



Probabilistic mapping of urban flood risk: Application to extreme events in Surat, India

Jorge Ramirez (1), Umamaheshwaran Rajasekar (2), Tom Coulthard (3), and Margreth Keiler (1)

(1) University of Bern, Institute of Geography, Bern, Switzerland (jorge.ramirez@giub.unibe.ch, margreth.keiler@giub.unibe.ch), (2) TARU Leading Edge Pvt. Ltd., New Delhi, India (mrajasekar@taru.org), (3) University of Hull, Department of Geography, Environment and Earth Sciences, Hull, United Kingdom (T.Coulthard@hull.ac.uk)

Surat, India is a coastal city that lies on the banks of the river Tapti and is located downstream from the Ukai dam. Given Surat's geographic location, the population of five million people are repeatedly exposed to flooding caused by high tide combined with large emergency dam releases into the Tapti river. In 2006 such a flood event occurred when intense rainfall in the Tapti catchment caused a dam release near 25,000 m³ s⁻¹ and flooded 90% of the city. A first step towards strengthening resilience in Surat requires a robust method for mapping potential flood risk that considers the uncertainty in future dam releases. Here, in this study we develop many combinations of dam release magnitude and duration for the Ukai dam. Afterwards we use these dam releases to drive a two dimensional flood model (CAESAR-Lisflood) of Surat that also considers tidal effects. Our flood model of Surat utilizes fine spatial resolution (30m) topography produced from an extensive differential global positioning system survey and measurements of river cross-sections. Within the city we have modelled scenarios that include extreme conditions with near maximum dam release levels (e.g. 1:250 year flood) and high tides. Results from all scenarios have been summarized into probabilistic flood risk maps for Surat. These maps are currently being integrated within the city disaster management plan for taking both mitigation and adaptation measures for different scenarios of flooding.