



Flood hydrodynamic modelling of river discharge carrying capacity - A case study of the Tapi river 2006 flood in Surat city of India

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Flood is a major disaster responsible for huge demolition, loss of properties and life due to heavy amount of water released in a short span of time. Surat in Gujarat, India, repeatedly affected by the flood in which the event of 2006 was the major one, occurred due to massive release of water from the Ukai dam to downstream. Despite of the high damage, there is a lack of detailed analysis available on the 2006 Surat urban flooding. The present work is focused on the simulation of discharge carrying capacity of the Lower Tapi river responsible for the major flooding in the city. Hydrodynamic modelling based on the 1-D Hydrologic Engineering Centres- River Analysis System (HEC- RAS) was employed on 299 river cross sections including 2 line structures named Kakrapar weir and Singanpur weir, and 5 major bridges across the river Tapi in the Surat city. The water release from the Ukai dam is considered as the upstream boundary while the Tidal level is considered as the downstream boundary for the 2006 flood event. The flow is simulated under an unsteady flow condition, calibrated from the year 1998 and validated for the year 2006. The simulated results indicated that the major sections situated in and around the city, have less than 24081 m³s⁻¹ carrying capacity against 25768 m³s⁻¹ released from the Ukai dam in 2006. In future, if water will be released above the existing carrying capacity, similar catastrophic floods will happen again. For flood mitigation, the sections with the lower discharge carrying capacity must be expanded in order to minimize the losses from such disasters.