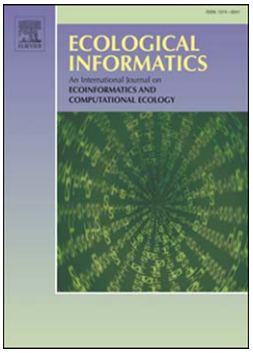

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Spatio-temporal variation in terminal drought over western India using dryness Index derived from long-term MODIS data

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ABSTRACT: Drought has always been one of the major hazards in semi-arid and arid regions of the world. This study was undertaken to investigate spatial trends in terminal drought over western India comprising the states of Rajasthan and Gujarat which are characterized by semi-arid to arid climate. These two states have been always vulnerable to drought since they receive highly variable moderate to scanty rainfall. Leaf Area Index (LAI)-based Temperature Vegetation Dryness Index (TVDI) for the period 2002-2012 was computed using 8-day composites of Moderate-Resolution Imaging Spectroradiometer (MODIS) Land Surface Temperature (LST) and LAI data sets with 1-kilometer spatial resolution. TVDI maps were prepared for all Days of Year (DOY) of the months September and October which facilitated understanding of the spatial extent of drought during different 8-day periods. Based on the analysis it was found that the LAI-based TVDI could captured drought condition over space and time. Temporal evolution of observed Crop Moisture Index (CMI) against and TVDI reveals that that the TVDI exhibits increasing trend as the CMI decreases or become negative during 2002 drought year. A significant and negative relation relationship (R^2 = 0.23) with TVDI and CMI indicates more sensitivity of TVDI to soil moisture in sparse vegetation canopies under drought conditions. Spatial trends in terminal drought intensity were analysed using linear regression and Mann-Kendall trend test. It was revealed that majority of the northern part of the study area witnessed increase in terminal drought intensity and the southern portion registered negative trends. With 80% of confidence, it can be stated that the terminal drought intensity increased at scattered locations over south-western and central Gujarat. However, over central and south-western Rajasthan decreasing trends were registered.

Keywords: Terminal Drought, TVDI, CMI, MODIS, India, Trend Analysis