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Evaluating potential impact of climate change on hydro-meteorological variables in upper blue Nile Basin

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Throughout the world, climate change impact is the main concern for sustainability of water management and water use activities like agricultural production. Climate changes alter 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 goal of this thesis is to assess the impact of climate change on the hydro climatology of Fincha Sub-basin located in upper Blue Nile Basin of Ethiopia. The GCM derived scenarios (HadCM3 A2a & B2a SRES emission scenarios) experiments were used for the climate projection. The statistical Downscaling Model (SDSM) was used to generate future possible local meteorological variables in the study area. The down-scaled data were then used as input to the Soil and Water Assessment Tool (SWAT) model to simulate the corresponding future stream flow in of Fincha Sub-basin located in upper Blue Nile Basin. A semi distributed hydrological model, SWAT was used to simulate future stream flow. Three benchmark periods simulated for this study were 2020s, 2050s and 2080s. The time series generated by GCM of HadCM3 A2a and B2a and Statistical Downscaling Model (SDSM) indicate a significant increasing trend in maximum and minimum temperature values and a slight decreasing trend in precipitation for both A2a and B2a emission scenarios in both Shambu and Neshe stations for all three bench mark periods. The hydrologic impact analysis made with the downscaled temperature and precipitation time series as input to the SWAT model suggested an overall decreasing trend in annual and monthly stream flow in the study area, in three benchmark periods in the future. This should be considered by policymakers of water resources planning and management. The hydrologic impact analysis made with the downscaled temperature and precipitation time series as input to the hydrological model SWAT suggested for both A2a and B2a emission scenarios. As a result, at the out let of the watershed the projected on average annual flow decrease by 5.59%,9.03%,11% and 2.16%,4.15 and 3.46% for the 2020s,2050s and 2080s for both A2a and B2a emissions scenarios. Potential evapotranspiration in the watershed also will increase annually on average 3 - 16% for the 2020s and 4-19% for the 2050s and 2080s for both A2a and B2a emissions scenarios.

Biography

Mekonnen Daba holds a B.Sc. degree from Arbaminch University, Ethiopia in Meteorology and Hydrology on 2009 and B.Sc. in Climate Change and Development from Arbaminch University on 2012, Mekonnen Daba has also participated in several international trainings and international conference in different country like, Research Methods Workshop for Graduate Students working on Climate, Agriculture and Food Security at Kenyatta University, Kenya October 16-19, 2012 and International Conference on Biodiversity Conservation and Ecosystems Services for Climate Change Mitigation and Sustainable Development Haramaya University, Ethiopia, December 20-22, 2012. He started his research career in 2010 as an Assistant Researcher at the Bako Agricultural Research Center. Currently he has been working as a Researcher in Bako Agricultural Research Center, Ethiopia.

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