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Combination Of The Hydrological Model And Sdsm For Assessing Climate Change Impacts On Future Water Resources In The R’dom Watershed, Morocco

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Abstract : Climate change effect of on water resources in semi-arid regions can be serious, it is essential to understand the effects of climate change on the water balance in order to develop sustainable adaptation strategies. This research project examined the impact of climate change on the components of the water balance in a R'Dom hydrological watershed in the Mediterranean region. The assessment of climate change impact on the future hydrology is done by using the SDSM (Statistical DownScaling Model) and SWAT+ (The Soil and Water Assessment Tool) hydrological model during the baseline period (2002–2013), the data was analyzed and compared to future climate projections . The future projections of the global circulation model canEMS2 under the RCP 2.6, RCP 4.5 and RCP 8.5 scenarios were statically downscaled for a period (2014–2100). Afterwards, the SWAT+ model is simulated for the period from 2000 to 2013, calibrated from 2002 to 2007, and validated from 2008 to 2013 using monthly streamflow data. The model results showed good performance with an NSE of 0.72 and R2 of 0.71 during the validation period. The future precipitation shows a decreasing tendency under all scenarios, with -6.59%, -2.86%, and -2.57% for RCPaveg 2.6, RCPaveg 4.5, and RCPaveg 8.5, respectively. On other hand, the average monthly streamflow of R’Dom river in the near future (2014–2043) will decrease by 44–48%, decrease by 36–48% in the Medium period (2044–2071) and decrease by 43–52% in the period (2072–2100) under the three RCP scenarios. Regarding the water balance components changes, the average annual of actual evapotranspiration is predicted to increase from 5% to 9% under the three RCP scenarios for the three future study periods. Projected average annual flows are expected to decrease by 37% to 90% under the three RCP scenarios over the three future periods. In general, the current scientific research context and the results obtained from the methodology applied will help to optimize future water planning in semi-arid regions in the face of climate change.

Keywords : climate change, water balance, R'Dom watershed, SDSM, SWAT+ model
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