Short Communication

Spatio temporal variability of drought and its trend in Marathwada

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The water scarcity being compounded by drought is frequently observed and has become a major issue affecting the people more than any natural hazards by causing serious economic, social and environmental losses in many countries. Drought is a climatic anomaly, characterized by deficient supply of moisture resulting either from sub-normal rainfall, erratic rainfall distribution, higher water need or a combination of all the factors (Bhalme and Mooley, 1980). Standardized precipitation index(SPI) is a powerful tool requiring only rainfall data for its calculation and delivering 5 major dimensions of drought: duration, intensity, severity, magnitude, and frequency (McKee *et al.,* 1993). Pradhan *et al.*, (2011) reported various categories of meteorological drought for New Delhi using SPI.Occurrence of droughts has become a common phenomenon in Marathwada where rainfall is deficient in every two out of five years.

The present study was undertaken to detect trends of annual rainfall pattern and meteorological drought over Marathwada region using standardized precipitation index (SPI*)* computed from historical precipitation data (1981-2016) for eight geologically well distributed locations. Mann-Kendall (Kendall, 1975) and Sen's slope (Sen, 1968) were applied to detect significant trends.Four categories of drought viz., mild, moderate, severe and extreme were selected based on SPI values using the classification suggested by McKee *et al*. (1993).

Results showed that during the study period Aurangabad, Jalna and Latur locations experienced extreme drought events twice (Table 1) followed by one event at Hingoli and Beed whereas no extreme drought event was observed at Parbhani,Nanded and Osmanabad. Aurangabad and Nanded locations also experienced severe draught events twice during the studytime scale. Moderate drought events were predominant at Hingoli followed by Jalna and Nanded. The frequency of mild drought was highest at Beed and Osmanabad followed by Parbhani and Nanded. Among all locations Beed showed minimum SPI value (-3.45) with extreme drought whereas the maximum SPI value (2.35) was observed at Nanded. Trend analysis of drought showed increasing trend at Aurangabad, Jalna and Hingoli whereas decreasing trend at Parbhani, Nanded, Beed, Latur and Osmanabad (Table 2) but all were non significant.

Evaluation of SPI characteristics highlighted the spatial and temporal variations of occurrence of meteorological droughts in Marathwada. Study revealed mixed pattern of drought trends in Marathwada region with spatial and temporal variability in its occurrence.

Table1: Location details and frequency of drought events based on SPI

Station	Location		Elevation (m)	Mean annual rainfall (mm)	SPI drought category			
	Latitude	Longitude			Mild Drought	Moderate Drought	Severe Drought	Extreme Drought
Aurangabad	75.35	19.82	618	708.8	12	0	2	2
Jalna	75.87	19.83	508	731.7	11	4	0	2
Parbhani	76.77	19.25	412	939.8	15	2	0	0
Hingoli	77.1	19.57	515	883.9	10	5	1	1
Nanded	77.32	19.13	356	842.3	14	4	2	0
Beed	75.8	18.92	619	748.3	16	1	1	1
Latur	76.56	18.4	633	777.0	11	3	1	2
Osmanabad	76.17	18.2	655	722.0	16	5	0	0

Table 2: Mann-Kendall and Sen's Test parameters for drought trends on whole period basis for Marathwada

Station	1981-2016		
	Trend	Sen's Slope (%)	Result
Aurangabad		0	NS
Jalna		0	NS
Parbhani	↓	1	NS
Hingoli		0	NS
Nanded	↓	1	NS
Beed	↓	1	NS
Latur	↓	2	NS
Osmanabad	↓	1	NS

NS- Non Significant, S-Significant*, -Increasing trend, ↓-Decreasing trend

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