The Osun Drainage Basin in the Western Lithoral Hydrological Zone of Nigeria: A morphometric study

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Abstract

The importance of drainage basin as a planning unit for water resources development and management cannot be overemphasized and this requires accurate characterization of the drainage basin. This study takes a closer look at the Osun drainage basin with a view to updating the existing records, estimate the morphometric features and make hydrological inferences. The data used in this study include a 30m resolution Digital Elevation Model (DEM) acquired from the United State Geological Survey (USGS), geology map of Nigeria acquired from Nigeria Geological Survey Agency (NGSA), Harmonized World Soil Database (HWSD) prepared by the Food and Agricultural Organization (FAO), and the 1991 locality population data of Nigeria acquired from National Population Commission (NPC). Remote sensing and GIS techniques were adopted in the analysis of the data using ArcGIS 10.2. The acquired DEM was used to delineate Osun drainage basin and 21 morphometric parameters were estimated. The results revealed that Osun drainage basin is a 4th order drainage basin, with an area of 9926.22km², and a length of 213.08km. The area covered by the two geology types and the four soil types were quantified and it revealed that 93.28% of the basin is underlain by the Basement Complex rocks, while 50.89% of the basin is covered by sandy clay loam soil. All these will influence the basin discharge rate, chances of flood occurrence, peak flow, infiltration rate and recharging of the Osun basin groundwater system among others. Based on these results, this study serves as a scientific database for further detailed hydrological investigation of Osun drainage basin while benefiting the sustainable drainage basin management and development programmes of the Ogun-Osun Rivers Basins Development Authority.

Keywords: drainage basin, GIS, hydrological zones, morphometric features, Nigeria, Osun River, water resources management