



Original paper

## Determination of Threshold Runoff for Flood Warning in Nepalese Rivers

Dilip Kumar Gautam<sup>1</sup> and Khadananda Dulal<sup>2</sup>

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**Abstract** The Southern Terai plain area of Nepal is exposed to recurring floods. The floods, landslides and avalanches in Nepal cause the loss of lives of about 300 people and damage to properties worth about 626 million NPR annually. Consequently, the overall development of the country has been adversely affected. The flood risk could be significantly reduced by developing effective operational flood early warning systems. Hence, a study has been conducted to assess flood danger levels and determine the threshold runoff at forecasting stations of six major rivers of Nepal for the purpose of developing threshold-stage based operational flood early warning system. Digital elevation model data from SRTM and ASTER supplemented with measured cross-section data and HEC-RAS model was used for multiple profile analysis and inundation mapping. Different inundation scenarios were generated for a range of flood discharge at upstream boundary and flood threshold levels or runoffs have been identified for each river, thus providing the basis for developing threshold-stage based flood early warning system in these rivers.

**Key Words** Flood, danger level, threshold runoff, hydrodynamic model, geographic information system

### 1. INTRODUCTION

Nepal's Terai region is the part of the Ganges River basin, which is one of the most disaster-prone regions in the world. The Terai region amounting to 17% of the total area of the country and regarded as the granary of Nepal is recurrently suffering from flooding. The floods, landslides and avalanches in Nepal cause the loss of lives of about 300 people and damage to properties worth about 626 million NPR annually (DWIDP 2007). The rivers in the Terai area become wide and braided with wide spread damages to agricultural lands. The damages are further exacerbated by erosion of banks and deposition of infertile coarse material on the cultivated land. The channel capacity of the rivers in this regime is said to be decreasing due to increased sediment load coming from an increased erosion rate upland, thus making these rivers unable to accommodate large floods. As a result the adjoining areas suffer from inundation.

While many studies have been conducted for reducing the disaster risk in many river basins of Nepal,

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<sup>1</sup>Regional Integrated Multi-Hazard Early Warning System for Africa and Asia, Asian Institute of Technology campus, PO Box 4, Klong Luang, Pathumthani 12120, Thailand, Phone: +66829260043, E-mail: dilip.gautam@rimes.int

<sup>2</sup>Kantipur Engineering College, Dhapakhel, Lalitpur, Nepal





















