

Flood hazard mapping of Bagmati River in Kathmandu valley using geo-informatics tools

Dilip K. Gautam¹ and Ram G. Kharbuja

Department of Hydrology and Meteorology, P. O. Box 406, Kathmandu, Nepal

ABSTRACT:

Bagmati River originates from Northern hills of Kathmandu valley and flows through the middle of the valley. A major flood disaster has occurred in Bagmati River basin on 19-21 July, 1993 which was caused by intensive rainfall in the central region of Nepal. The floods caused heavy damages to Bagmati barrage and Kulekhani Hydropower Plant. Many villages and several bridges were washed away and the disaster claimed the life of about 1336 persons including 163 injured. Property loss was tentatively estimated to be NRs 4.9 billion. Kathmandu valley is vulnerable to flood hazard due to rapid encroachment of settlement in flood plains of the Bagmati River. The loss of property occurred due to inundation along the Bagmati River and its tributaries, in another event of July 2002 were considerably high and unforgettable for the residents of the valley.

Hydrological and hydrodynamic models coupled with Geographic Information System (GIS) are powerful tools for quantitative and qualitative monitoring of spatial and temporal variation of flows in the river. The dynamic capability of GIS interfaced models which provide impressive visual perception in the sense of spatial and temporal variation of the modeling results in different scenarios for planners, could be used as a decision making tool for better urban planning and sustainable integrated water resources management. In this study, flood hazard maps of Bagmati River within the Kathmandu valley are prepared for various return period floods by using hydrodynamic modeling to compute the unsteady flow water level profile along the channel reach and GIS to acquire cross-section, to interpolate flood water levels and to compute flood depth from Digital Elevation Model (DEM). These maps will provide guidelines for development of built-up areas along the river bank and help to minimize loss of life and property due to floods.

Keywords: Hydrological Model; Hydrodynamic Model, Geographic Information System, Integrated Water Resources Management, Flood Hazard Map.