



Projected change in streamflow in southern Western Australia and changes in hydrologic regime under projected climate change – is this non-stationarity?

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The impact of climate change on water resources is felt in many regions of the world with some areas having increased rainfall and streamflow and some the opposite. In the south-west of Western Australia, there has been a reduction in rainfall since the late 1960s, manifest as a significant decline in streamflows from the mid 1970s onwards. A 15 percent decline in rainfall has resulted in an 80 percent decline in streamflows to the major water resources reservoirs in the region. We undertook a project to estimate the impact of projected climate change on streamflows to 2040. Climate projections were taken from 15 global climate models (GCMs) with 3 emission scenarios resulting in 45 future climate sequences. An additional sequence assumed the next 33 years would be the same as the last 33 and another “recent” scenario the same as the last 11 years which have been noticeably drier than the previous 22 years over much of the region. A suite of rainfall-runoff models was calibrated with the existing record from 106 gauged streams and we had to presume the stability of the fitted model parameters for the projected future series. Averaged across the project area, the median projection is for an 8% decline in rainfall resulting in a 25% decline in streamflow. This has major implications for water resources in the region, and may exacerbate the already predominant reliance on groundwater and a growing dependence on desalinated seawater. It also has potentially grave implications for aquatic ecosystems dependent on continuous streamflow. Additional analysis showed a trend in model residual errors through the record in about half the 106 calibration catchments, suggesting a change in regional hydrology over this 33 year period.