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Monitoring Spatio-temporal Dynamics of Land Cover/Use in the Gum Arabic Belt of Kordofan, Sudan by means of Remote Sensing and GIS

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Abstract

Land cover/use change is a necessary step for an interdisciplinary research involving climate, ecological and socioeconomics drive and the process and response of change. The research was carried in Kordofan State in Sudan, which is situated in the gum arabic belt. The belt is situated at latitude between 12° and 14° N and covers one fifth of Sudan area. The vegetation cover is dominated by *Acacia senegal*, which is regarded as sustainable in terms of its environmental, social and ecological benefits. The objective of this study was to classify, investigate and analyse the land cover/use dynamics over 35 years in the gum arabic belt using supervised image classification and vegetation indices. Multi-temporal MSS (1972), Landsat TM (1985), Landsat ETM+ (1999) and ASTER (2007) data has been utilised to analyse the historical vegetation changes. Five land cover/use classes were extracted by remote sensing classification after the image pre-processing such as geometric correction and registration. A change matrix was created in order to map the land cover/use changes from 1972 to 2007. The results indicate that the forest dominated by *Acacia senegal* class covers 23.12 %, while bare and farm land, grass and bush land, mixed woodland and residential area classes cover 16.65 %, 48.32 %, 10.17 % and 1.73 %, respectively. From 1999 to 2007, a considerable recovery and improvement in land cover in the gum arabic belt was observed, due to the good rainy seasons. The study concluded that, using of the traditional *Acacia senegal*-based agro-forestry as one of the most successful forms of natural forest management in the gum belt will give successful land cover/use recovery.

Keywords: GIS, Gum arabic belt, land cover use, remote sensing, Sudan