

Abstract

In the present study, temporal and spatial drought-risk events are characterized using a Modified Surface Water Supply Index (SWSI) for upper Tana River basin, located in tropics, Kenya. Forty years (1970-2010) hydro-meteorological data for low, lower middle, middle and high elevations at eight hydro-metric stations was used to characterize spatial and temporal distribution of drought. The spatial drought distribution is obtained via interpolation of hydro-metric stations data using Kriging interpolation technique embedded ArcGIS 10.1 was used. The drought trends were analyzed using a non-parametric Mann-Kendall trend test. The results show that south-eastern parts of the basin are the most drought-prone areas at different drought severities and frequencies. Drought severity classes ranged from 1.69-2.22 to 3.39-4.17 and 2.68-3.21 to 4.37-4.96 in 1970 and 2010 respectively across the river basin. The south-western parts of the basin exhibited highest drought frequency ranging from 10.61 to 13.16 while the north-western areas gave frequency values ranging from 3.74 to 6.29. The findings of the study are applicable in Early Drought Warning Systems, prioritized water resources planning and management.