Application of 2D HEC-RAS Hydrodynamic Modelling for Flood Inundation Mapping - A Case of Ahmedabad City, Gujarat, India

Akshay Bhootra (1), Balkishan Chandak (1), Ujas Pandya (2), and Dhruvesh Patel (1)

(1) Pandit Deendayal Petroleum University, School of technology, Civil Engineering, India (akshay.bcv14@sot.pdpu.ac.in),
(2) Department of Civil Engineering, Government Engineering College, Gandhinagar, Gujarat, India

Floods lead to catastrophic disasters in developing countries, resulting in loss of life and property; therefore it is important to assess the flood to reduce such disastrous calamities in future. Recently, Ahmedabad city, the former capital city of Gujarat experienced floods in 2006. Many wards of the city were under inundation. To estimate the inundated area and identify the low lying areas of Ahmedabad city, Hydrologic Engineering Center-River Analysis System(HEC-RAS) based 2D hydrodynamic modelling for Ahmedabad city is prepared. The Advanced Land Observation Satellite (ALOS) world 30m grid interval (AW3D30) data is considered to generate the 2D geometry of Ahmedabad city. Release from the Dharoi dam and normal depth at Vasna barrage is considered as an upstream and downstream boundary. The HEC-RAS 5.0.3 is simulated under an unsteady flow condition. The simulated results show that 21th August at 11.00 hr was the worst day for Ahmedabad city and a maximum of 60-65 % area at river site was under inundation. Most of the flooded area experienced 0.25 – 0.5 ms-1 water velocity with a duration of 70 hr. Due to low velocity and high duration of the flood, low lying areas such as south zone and south-east zone were badly affected by the floods, whereas north zone and north-west zone were at the least affected zones. The simulated results will provide important informations to evacuate the people from low lying areas during floods. In addition, it reduces the uncertainty for flood inundation mapping under future dam releases. Hence, the present case study shows the applicability of 2D HEC-RAS hydrodynamic modelling for flood inundation mapping.