Application of Geospatial Techniques for Analysis of River Inundation and Flood Risk Potential along Lower Niger Basin in Nigeria

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SUMMARY

The application of geospatial technologies (Remote sensing and GIS) in analysis and management of spatial information is gaining popularity in recent times. It provides information that has proved useful for a wide range of application in disaster management. The evaluation and management of floods constitute the first step and the rational basis of mitigation measures against flood damages. Geospatial techniques have been proved to be the most effective tool for flood analysis. The use of remote sensing and GIS techniques for flood mapping and monitoring is an important tool of information for decision-makers. Therefore, an attempt has been made to apply this modern technique for the assessment of 2012 river inundation and flood risk along lower Niger basin in Nigeria. Time series Moderate resolution imaging spectrordiometre (MODIS) data of NASA terra satellite, SRTM, land use/cover map, population data and geographical information system (GIS) were used for this purpose. The map generated from the non-flood image captured on 20th October 2010 was used as a reference to determine the extent of flooding from the disaster image and the spatial impact was measured based on the proportion of the submerged land territory while physical impact was measured based on the affected population. Five indexes of flood risk identification, namely, elevation, proximity to the river land use, population density and flow accumulation were used for flood risk analysis in the study area. Each of these parameters was reclassified into four which included high risk, moderately risk, low risk, and no risk through the ranking process. The objective for using multiple factors was to define areas with the highest risk inducing factors (most likely to flood) and assess how closely these locations are to the actual flooded areas reported during the 2012 flood. Flood risk map (FRM) was later generated by overlaying the reclassified maps of all the parameters using addition operator. The integration of remotely sensed data and other spatial and non-spatial data within the GIS platform was able to produce series of thematic maps which was used to generate a geospatial database for flood risk analysis and assessment. The result of the analysis shows that the areas inundated was also the locations identified as very high

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risk zones. This effectively demonstrated the contribution of geospatial methods in management of flooding. It was therefore, suggested that policy makers and all stake holders concerned in disaster management should adopt this reliable technique for informed decision making.

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