Comparison of flood delineation between morphological features/indices and hydraulic models in Dar Es Salaam

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Flood event as a natural disaster is becoming more and more frequent due to land use and climate change. In order to prevent or reduce human and economic losses, reliable and accurate information regarding the risk associated with flooding is undeniably necessary. Since hazard map is a key component of flood risk map, therefore, the demand for higher quality flood hazard maps is growing. To make a holistic flood hazard map, in this research, a morphological indices method as preliminary delimitation is applied to determine flood-prone areas. Different DEM resolution used from different databases such as SRTM DEM and Deltares modified DEM to extract some morphological indices and local features from DEMs to identify the spatial distribution of the potential flood inundation areas. 1D and 2D hydraulic models are applied to train the morphological indices method. Logistic regression as a linear binary classification is used to train the morphological indices method to estimate flood-prone areas. ROC curves as sensitivity analysis also applied to obtain the best morphological indices/features in identifying flood-prone areas. Eventually, with combining map from OpenStreetMap (OSM) as exposure map with flood-prone area map derived from the morphological map, flood impact map is calculated and also it has compared with flood risk map originated by hydraulic map. InaSAFE software is applied to combine these two maps and prepare an impact map for the case study area. The method explained in the present study tested on Msimbazi River basin and an urban part of Dar Es Salaam in Tanzania. The results show that the suggested method has suitable accuracy to identify flood-exposure areas and it can be considered as an alternative method for hydraulic modeling for ungauged basins. Also among all the indices and features ln [hr/H] indices present the highest accuracy in identifying flood-prone areas. The impact flood map from morphological indices/feature method in terms of identifying flood-prone areas using InaSAFE shows a good accuracy almost as well as hydraulic method.