

Morphometric Analysis of Delta State River Niger Basin in Nigeria Using Remote Sensing and GIS

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SUMMARY

In contemporary times, the pace of climatic changes is increasing in alarming rate therefore the need to adopt the most reliable technologies to monitor and sustain our environments. Technology involving the integration of geographical information system (GIS) and remote sensing technique has proved to be reliable in solving problems in geospatial space. Therefore the aim of this paper is to demonstrate the potential of Remote Sensing (RS) and Geographic Information System (GIS) techniques for characterization of Morphometric attributes of Delta state river Niger basin in Nigeria. Basic terrain and hydrological parameters such as slope aspect, 3-D Land scape, sub-catchments, flow direction, channel networks, drainage density, stream orders, stream frequency etc has been processed using Advance space borne thermal emission Data (ASTER) in GIS environment. Ground truthing and accuracy assessment has been carried out to ensure the reliability of the result. Based on Strahler's method of stream ordering, the river basin is designated as 4th order basin, with 1st order streams mostly dominating. The overall stream network revealed a hierarchy of 1st, 2nd, 3rd order streams with Benin river, Escavos river, River Forcados, which originate from the Atlantic ocean and river Niger positioned as 4th order streams in the hierarchy. This study reveals a total number of 123 streams draining an area of 17530square kilometers of land. The total sum of the lengths of the streams measured 2907.33kilometers giving rises to a drainage density of 0.1659km-1. It further revealed that there are ninety six (96) first order streams, nineteen(19) second order streams and four (4)third order streams within the basin. Further investigation revealed that the basin has circulatory ratio of 0.4, stream frequency of 7.017×10^{-3} , Form factor of 0.154, basin length of 337.60km and bifurcation ratio of range of 4.75 to 5.0. These digital derivatives are essential for the proper management of the river basin and also attest that Remote Sensing and GIS can be effectively utilized as a viable tool to study river basins and their associated morphometry.

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