

Climate change impacts on extreme precipitation and streamflow of an important water supply area in Turkey

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The frequency and magnitude of extreme weather events such as floods and droughts, have increased across almost the whole world. It is important to determine possible changes in climates and their effects on the environment in order to take necessary precautions. This study investigates the impacts of climate change on water resources through precipitation and discharge analyses in Omerli catchment Istanbul, Turkey. Precipitation and temperature data are obtained from GCM (Global Circulation Model)/RCM (Regional Climate Model) combinations based on A1B carbon scenario via European Union (EU)-ENSEMBLES project. The data is obtained at 25 km resolution on daily time scale for reference period between 1960 and 1990 and future period between 2071 and 2100. The HBV (Hydrologiska Byråns Vattenbalansavdel-ning) model is used to investigate discharge properties of study area. Because RCM scale is comparatively coarse (25 km) for catchment scale its results are downscaled to 1 km using the Geographically Weighted Regression (GWR) method. RCM precipitation with and without GWR method are evaluated for characteristics of extreme precipitation events and they are used in HBV model for estimating the extreme discharges along with reference and future periods. All RCMs strongly underestimate precipitation. GWR improves underestimation tendency of RCMs precipitation especially for extreme events. Depending on precipitation input from RCMs with and without GWR the HBV also shows significant underestimation in daily and extreme runoff but it provides better estimates with GWR input. The magnitude of the extreme events increases in winter, spring and summer but decreases in fall from current to future period. Return periods of the extreme events increase in the future period.