Investigation of climate change impact on surface water availability under different water allocation scenarios by using coupled swat and weap models: The case of Kikuletwa and Ruvu catchments in Pangani river sub-basin

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Surface water in Kikuletwa and Ruvu catchments has continuously decreasing resulting to growth unmet demands. The major causes has been reported to be climate change (CC) and uncontrolled water abstractions. This research determined the qualitative future change of streamflows due to CC, and analyzed different water allocation scenarios to understand how much the demand will be met or unmet. Six common GCMs from WCRP-CMIP3 with complete data set of daily mean temperature and total annual precipitation (HadCM3, HadGEMI, ECHAMS, MIROC3, 2MED, GFDLCM2.1 and GSIPOMK3 with SRES emission scenario A2) were used. Ensemble means of best performed GCMs were used in LARS-WG to simulate time series of daily rainfall and temperature. Generated daily climate data were used in SWAT to generate streamflows. The results show that climate change will decrease streamflows by 5.3% from the present day flows. Peak flows will decrease while lower to medium flows will be nearly equal to that of present day. The projected water demands to 2060s were analyzed in the WEAP model. Major water use sectors in the area were used to establish water allocation scenario. The most probable scenario (all sectors will increase water demand) shows that; total annual unmet will be 1,283.60Mm^3 (51.51%) of the future demand. Generally, further study is recommended to increase the climate station and to understand the hydrological processes of rainfall runoff relation of the existing springs in the study area to increase the model efficiency on the base flow