Geophysical Research Abstracts
Vol. 15, EGU2013-5153, 2013
EGU General Assembly 2013

Influence of structures on flood hazard

Anuar Md Ali (1,2), Giuliano Di Baldassarre (1), Dimitri P. Solomatine (1,3)

(1) Department of Integrated Water Systems and Governance, UNESCO-IHE Institute for Water Education, Delft, Netherlands (a.ali@unesco-ihe.org), (2) Department of Irrigation and Drainage, Kuala Lumpur, Malaysia, (3) Water Resource Section, Delft University of Technology, Netherlands

In flood hazard mapping via 1D hydraulic models, a certain number of cross sections is required to properly represent the river channel and its surrounding floodplain. Other than having a river cross section at finer spacing, it also suggested having river cross sections upstream and downstream every structure across the river (e.g. bridges). However, the inclusion of a large number of cross sections increases the computational time and the costs of topographical surveys.

The objective of this study are (i) to quantify the performance of 1D hydraulic models, and (ii) assess the differences of flood hazard classification due to the inclusion/exclusion of a bridge section into the 1D hydraulic model.

To achieve the objective of this study, two hydraulic models of the 30km reach of the Johor River, Malaysia were conducted using the hydrodynamic model code HEC-RAS. The cross sections of the models were based on the ground survey method across the river with the spacing between cross section is approximately 1000m. To enable sufficient coverage area for floodplain in hydraulic modelling, the DEM from the LiDAR were integrated with the cross section from the ground survey works.

Based on the simulation of the December 2006 flood (calibration event), the sensitivity analysis of the Nash Sutcliffe Efficiency (NSE) between the 500 simulated and observed maximum water levels for a matrix of Manning's n roughness coefficient for the river channel and floodplain were conducted. Finally, to assess the differences of flood hazard categorization for the two different models, a flood hazard map was prepared where the hazard was defined as the depth of inundation. As a result, the simulation showed that the total inundation area for the model with a bridge is smaller than the inundation area obtained with the model without the bridge.