

FLOOD HAZARD MAPPING OF BAGMATI RIVER IN KATHMANDU VALLEY USING GEO-INFORMATICS TOOLS

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Bagmati River originates from Northern hills of Kathmandu valley, known as Shivpuri mountain (2677 m) and flows through the middle of the valley. Draining the Kathmandu valley, the river flows through the middle mountains, Mahabharat and Siwalik range before entering into Terai. The area of the basin is 612 km² within Kathmandu valley and the altitude range varies from 1260 m to 2677 m. The length of the river within the Kathmandu valley from Gokarna to Khokana is 25 km and the average gradient is 0.0025. There are several tributaries of different orders originating from Mahabharat and Siwalik range which feed Bagmati river. Near Sundarijal, the Nagmati and Syalmati river join the Bagmati river and flowing to the South, it passes through the holy Pashupatinath Temple. Manahara joins Bagmati at Koteswor where the river changes its direction to the West. Near Thapathali, the Dhobi khola joins the Bagmati river. At Teku it takes a turn towards South, where Bishnumati joins Bagmati. Manahara, Dhobi khola, Bishnumati and Nakhu are the main tributaries of Bagmati inside Kathmandu valley. Bagmati leaves Kathmandu valley at Gwaldah after passing through Chobhar gorge. 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. 540 mm of 24 hour rainfall with intensity as high as 65 mm per hour was recorded which was the highest ever recorded in the history 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 July of 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. The flood hazard mapping of the Bagmati River in Kathmandu valley will provide guidelines for development of built-up areas along the river bank. This paper presents the application of GIS and hydrodynamic model for the preparation of flood hazard map for Kathmandu valley.

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