

Multi-Criteria Evaluation of Sites for Small Hydropower Energy Potential in Eastern Nigeria Using Geospatial Technology.

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Key words: Geoinformation/GI; Hydrography; Remote sensing; Geospatial Technology; Modelbuilder; River Reach; Multi-criteria Decision; ASTERDEM.

SUMMARY

Multi-criteria evaluation of sites for small hydropower energy potential in Eastern Nigeria using geospatial technology.

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Abstract

Efforts at advancing the various ways of developing energies that are environmentally friendly have been a national and global concern. Small hydropower energy is one of such energies and its potential in Eastern region of Nigeria, is being explored. This study was aimed at employing the geospatial tools at evaluating sites with the potentials of small hydropower energy within the study area. The research adopted the Multi-Criteria Decision Making ModelBuilder - a geoprocessing research tool of ArcGIS 10.1 GIS software – for data processing, analysis and suitable sites selection. The data used are: the Advanced Spaceborne Thermal Emission and Reflection Radiometer- (ASTER) Digital Elevation Model (DEM) of 30m resolution, the National Forest Reserve shapefile of the study area and the Nigeria river map, which was acquired and re-sampled into one kilometer by one kilometer (1km x 1km) pixels in order to determine the 1km river reach. The combination of the slope factor map with the river reach produces the slope for every one

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kilometer of the river reach. The criteria for generation of Small Hydropower potential map include river reach of 1km, slope $\geq 30\%$ and forest reserve exclusion. The results showed the small hydropower energy potentials map of eastern region of Nigeria, with suitable areas lying more in Bayelsa and Rivers States over an area of 19,700 Ha or 0.2% of the entire area. The result of the research can be broken down further into local government authorities and deployed for the development of the alternative renewable energy potentials in the region.

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