



Tropentag, September 9-11, 2020, virtual conference

“Food and nutrition security and its resilience
to global crises”

Assessing Changes in Land Cover of Kassala State, Eastern Sudan Using Multi-temporal Landsat Imagery

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Abstract

In semi-arid region, where fragile ecosystems are dominant, the land cover change often reflects the most significant impact on the environment due to excessive human activities.

Land cover change (LC) plays a pivotal role in regional socioeconomic development and global environment changes. Accordingly, to the location of the selected study area in semi-arid region, human activities such as livestock grazing by nomads and large scale mechanised farming operation has influenced the ecological pattern of the area. thereby resulting to loss of natural vegetation, reduction of ground water via a low rainfall trend and decrease in clay soil which accelerate desert-like condition and introduction of unfavourable mesquite tree. The study attempt to assess and analyse variation of land use land cover changes and it is impacts in Kassala state, particularly the changes on the agricultural territories in the Gash river scheme, Eastern Sudan. Multi-temporal remotely sensed data (Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper plus (ETM+) between 1980 and 2015 were used together with Geographical Information System (GIS) techniques to assess changes in the study area. To minimise the seasonal fluctuation and removal of different distortions from the satellite images, atmospheric correction, radiometric correction for the spectral reflectance, geometric correction, reprojecting and rectification using a nearest neighbourhood method were done. To identify the land use land cover classes, a supervised maximum likelihood classification routine were used for the entire sub areas. The classes identified were: clay soil, sandy clay soil, high dense mesquite trees, low dense mesquite tree and sand land. The study reveals that there was rapid increase of invasion of mesquite tree as well as increase in sand land during the period of the study and clear decrease in cultivated and grass land.

Keywords: Kassala state, land cover, remote sensing, semi-arid region, Sudan