

ABSTRACT

Drought phenomena are attributed to water availability deficit that is caused by low precipitation. However, droughts are quite complex and cannot simply be defined on the basis of precipitation as other factors may have an influence. In this study, we investigated the spatio-temporal patterns of droughts in Lake Chilwa Basin, an endorheic lake basin that has recently experienced major recurrent lake recessions. The standardized precipitation index (SPI) and standardized precipitation evapotranspiration index (SPEI) at 6- and 12-month timescales were used to evaluate drought severity variations from 1970 to 2018, in relation to the recessions. The stationarity difference in rainfall between 1973 to 1995 and 1996 to 2018 and climatological trends were tested using Mann-Whitney and Mann-Kendall tests, respectively. The El Niño Southern Oscillation (ENSO) influence on rainfall was also investigated. In general, the results show a statistically insignificant decreasing rainfall trend, coupled with statistically significant temperature increase ($\alpha=0.05$). In addition, both indices broadly detected droughts within similar category ranges and variation patterns, suggesting minimal influence of temperature on droughts compared to rainfall. The study also reveals that not every ENSO event leads to low rainfall in the basin. It is further shown that unlike past major recessions, e.g., 1994/95, recent lake dry-ups of 2012 and 2015 were as a result of milder droughts. Moreover, the trigger threshold of lake dry-ups is shown to have shifted; such that average annual rainfall below 1000mm is likely to yield a dry-up in recent times than before, which may be attributable to anthropogenic pressure.