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Mapping and Assessment of Sand Encroachment on the River Nile, Northern Sudan, by Means of Remote Sensing and GIS

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Abstract

Wind erosion is the most widely spread soil degradation process in the arid and semi-arid zone of Sudan affecting over 40% of the 64 million hectares of degraded land. Sand encroachment on the Nile river in north, on productive first terrace alluvial soils, on villages and infrastructures are additional manifestation of land degradation. Desert encroachment has been recognised as the most serious environmental problem in northern part of the country. In the last two decades remote sensing proved to be a powerful technique for monitoring and assessment of natural resources in large areas. The aim of this research is to investigate the potential use of remote sensing and GIS in assessing and monitoring of sand encroachment as desertification indicator in Nile river, northern Sudan. The study was conducted in Kannar area in northern Sudan on the eastern bank of the Nile river. Three cloud free landsat images MSS (1972), TM (1987) and EMT+ (2001) covering the study area were acquired for the research. The MSS (1972) and TM (1987) images were geometrically co-registered to rectified EMT+ (2001) image (UTM north zone 36N) using ground control points (GCPs). Supervised classification and change detection were used for the analysis of the images. The study showed that the erosional forms (sand dunes active and stabilised) in the area in 1972, 1987 and 2001 cover about 47.2%, 52.2% and 49.9% of the total area, which indicate that half of the area is affected by sand dune encroachment (is degraded by sand invasion). This degradation is related to wind erosion (physical environment and harsh climatic conditions) and human misuse (*e.g.* cultivation). Sand encroachment threatens the highly productive agricultural land and settlement in Kannar area, the course of the River Nile and endangers the livelihood of inhabitants in the area. The study concluded that, remote sensing and GIS are helpful techniques in studying, assessing and monitoring sand encroachment.

Keywords: Mapping, remote sensing, river Nile, sand encroachment