

LONG-RANGE STREAM LOW FORECASTING USING EL NIÑO-SOUTHERN OSCILLATION INDICATORS IN THE ATHI RIVER BASIN, KENYA

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ENSO is one of the primary modes of climate variability in the tropics. It can be predicted with reasonable skill with time leads of at least six months and can form the foundation for mitigation of the impacts of frequent floods, droughts and water management problems. This study attempts to establish a relationship between ENSO and stream flow in the Athi river basin in Kenya and develop a forecasting model for seasonal stream flow in the basin. Stream flow data from the Athi river basin was subjected to homogeneity analysis using the runs and the mass curve methods. The Principal component analysis was used to study the spatial variability of stream flow in the Athi river basin while simple correlation method was used to investigate the link between streamflow and ENSO indicators. The long range seasonal forecasts models were developed using step-wise regression method and the non-parametric seasonal forecasting model (NSFM). The results for spatial characteristics of seasonal streamflow in the Athi river basin showed a strong influence of the north-south oscillation of the ITCZ, the land and sea meso scale circulation system, orography and land use effects on seasonal variability of stream flow. The results for the teleconnection showed a significant correlation between streamflow and ENSO indicators at various lags. The results for the regression models indicated that SON streamflow could be predicted 3 months earlier using May-June SOI. The results for NSFM streamflow showed that the February-March streamflow could predict SON streamflow at lag 6 with good prediction skills of $E = 0.4$ and $LEPS = 40\%$ at calibration and $E = 0.3$ $LEPS = 33\%$ at verification stage. The results show that it is possible to use ENSO indicators to forecast stream flow hence making it possible for the authority to give early warning system on the use water resources in the basin.