



Urban flash floods modelling in Mzuzu City, Malawi

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Abstract

Since 2011, Mzuzu City in the northern part of Malawi has been experiencing flash floods for which little or no studies have been carried out to map flood hazard and risk in the City. The study aimed at applying remote sensing, GIS and hydrological techniques to map flood hazard and occurrences in Mzuzu City. In determining the spatial and temporal variation of flood inundation in the city, Sentinel 2 images for the period 2013 – 2016 were processed using Sentinel Application Platform. Validation of the flood derived areas was done using ground control points collected using a participatory GIS mapping methods with the communities. A binary logistic regression model through the SPSS software was used to determine the spatial variation of flood hazard as a function of environmental factors. The TRMM 3B42: 3 hour 0.25 X 0.25 degree TMPA which were time variably bias corrected were used to identify and analyse the extreme rainfall events susceptible to causing flooding in the study area. The HEC-HMS model helped in quantifying the peak flow and runoff contributed by the study area. The HEC-RAS model was used to map flood inundated areas. The study conclude that Mzuzu City is vulnerable to flash floods and Masasa, Chibanja and Chibavi wards are more susceptible. The elements which are at risk in the City are settlements, roads and agricultural land.

Keywords: TRMM 3B42, Mzuzu City, flood hazard, Sentinel 2 images, Binary Logistic Regression, HEC-HMS, extreme rainfall events.