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Assessment of Desertification in the North—western Part of Nigeria Using Remote Sensing and Gis: A Case Study of Sokoto State, Nigeria

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Abstract

Desertification is the diminution or destruction of the biological potential of the land cover (forest cover) leading ultimately to desert-like conditions. The process of deterioration in the ecosystems caused by desertification can be measured by accelerated soil deterioration, and increased hazards for human occupancy. Desertification is a very serious environmental problem which is currently ravaging the north-western states of Nigeria; it has progressed due to vegetation depletion induced by human activities and climatic factors, which has lead to decline in agricultural production, exacerbates hunger and malnutrition, as well as increase level of existing poverty in the country. The study was carried out in Sokoto state, North-western Nigeria. It covered an area from latitude130 04´ - 130 44´N and from longitude 40–5023´E. The objective of this research is to evaluate the extent and rate of desertification in Sokoto state, North-western Nigeria, using remote sensing and GIS from 1986–2007.

Satellite imagery (historical and current) from Landsat TM (1986), Landsat ETM (1999) and NigeriaSat^{-1} (2007) of the study area were radiometrically and geometrically corrected and co-registered. The three satellite images were classified into seven land use classes using collected training samples in supervised classification approach (maximum likelihood). ILWIS academic 3.1 software were used for image classification, change detection and analysis. The results of the assessment proved that there was significant change in forest cover depletion and an increase in farmland area which lead to increase in bare surface there by resulting into desertification. From 1986 to 1999, the rate of desertification was 4.01 % while the rate of desertification within the period of 1999 to 2007 was 4.91 %. The extent of desertification in the study area was also assessed and result shows that desert area (bare surface) expanded over area coverage of 930.3 km^2 (7.16 %) between the period of 13 years (1986–1999) and 2142.72 km^2 (16.48 %) between the periods of 8 years (1999–2007). It can be concluded that, application of remotely sensed data is reliable tool for the spatial dimension assessment in full coverage for proper mapping and monitoring of desertification

Keywords: Assessment, desertification, Remote sensing, Sokoto State

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