

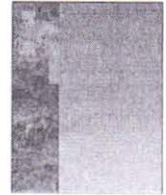


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### Evaluation of drought using SPEI drought class transitions and log-linear models for different agro-ecological regions of India



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#### ABSTRACT

Markov chain and 3-dimensional log-linear models were attempted to model drought class transitions derived from the newly developed drought index the Standardized Precipitation Evapotranspiration Index (SPEI) at a 12 month time scale for six major drought prone areas of India. Log-linear modelling approach has been used to investigate differences relative to drought class transitions using SPEI-12 time series derived from 48 years monthly rainfall and temperature data. In this study, the probabilities of drought class transition, the mean residence time, the 1, 2 or 3 months ahead prediction of average transition time between drought classes and the drought severity class have been derived. Seasonality of precipitation has been derived for non-homogeneous Markov chains which could be used to explain the effect of the potential retreat of drought. Quasi-association and Quasi-symmetry log-linear models have been fitted to the drought class transitions derived from SPEI-12 time series. The estimates of odds along with their confidence intervals were obtained to explain the progression of drought and estimation of drought class transition probabilities. For initial months as the drought severity increases the calculated odds shows lower value and the odds decreases for the succeeding months. This indicates that the ratio of expected frequencies of occurrence of transition from drought class to the non-drought class decreases as compared to transition to any drought class when the drought severity of the present class increases. From 3-dimensional log-linear model it is clear that during the last 24 years the drought probability has increased for almost all the six regions. The findings from the present study will immensely help to assess the impact of drought on the gross primary production and to develop future contingent planning in similar regions worldwide.