

# APPRAISAL OF LANDCOVER AND CLIMATE CHANGE IMPACT ON WATER RESOURCES: A CASE STUDY OF MUNDA DAM CATCHMENT, PAKISTAN

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by

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2020-MS-WRE-102

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CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING  
UNIVERSITY OF ENGINEERING AND TECHNOLOGY,  
LAHORE

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RESOURCES: A CASE STUDY OF MUNDA DAM CATCHMENT, PAKISTAN

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## ABSTRACT

Landcover change (LCC) and climate change (CC) impacts on streamflows in high elevated catchments are great challenge to sustainable management and development of water resources. This study evaluates future possible impacts of both landcover and climate change on the streamflows in Munda dam catchment, Pakistan, by utilizing the semi-distributed hydrological model titled "Soil and Water Assessment Tool" (SWAT) along with the latest Coupled Model Intercomparison Project phase 6 (CMIP6) dataset of different Global Climate Models (GCMs). Downscaling of precipitation and temperature data was performed by CMhyd software. Downscaled precipitation and temperature projections from the best performing GCM out of four GCMs namely; MIROC6, MPI-ESM1-2-HR, ACCESS-CM2 and MRI-ESM2-0, under two Shared Socioeconomic Pathways (SSP2 and SSP5) and future landcover conditions were forced in a calibrated hydrological model (SWAT Model). Compared to the baseline period (1990–2015), outputs of selected GCM indicated an increase in the average monthly precipitation, maximum and minimum temperature in the study area under both SSP2 and SSP5 scenarios, by the end of the 21st century. It is notable that increase in precipitation for 2016-2100 is 10.5 % and 11.4% under SSP2 and SSP5 scenarios. Simulated results of the SWAT model showed a significant impact of projected climate and landcover on the Swat River flows that includes (a) increase in overall mean annual flow, whereas the mean monthly flows of June, July and August are decreased, and (b) a shift of peak flows in the Swat basin from July to June. It is concluded that the projected climate changes can substantially influence the seasonality of flows at Munda Dam site. Climate and landcover change impacts are significant thus

project planners and managers must include CC and LCC impacts in their future operational strategy.