Applying Change Vector Analysis Method to Detect Vegetation Regeneration and Deforestation in Southern Darfur, Sudan

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Abstract

The continuous extraction of wood and the conversion of forest to scale agriculture due to rapid growth of human population in Southern Darfur State since the drought of 1985 (4.15 % per year) are rapidly changing the natural vegetation cover of the Edd Al Fursan locality,. However the main aim of the presented study was to assess change dynamics of the natural vegetation cover during the period 1972 and 2008 in this area.

Multi-temporal Landsat (MSS, ETM) and ASTER data has been utilised to detect historical vegetation change using Change Vector Analysis (CVA) of Kauth- Thomas features representing brightness and greenness. The technique produced images of change direction and magnitude between two dates based on the inputs of brightness and greenness. The direction of change indicated whether a landscape had experienced deforestation, reforestation, or remained persistent. Magnitude indicated to what degree the change occurred. Supervised classification has been used to quantify different land cover classes. The results of the study show that intensive deforestation as well as bare soil expansion occurred during the periods 1972–1984, 1984–1989, 1999–2008 and 1972–2008. Since the early 1970s drought conditions were present and human migration from Northern to Southern Darfur took place. Moreover in recent years conflict and war pushed a very large number of the Internally Displaced Persons (IDPs) into that area. Many areas have been cleared from its forest cover either for agricultural purpose or selling. The harvested wood was sold at local market as fire wood and or building materials. In contrary significant vegetation regeneration occurred during the period 1989–1999, which indicates that the environment recovered from the drought due to sufficient annual rainfall as well as livelihood diversification that adapted by local people. The study demonstrated the capability of the CVA to classify and quantify vegetation cover change in Southern Darfur.

Keywords: Change detection, change vector analysis, land cover change dynamics

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