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Hydro-climatological Change Detection in Cauvery River Basin of India

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An increase in global average surface temperature has been experienced over a past few decades, causing irregularities in hydro-climatic parameters such as precipitation, temperature and evapotranspiration. Investigation of trends in hydroclimatology of major river basins of India is utmost importance because of the critical issues such as water availability, disputes for the inter-state water transfer and hindrances in the socio-economic growth of the country. Cauvery River is a major source of fresh water for two major states of India viz. Karnataka and Tamil Nadu (total population of around 144 million). Over the past decades, irrigation activity over this basin has increased exponentially which resulted in a significant increase in the demand for water. In addition, the water quality within the basin has been deteriorating because of anthropogenic activities. Therefore, a thorough understanding of hydro-climatology of Cauvery river basin is essential for efficient planning and management of water resource within the basin.

Investigations of trend and variability in precipitation, potential evapotranspiration, maximum and minimum temperatures (Tmax and Tmin) during 1950-2012 were carried out at seasonal, annual and monthly time scales using various non parametric approaches viz. Trend-free pre-whitening (TFPW) with the Mann- Kendall (MK) and Variance correction with MK, Sequential MK and Sen's slope.
Analysis showed a considerable variability in the seasonal trend magnitude for all considered parameters. Significant increasing trends in Tmax and Tmin were found during all seasons. Along with temperature, PET was found to possess significant increasing trend at all seasonal scales with high trend magnitude during monsoon and post monsoon seasons. No significant changes were observed in the case of precipitation. Spearman rank correlation analysis revealed that PET possesses good correlation with Tmax compared to Tmin. Further, an attempt was made to investigate the land use, land cover changes in the study region.