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Modeling the Impact of climate change on water resources of upper Kharun catchment

Navneet
Germany

The Upper Kharun Catchment (UKC) is one of the most important, economically sound and highly populated watersheds of Chhattisgarh state in India. The inhabitants strongly depend on monsoon and are severely prone to water stress. This research aims to assess the impact of climate change on water balance components in UKC. We applied the Soil and Water Assessment Tool (SWAT) in the Upper Kharun Catchment/India. High-resolution input on land use including explicitly irrigation issues and three climate simulations of PRECIS regional climate model were used. The station-level bias-corrected PRECIS (Providing REgional Climates for Impact Studies) projections generally show increasing trends for annual rainfall and temperature. Hydrological simulations, performed by SWAT (Soil and Water Assessment Tool), indicate over-proportional runoff-rainfall and under-proportional percolation-rainfall relationships. Simulated annual discharge for the 2020s will decrease by 2.9% on average (with a decrease of 25.9% for q1 to an increase of 23.6% for q14); for 2050s an average increase by 12.4% (17.6% decrease for q1 to 39.4% increase for q0); for 2080s an average increase of 39.5% (16.3% increase for q1 to an increase of 63.7% for q0). Respective ranges on percolation: for 2020s an average decrease by 0.8% (12.8% decrease for q1 to an increase of 8.7% for q14); for 2050s an average increase by 2.5% (10.3% decrease for q1 to 15.4% increase for q0); for 2080s an average increase by 7.5% (0.3% decrease for q1 to 13.7% increase for q0). These over- and under-proportional relationships indicate future enhancement of floods and question sufficiency of groundwater recharge.

nkumar@uni-bonn.de