

## Abstract

Drought occurrence in the upper Tana River basin in Kenya has impacted negatively on water resources, hydro-power generation and agricultural production within the basin. Although this is an important river basin in Kenya, there is limited research work that has been done to assess and characterize drought to provide feasible mitigation measures and /or coping mechanics for water resources management. The Standardized Precipitation Index (SPI) was used to assess the spatio-temporal drought characteristics within the upper Tana River basin based on precipitation data for 41 years for eight gauging stations within the basin. The Kriging interpolation technique was applied to estimate spatially drought occurrence within the basin while the non-parametric Mann-Kendall (MK) trend test was used for trend detection. Results show that the south-eastern parts of the basin exhibit the highest drought severities while the north-western parts have the lowest drought values with averages of 2.140 and 4.065, and 2.542 and 4.812 in 1970 and 2010 respectively. The areal-extend of drought severities in both the south-eastern and north-western areas increased from 4868.7 km<sup>2</sup> to 6880 km<sup>2</sup>, and 6163.9 km<sup>2</sup> to 6985.5 km<sup>2</sup> from 1970 to 2010 respectively. The drought trend increased in the south-eastern parts of the basin at 90% and 95% significant levels while no significant trend was detected in the north-western areas. The results presented in this paper are useful in formulating a drought early warning system that can be used to assist water resources managers in developing timely mitigation measures in planning and managing water resources within the basin.