

## **Century wide hydrologic trends in the Colorado River Basin**

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Stationarity, one of the main assumption used in hydrologic studies, is being challenged by changing climate. This study evaluates the long-term trends and regime shifts in three hydrologic variables: precipitation, temperature, and streamflow over a time period of 103 years (1906-2008) in the Colorado River Basin. Monthly precipitation and temperature data for 29 climate divisions encompassing the Colorado River Basin and 29 naturalized streamflow gages are analyzed in the present study for hydroclimatological trends and shifts. The variations of non-parametric Mann-Kendall (MK) test i.e. independent MK test, MK with lag-1 autocorrelation and trend-free pre-whitening, and MK with long term persistence are used to evaluate the long term trends. The non-parametric Pettit test is used evaluate the shifts. The results indicated decreasing winter precipitation trends over the snow dominated regions in the upper basin. Temperature increases for majority of the climate divisions are noted over several months and those are consistent with the decreases in spring summer streamflow. Significant hydrologic shifts are noted during several decadal periods. The results also highlighted the importance of using different variations of MK tests that helped in evaluating the effect of autocorrelation and long term persistence, if not accounted may have led to spurious trends. Overall, the current study provided a detailed overview of the past hydrologic trends and shifts and may assist water managers in better planning and management of water resources within the Colorado River Basin.