 2010 (Aster). These images were covering the study area, were geometrically, radiometrically, and atmospherically corrected to remove the distortions, and were classified for analysis using maximum likelihood classifier via Erdas imagine software. The analysis produced five land cover / land use classes namely: mobile sand land, high dense mesquite trees land, low dense mesquite trees land, stabilised sand land and cultivated land. The routine matrix change was applied to determine values and to map land cover change during the study period. A MAD was also applied as linear transformation to identify the change quality. Final results showed a noticeable rapid decrease of the cultivated land to 50 %, from 25.2 % to 13.8 %, as a result of accelerated and drastic increase of both the mesquite trees land (42.3 %) and sandy land (42.0 %) during the last period (1999-2010) of the study. Furthermore, the increase of both the mesquite trees land and sandy land affected the residential areas as well as threatened the Gash River course during dry season, consequently led to decreased arable cultivated land, and hence decreased crop production in the study area. The study concluded that remote sensing can be used to support mapping and assessing land cover dynamics and to provide more information on changes in vegetation, particularly for studies in semi arid regions.

Keywords: Gash agricultural scheme, land cover / land use dynamic, mapping and monitoring, remote sensing