RSHS18-65-1
Remote Sensing and Hydrology Symposium (ICRS-IAHS)

An evaluation of river basin morphometric characteristics from multiple sensors imageries: Example from Opa River Basin in southwest Nigeria

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Existing studies on the hydrological basins in Africa have indicated poor understanding of the behaviour of most medium – to - large basins, despite that they support important livelihood activities, due to inadequate evaluation procedures. Commonly used procedures lack the spatial and temporal dimensions which remote sensing method offers. The present study is therefore aimed at understanding the changes in within one (Opa river basin) of the sub-basins of Ogun-Osun River Basin in Nigeria, especially with increasing level of urbanization in the area. Data used were the multi-date Landsat imageries (1986, 1999, 2002 and 2016) for evaluation of land use/cover characteristics within the Opa river basin, 2014 (30 by 30m) SRTM, 2011 (15 by 15m and 30 by 30m) ASTER DEM of the basin. Data were analysed using the Arc-Hydro extension in of the ArcGIS 10.1. The Opa basin is a 5th – order basin, with 4.6 bifurcation ratio, and of the dendritic drainage pattern. Analysis of the landuse/cover change showed about 47 % decrease in natural vegetation area and 65% increase in farmlands and built-up areas. Total streams lengths were underestimated, and mean lengths overestimated by at least 10% with SRTM data over ASTER data. The study stratified the river basin into 13 sub-basins of three major morphological types for easy management. The study concluded that landuse/cover in the river basin has changed, and so are selected basin morphometry. The study recommends further study into the patterns of change of the water quality in the basin.

Keywords: Landuse/land cover change, Morphometric analysis, Remote sensing in River Basin analysis, River basin management