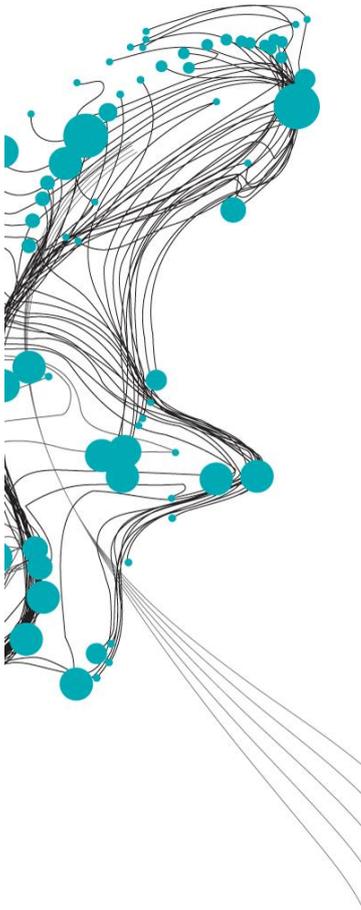


IMPROVING INUNDATION SIMULATION BY ADAPTED ROUGHNESS AND BED PROFILE IMPLEMENTATION IN A FLOOD HAZARD MAPPER



The quick scan Flood Hazard Mapper (FHM) is developed to generate flood inundation maps for river basins based on open source Digital Elevation Models (DEMs). The Flood Hazard Mapper consists of separate modules for hydrology (generation of water available for runoff), flow routing (discharge through networks) and flood inundation mapping.

The FHM is developed to identify flood prone areas along rivers for which limited data is available like in developing countries. The flood inundation maps can be used for spatial planning and planning flood protection measures. This research focuses on improving the FHM with application to the Ayeyarwady River in Myanmar.

First the available discharge and water level data were analyzed and combined to useful data series. Two aspects of the FHM were looked at (1) the shape of the bed profile and (2) the implementation of roughness.

The cross-section of the river below the water surface at the moment the satellite images were taken from which the DEM is derived is unknown. The shape of the bed profile has a significant influence on the simulated water levels. Three profile shapes are compared to find the best fit between simulated and measured water levels. Based on the results for the Lower Ayeyarwady River, the trapezoidal profile gave the best results.

In the current version of the FHM a Manning roughness coefficient between 0.030 - 0.035 $s\ m^{-1/3}$, depending on the slope, is used for both the riverbed and floodplains of the Lower Ayeyarwady River. In the new approach a distinction is made between the Manning coefficient for the riverbed and the floodplains. Based on literature values between 0.030 - 0.033 $s\ m^{-1/3}$ were used for the river bed and between 0.045 - 0.058 $s\ m^{-1/3}$ for the floodplains which are significantly rougher than the river bed due to vegetation and obstructions.

The results show that the use of a trapezoidal shape of the river bed and a separated Manning coefficient for the river bed and floodplains, with a higher value for the floodplains, reduced the root mean square error between the measured and simulated water levels compared to the current model, suggesting that more accurate flood inundation maps are produced for the Ayeyarwady River in Myanmar.

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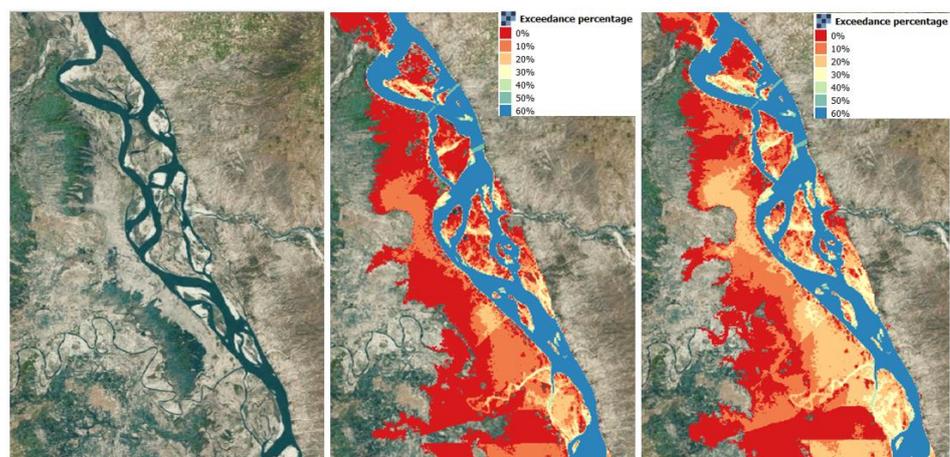


Figure 1. Inundation maps of the Ayeyarwady River at gauging station Magway in Myanmar with exceedances percentages of representative discharges, for a single river roughness $n = 0.033$ (middle) and different Manning values for the riverbed $n = 0.033$ and floodplain $n = 0.058$ (right)