

Climate change effect on river runoff under CMIP6 GCM's in the Upper regions of Indus River

Kashif Haleem Haleem¹, Afed Ullah Khan¹, Fayaz Ahmad Khan¹, Umar Zada², and Jehanzeb Khan³

¹National Institute of Urban Infrastructure Planning University of Engineering and Technology Peshawar Peshawar 25000 Pakistan

²University of Engineering & Technology

³Government Post Graduate College Kohat

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Abstract

Pakistan is primarily dependent on water supplies from the Upper Indus basin for irrigated agriculture. Any changes in available resources due to climate, consequently has the potential to have a significant impact on the environment. Coupled model inter-comparison project phase 6 (CMIP6) based global climate models (GCMs) under shared socioeconomic pathways (SSP245) scenario were assessed to evaluate the study area for climate change effect on river runoff using Soil and water assessment tool (SWAT). Temperature fluctuations have a significant effect on stream flow, since the primary sources of river runoff in the Upper Regions of Indus Basin (URIB) are snow and glacier melting. The temperature (min & max) will likely increase by almost 18% in the future, the projected precipitation pattern will increase by 13-17 %, and the stream flow will increase by 19-30 % in the future due to the warmer temperature. Temperature (min & max), precipitation and stream flow have had different effects in each season, while their variability in the projected annual changes are increasing for mid and late 21st century. Hydroelectricity generation, irrigation, flood prevention, and storage reservoir will be required in the strategies and action plans for the effective water resources management.

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