

Delineating Floodplain along the Nasia River in Northern Ghana Using HAND Contour

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Abstract : The Nasia River is an important source of water for domestic and agricultural purposes to the inhabitants of its catchment. Major farming activities takes place within the floodplain of the river and its network of tributaries. The actual inundation extent of the river system is; however, unknown. Reasons for this lack of information include financial constraints and inadequate human resources as flood modelling is becoming increasingly complex by the day. Knowledge of the inundation extent will help in the assessment of risk posed by the annual flooding of the river, and help in the planning of flood recession agricultural activities. This study used a simple terrain based algorithm, Height Above Nearest Drainage (HAND), to delineate the floodplain of the Nasia River and its tributaries. The HAND model is a drainage normalized digital elevation model, which has its height reference based on the local drainage systems rather than the average mean sea level (AMSL). The underlying principle guiding the development of the HAND model is that hillslope flow paths behave differently when the reference gradient is to the local drainage network as compared to the seaward gradient. The new terrain model of the catchment was created using the NASA's SRTM Digital Elevation Model (DEM) 30m as the only data input. Contours (HAND Contour) were then generated from the normalized DEM. Based on field flood inundation survey, historical information of flooding of the area as well as satellite images, a HAND Contour of 2m was found to best correlates with the flood inundation extent of the river and its tributaries. A percentage accuracy of 75% was obtained when the surface area created by the 2m contour was compared with surface area of the floodplain computed from a satellite image captured during the peak flooding season in September 2016. It was estimated that the flooding of the Nasia River and its tributaries created a floodplain area of 1011 km².

Keywords : digital elevation model, floodplain, HAND contour, inundation extent, Nasia River

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