

M.Sc. Thesis

IMPACT ASSESSMENT OF CLIMATE CHANGE ON RUNOFF IN THE
KUNHAR RIVER WATERSHED USING SWAT MODEL

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Advisor

DR. GHULAM NABI

Submitted By:

Haseeb Akbar

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CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING

University of Engineering and Technology,

Lahore, Pakistan

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ABSTRACT

Climate change is badly hammering water resources and agriculture of Pakistan. Aim of this investigation was to explore temporal and spatial variations in climate and its impact on river future flows in the kunhar river watershed, located in the North East Pakistan. For future projection Hadley Centre Global Environmental Model (Had-GEM2) was used as a climatic model with representative concentration pathway (RCP) 4.5 and 8.5 scenarios. Linear scaling technique was used for downscaling of climatic parameters. RClmDex model based on R language was used for climatic analysis. Indices have been determined by least squares and weighted average regression analysis. Soil and Water Assessment Tool (SWAT) model was run for fifteen years. Model operation was divided into three sub classes as warm up period, calibrated period, and validated period. Sensitivity analysis carried out by Soil and Water Assessment Tool Calibration and Uncertainty Procedures (SWAT-CUP) using Sequential Uncertainty Fitting Version-2 (SUFI2) under RCP 4.5 and 8.5 runoff simulation (2021-2099) monthly basis it was estimated under the both scenarios. It was found that average annual maximum temperature, minimum temperature and rainfall for Balakot station were decreasing while average annual maximum temperature, minimum temperature and rainfall for Naran station were increasing. Mean annual discharge at Gharihabibullah was decreasing during baseline period (1981-2015). The results reveal that summer season showed a considerable decrease in mean monthly flow and high flow. But winter exhibited large increased and spring and autumn showed minute increase in mean monthly flow and high flow respectively for the both scenarios for future as compared to baseline phase. Water resources of Kunhar River are very important because it feeds Mangla reservoir and important for Suki Kinari, Ppatrind and many purposed sites at Kunhar River.