

## Assessing socio-economic and climate change impacts on surface water availability in Upper Indus Basin, Pakistan with using WEAP model.

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**Abstract**

According to Asian Development Bank report Pakistan is among water scarce countries. Climate scenario on the basis IPCC fifth assessment report (AR5) revealed that annual mean temperature of Pakistan from year 2010-2019 was 17 C<sup>o</sup> which will rise up to 21 C<sup>o</sup> at the end of this century, similarly almost 10% decrease of annual rainfall is expected at the end of the century. It is a changing task in underdeveloped countries like Pakistan to meet the water demands of rapidly increasing population in a changing climate. While many studies have tackled scarcity and stream flow forecasting of the Upper Indus Basin (UIB) Pakistan, very few of them are related to socio-economic and climate change impact on sustainable water management of UIB. This study investigates the pattern of current and future surface water availability for various demand sites (e.g. domestic, agriculture and industrial) under different socio-economic and climate change scenarios in Upper Indus Basin (UIB) Pakistan for a period of 2010 to 2050. A state-of-the-art planning tool Water Evaluation and Planning (WEAP) is used to analyze the dynamics of current and future water demand. The stream flow data of five sub catchment (Astore, Gilgit, Hunza, Shigar and Shoyke) and entire UIB were calibrated and validated for the year of 2006 to 2011 using WEAP. The Nash Sutcliffe coefficient and coefficient of determination is achieved ranging from 0.63 to 0.92. The results indicate that unmet water demand is likely to increase severe threshold and the external driving forces e.g. socio-economic and climate change will create a gap between supply and demand of water.

**Keywords: Climate, WEAP, Upper Indus Basin**

**Acknowledgement:** This work was supported by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) (No. 2018R1A1A3A04079419 ), and by Korea Environment Industry & Technology Institute (KEITI) through Climate Change R&D program, funded by Korea Ministry of Environment (MOE) (2018001310001).

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