EuroSciCon

August 13-14, 2018
Paris, France

Annual Summit on
Renewable & Sustainable Energy

Trends in Green chem 2018, Volume: 4
DOI: 10.21767/2471-9889-C1-009

# SWAT SIMULATED HYDROLOGICAL RESPONSE TO CLIMATE CHANGE IMPACTS AND ITS ADAPTATION STRATEGIES

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**Climate change alters regional hydrologic conditions and results in a variety of impacts on water resource systems. Such hydrologic changes will affect almost every aspect of human well-being. The economy of Ethiopia mainly depends on agriculture, and this in turn largely depends on available water resources. The aim of this study is to assess the impacts of climate change on surface water availability of upper Awash River basin using Soil and Water Assessment Tool (SWAT) hydrological model and Regional Climate Model (RCM). In order to investigate the hydrological impact of a possible future climate change scenario; downscaling of regional climate model (ECHAM5 with A1B emission scenario) to meteorological variables at local scale was applied for three time periods (2020s, 2050s and 2080s). Bias-correction methods have been developed to adjust RCM climate variables. The results show that average annual maximum temperature changes for the basin were 2020s: 0.53°C, 2050s: 1.18°C and 2080s: 1.87°C relative to the historical climate (1980-2010). Average annual minimum temperature change were 0.58°C, 0.82°C and 2.14°C in 2020s, 2050s and 2080s respectively. Basin average annual rainfall based on the ECHAM5 downscaling were 2.40, -2.14 and -10.11% for future periods of 2020s, 2050s and 2080s respectively. The annual stream flow of upper Awash sub-basin is reduced by 2.46% and 18.14% in 2050s and 2080s respectively, while the stream flow increased in 2020s by 4.90% for A1B scenario. The simulated flow at: 2050s and 2080s with A1B scenario from RCM shows reduction of runoff by 1.52% and 3.50% in the sub-basin and it is directly related to the reduction in precipitation, while the annual runoff increase in 2020s by 8%. Model result shows that about 44.36% of annual rainfall contributes to stream flow as surface runoff. Generally, the results revealed that change in climate variables such as decrease in rainfall and increase in temperature would have a significant impact on the stream flow and surface runoff, causing a possible reduction on the total water availability in the sub-basin.**

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