Assessment and Analysis of Flood Vulnerability In Abia State Using Tuflow and HEC-RAS

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SUMMARY

This study aimed at Assessing and analyzing flood vulnerable areas in Abia State using HecRAS and Tuflow. The methodology involved acquisition of Sentinel-2 imagery covering Abia State, Rainfall data and ALOS PALSAR. Image subsetting was done to extract the area of study from the acquired dataset; this was followed by analysis of DEM accuracy using root mean square error, image classification to extract the landuse/landcover of the study area, surface runoff modelling to determine surface runoff potential in the study area and flood modelling. The flood frequency return as modeled by HecRAS revealed a 25.43km2 inundation extent in a 2-year return period, 28.09km2 inundation extent for a 5-year period and 26.67km2 inundation extent for a 10-year return period, increasing to its peak extent by 3.15% by the 5-year return period, then decreasing by 1.8% by the 10-year return period. The flood frequency return as modeled by TUFLOW also revealed a 24.97km2 inundation extent for 2-year return period, 27.87km2 inundation extent for a 5-year period and 26.10km2 inundation extent for a 10-year return period, increasing to its peak extent by 3.67% by the 5-year return period, then decreased by 2.24% by the 10-year return period. The surface runoff potential revealed that 35.99% with an area of 1630.19 km2 had low infiltration potential, 32.51% with an area of 1472.56 km2 had moderate infiltration while 31.50% with an area of 1426.82 km2 had high infiltration. This indicated that a large portion of the study area has a high potential of low surface infiltration which will lead to flooding during rainfalls. The modelled zones points were compared to flood points obtained from ground using correlation analysis and the results revealed that HecRAS modelled result obtained a coefficient of 0.8411 and standard error of 0.44 against the ground flood points, TUFLOW modelled result obtained a coefficient of 0.8296 and standard error of 0.46 against the ground flood points while flood modeler modelled result obtained a coefficient of 0.8296 and standard error of 0.46 against the ground flood points. These results indicated that HecRAS came out on top as having the best fit to the ground flood points.