

Flood Hazard Zonation of Guwahati City: A remote sensing based approach

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Abstract (300-500 words)

India is rapidly urbanizing at a rate of 1.1% which is significantly higher than the global average. The unplanned city expansion many times leads to developed catchment which causes urban flooding. This may increase the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Hence the flooding occurs very quickly due to faster flow times.

Guwahati, the capital city of Assam is the gateway to north-east India and extends further to south-east Asia. The city is often regarded as the economic capital of NE India and houses world's largest tea auction center. However, due to rapid and unplanned urbanization, it has led to rise in artificial urban flooding in last few decades. For many days the city comes to standstill during heavy rain causing enormous economic loss and social distress.

To map the flood hazard zones of Guwahati, the present study was conducted using Landsat data, DEM prepared from ground survey and satellite data and other ancillary data. The work was carried using QGIS software. From the high resolution DEM, sub-catchments within the Guwahati city are delineated. Parameters such as remotest point elevation, outlet, longest flow path is computed from DEM. Time of concentration is calculated for each and every sub-basin based on the Kiprich's formula. Landuse landcover maps were prepared from Landsat and Corona datasets. "Excess rainfall intensity" grid was developed with the help of unitary rainfall. "Velocity Grid" is calculated which is further used for development "Time-area grid" which indicates the travel time across each and every catchment as the function of travel distance and velocity. Further, "Time-Area" histograms are compiled for each sub-catchment on their particular "Time-Area" grids. Hydrographs are created by converting the histogram to hydrographs by converting Area into Discharge. For each and every sub-catchment outlet the hydrograph peak flow rate is calculated and interpolated across the basin. From all those outputs, catchments are ranked in five classes according to the peak flow rate values. Finally the flood hazard zones of Guwahati city is delineated which shows the area more prone to urban flood.

The methodology is very robust and the output is of great importance to the planners for identifying the hazardous areas and further estimate the flood risk in Guwahati city.

1. Author/s Biography



Jeff McKenna was an admin member of OSGeo's first participation in the Google Code-in contest in 2017/2018; Jeff also was voted by the winning OSGeo students to represent OSGeo at Google's main headquarters in Mountain View, California, in 2018. Jeff is also an admin member of OSGeo's mentoring of university students, through the Google Summer of Code program. In 2016 Jeff was awarded the Sol Katz Award for his leadership in the FOSS4G community. Jeff is also the former president of OSGeo, and a longtime member of the OSGeo Board of Directors. Jeff McKenna operates a consulting company, Gateway Geomatics, located on the East Coast of Canada, focusing on assisting organizations publish spatial information on the Internet