Analysis and investigation on spatio-temporal dynamic pattern of drought in Thailand.

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Drought in Thailand is a recurring natural phenomenon occurred in different regions. It has been a crucial problem in Thailand that is merely not a recent issue these days, but it is a severe recurring difficulty. This study analyzed and investigated the spatio-temporal dynamics of drought in Thailand, with four drought indicators analyzed from 1991 to 2020. The primary goal of this study is to analyze and investigate the evolution of the spatio-temporal patterns from major drought indices that affect the transition of drought over Thailand. Besides, it aims to study the relationship among meteorological drought, vegetation drought, soil moisture drought, and hydrological drought. The Standardized Precipitation Index (SPI) is a meteorological index that uses data from rainfall gauge sites to calculate precipitation. The Standardized Runoff Index (SRI) is the hydrological data obtained from the runoff, whereas the Standardized Soil Moisture Index (SSI) is soil moisture data collected from root zone soil moisture, both of which were derived from the MERRA-2. This work, moreover, includes the Vegetation Condition Index (VCI) derived from NDVI that was primitively obtained from the NOAA Climate Data Record (CDR) of the AVHRR Normalized Difference Vegetation Index. Common factors derived from remotely sensed data were employed for drought assessment. This can be easily monitored and has the ability to analyze drought-prone areas according to time series, which generates the best correlation-anticipation relationship for early signs of drought impacts and drought monitoring purposes.

As a result, the SPI index found that the years with the most severe droughts were 1992, 2004, 2012, 2016, and 2020, with the droughts starting in March to May and November to December on average. SSI, SRI, and VCI experienced the same drought in 1992, 2004, 2016, and 2020. The mean of each index is consistent with changes in rainfall but affects a distinct time connection, according to the results of the four-index analysis. The SPI index using meteorological data is valuable for monitoring the accumulated drought, but only visual inspection is insufficient to detect when the study area has become drier or wetter. This is likely to be beneficial; however, it should be combined with other indices and data.

In conclusion, indices derived from satellite data represent an alternate method for evaluating and analyzing temporal and spatial drought, even if they might be combined with other meteorological data. This method is simple and quick, and the results can be used on a regular basis. Drought evaluated using indices obtained from satellite imagery on the different land use and land cover are also given the drought’s effect differently. Therefore, the drought database of other areas should be spatially evaluated. In the meantime, data from other factors that influence drought occurrence should be incorporated to demonstrate the drought's decision-making.

Keywords: Geographic information systems, Rainfall/runoff, Remote sensing, Satellite imagery