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# Application of Remote Sensing and GIS in Land Use and Land Cover changes in West Kordofan State, Sudan

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**Abstract**

This study was conducted in West Kordofan state, Sudan. The aimed was to identify, analyze, monitor and map of land use and land cover changes in the period from 1986 to 2014. It also aimed to investigate the impacts of socio-economic activities on the land use and land cover changes. Three Landsat imageries with multi-temporal dates; thematic mapping (TM) 1984, enhancement thematic mapping plus (ETM+) 2003 and Landsat8 2014 were acquired in dry season. The imageries were geo-referenced and radiometrically corrected. Image classification, change detection and accuracy assessment were applied. A total of 200 control points were registered using Global Positioning System. For social survey, 75 respondents (6 %) were randomly interviewed on issues related to land use and land cover changes using a questionnaire. Remotely sensed data were processed and analysed using ERDAS 9.1 and ArcGIS10.0 software, while social survey data were analysed using Excel and SPSS. The results of land use and land cover classification showed six classes; dense forests, agricultural and bare land, shrubs land, range land, low dense forest and water bodies. The overall transformation of land use land cover during the studied period 1986–2014 is indicated by the increase of water bodies from 0.01 % to 0.19 %, agricultural and bare land from 31.39 % to 44.6 % and range land from 12.69 % to 39.24 %. However, during the same period, dense forests, low dense forests and shrubs land showed a decreasing rate from 20.97 % to 8.93 %, 8.85 % to 3.61 % and 26.09 % to 3.41 %, respectively. The overall accuracy assessment of classified imagery from TM, ETM+5 and landsat8 revealed 0.75 %, 0.81 % and 0.88 % in Kappa statistics, respectively. The results of social survey indicated that population activities have significant impact on land use and land cover changes ($\alpha$= 0.05). The study recommended conduction of periodical assessment and monitoring the land use and land cover changes with the aid for remote sensing techniques for strategic land use and land cover planning.

**Keywords:** , changes, GIS , land Cover, land Use, remote Sensing , Sudan, West Kordofan

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