

## **Modelling runoff and its components in Himalayan basins**

**HONG LI<sup>1</sup>, STEIN BELDRING<sup>2</sup>, CHONG-YU XU<sup>1,3</sup> & SHARAD K. JAIN<sup>4</sup>**

*1 Department of Geosciences, University of Oslo, PO Box 1047 Blindern, 0316 Oslo, Norway*  
[hongli@geo.uio.no](mailto:hongli@geo.uio.no)

*2 Norwegian Water Resources and Energy Directorate, PO Box 5091, Majorstua, 0301 Oslo, Norway*

*3 Department of Earth Sciences, Uppsala University, Sweden*

*4 National Institute of Hydrology, Roorkee 247 667, India*

**Abstract** The hydrology of Himalayan basins is not well understood due to the complexities in the climate and geography, and the scarcity of data. The objective of this study is to quantitatively assess the contribution of various components of runoff in the Himalayan basins. To achieve this goal, the Hydrologiska Byråns Vattenbalansavdelning (HBV) model was used to simulate the runoff and its components on two Himalayan basins, the Beas River basin, India and the Wang Chhu basin, Bhutan. Four components: runoff from glacier melting, snow melting on glacier, snow melting outside glacier, and rainfall were identified by the HBV model. The simulation results show that the HBV model can give a fair estimation of the runoff of these two catchments and the effects of glaciers and snow are largely dependent on the catchment characteristics and the glaciated area. For the Wang Chhu basin, the largest contributor to runoff is rainfall, whereas melting of snow and glacier is dominant in the Beas River basin. This research will not only contribute to the improved understanding of the impacts of climate change on the hydrological response in the Himalaya area, but will also provide guidance for the development of hydropower potential and water resources assessment in these Himalayan basins.

**Key words** climate change; HBV; Himalayan basins; hydrological modelling; runoff components; snow and glacier