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Impact of Climate Change and Human Intervention on River Flow Regimes

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Climate change and human interventions like dam construction bring freshwater ecosystem under stress by changing flow regime. It is important to analyse their impact at a regional scale along with changes in the extremes of temperature and precipitation which further modify the flow regime components such as magnitude, timing, frequency, duration, and rate of change of flow. In this study, the Kangsabati river is chosen to analyse the hydrological alterations in its flow regime caused by dam, climate change and their combined impact using Soil and Water Assessment Tool (SWAT) and the Indicators of Hydrologic Alteration (IHA) program based on the Range of Variability Approach (RVA). Results show that flow variability is significantly reduced due to dam construction with high flows getting absorbed and pre-monsoon low flows being augmented by the reservoir. Climate change alone reduces the high peaks whereas a combination of dam and climate change significantly reduces variability by affecting both high and low flows, thereby further disrupting the functioning of riverine ecosystems. Analysis shows that in the Kangsabati basin, influence of dam is greater than that of the climate change, thereby emphasising the significance of direct human intervention.

Keywords: Climate change, human impact, flow regime, Kangsabati river, SWAT, IHA, RVA.