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Evaluation of the potential impacts of climate change on the hydrolgy and water resources availability of Didessa catchment, Blue Nile River Basin, Ethiopia

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This study was carried out in Didessa watershed, which is situated in the south-west part of Abay River Basin. Due to great importance of the basin by economic and social criteria, it was important to undertake a research to evaluate the potential impacts of climate change on the water resources availability. In this study because of lack of availability of data it was difficult to consider the whole catchment, only the upper Didessa catchment was considered for the study which was taking the outlet gauging station at near Arjo town (9981km^2).Future Climate change scenarios of precipitation and potential evaporation were developed using output of dynamically downscaled data of ECHAM5 (GCM) under A1B emission scenario condition for 2030's (2031-2040) and 2090's (2091-2100). The projected climate variable showed an increasing trend from the 1991-2000(base period) level. The monthly mean minimum and maximum temperature shows an increasing trend. It is estimated that the average seasonal and annual potential evaporation in the watershed for 2030's might increase up to 5.2% and 4% respectively and in 2090's the average potential evaporation might increase up to 15.85% seasonally and 12.66% annually. Besides, at 2030's it is exhibited that the average seasonal precipitation might increase from 12.14% up to 62.79% and annually 30.22% .The maximum increment is observed during spring while the minimum in autumn. In the other time horizon, in 2090's the average seasonal precipitation might vary from -10.29% up to 25.29%, maximum increase in autumn, where as reduction is projected during spring season.

These changes of climate variables were used as input to the HBV hydrological model which was calibrated (R^2=0.601) and validated (R^2=0.61) with historical data to investigate the potential impacts of climate changes in the catchment. The simulation results obtained from the investigation indicated that there was a significant variation in the seasonal and monthly flow in both future period scenarios. At 2030's seasonally as well as monthly positive incremental change is observed, during the main rainy season (summer) the percentage changes might reaches up to 157%.At 2090's the average monthly flow only during the month of April showed 12% reduction, in the rest of the months a great increment is exhibited, the average seasonal flow also showed a significant increment during summer, 136% in respect to the base period. Hence, in Didessa watershed, runoff is likely to increase in the future.

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