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# Impact of climate change on hydrological behaviour and crop production in a glacial river basin

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Himalayan valleys are confronting severe climate change related issues (flash flood and landslides, water scarcity in higher altitudes) because of fluctuating monsoon precipitation and increasing seasonal temperatures. In this study, the Soil and Water Assessment Tool (SWAT) model has been applied to the River Beas basin, using daily Tropical Rainfall Measuring Mission (TRMM) precipitation and NCEP Climate Forecast System Reanalysis (CFSR) meteorological data to simulate the river regime and crop yields. The Beas is regionally significant as it holds two giant dams, one which annually diverts 4700 Mm3 of water to a nearby basin. We have applied Sequential Uncertainty Fitting Ver. 2 (SUFI-2) to quantify the parameter uncertainty of the stream [U+FB02]ow modelling. The model evaluation statistics for Daily River flows at the Jwalamukhi and Pong gauges show good agreement with measured flows (Nash Sutcliffe efficiency of 0.70 and PBIAS of 7.54 %). We then applied the models within a scenario-neutral framework to develop hydrological and crop yield Impact Response Surfaces (IRS) for future changes in annual temperature and precipitation for the region from AR5. Future Q10 and Q90 daily flows indicate amplified 'flash flood' situations and increased low flows, respectively, with increasing temperatures due to increased snowmelt from retreating glaciers. Under existing crop and irrigation management practices, the IRS show decreasing and increasing crop yields for summer (monsoon) and winter (post monsoon) crops, respectively, with rising temperature. The sensitivity of winter (post monsoon) crop yields to precipitation increases with increasing temperature. The paper will consider the implications of the research for future agricultural water management and the potential of agronomic and irrigation adaptation to offset yield losses