Submitted Abstract

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Abstract

The climate change impact on flow regimes in the different physiographic regions (Low-lying plain areas, Middle Mountains, and High Himalayas) of the Koshi River Basin, Nepal was studied using the Soil and Water Assessment Tool (SWAT). This study analyses the climate projections of climate variables from the latest Coupled Model Intercomparison Project (CMIP6) from 2015 to 2100 with four climate models (BCC, CANESM-CCCma, CNRMCM-CERFACS, and IPSL) under two shared socio-economic pathways (SSP2-4.5 and SSP5-8.5). The SWAT model was first calibrated (1985-2006) and validated (2009-2012) at a daily timescale for simulation of streamflow in every physiographic region of the Koshi River Basin. The flow is also analyzed based upon the magnitude, intensity, and duration flow parameters. The results show that the GCM-specific changes in the climate variables also have an impact on the regional and seasonal scales. The projection showed a wider range of deviation with respect to the baseline, predominantly increasing heavy rainfall in the Middle Mountains and High Himalayas region of the basin. The summer rainfall and winter temperature of the basin expect to increase more than 20% which indicates the risk of extreme climate events in the future. The SWAT model predicted an annual increase in streamflow by 19% and 60% under SSP2-4.5 and SSP5-8.5, respectively. Also, climate change is expected to increase the maximum monthly streamflow, especially from June-September with the potential of extreme flow events in the Koshi River Basin. The predicted high and moderate rise in streamflow under SSP5-8.5 suggests the need for an adaptation plan and mitigation strategies in the basin.