Abstract

Occurrence of drought events leads to water resources imbalance within a river basin. However, information on drought episodes for most basins such as Tana River basin in Kenya is limited. Due to the critical role of drought forecasting in early warning system and water resources planning and management, this paper presents the performance of Standardized Precipitation Index (SPI) and Effective Drought index (EDI) in drought forecasting using the Artificial Neural Networks (ANNs) for upper Tana River basin. The forecasting was conducted using various combinations of the past precipitation as input into the SPI and EDI functions in the proceeding forecasts. Numerous ANNs model architectures of SPI and EDI for 1, 3, 6, 9, 12, 18 and 24-months lead times were assessed for precipitation data from Mwea Irrigation and Agricultural Development (MIAD) Centre within the upper Tana River basin. The models were calibrated and validated using the correlation coefficient (R^2), Root-Mean Square Error (RMSE) and Mean Absolute Error (MAE). It was concluded that the optimum models forecast for EDI were found to be superior to SPI values with correlation coefficient (R^2) values ranging from 0.821 to 0.51 and 0.795 to 0.57 respectively for a 6- months lead time drought forecasting. The resulting forecasts of the Indices and ANNs models can be applied for timely drought early warning systems, water resources management and irrigation scheduling in upper Tana River basin