

Spatio-Temporal Assessment of Vulnerability to Drought

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ABSTRACT

This paper proposes a methodology for assessment of drought vulnerability at spatial and temporal scales using physiographic, climatic and hydrologic factors by integrating relative influence of different factors at the scale of hydrologic response units (HRUs). In the proposed methodology, an index termed as “Integrated Drought Vulnerability Index (IDVI)” is devised as an indicator of vulnerability to drought. The SWAT model has been applied to demarcate HRUs and estimation of soil moisture in the study basin. Spatial information of different influencing factors is categorized into various sub-classes, and maps have been prepared using ArcGIS. In this analysis, monthly rainfall departure is considered as climatic factor and Soil Moisture Deficit Index as hydrologic factor. The applicability of the proposed methodology is demonstrated on the Ken River basin, located in the Bundelkhand region in central India. Using the proposed methodology, maps showing spatial distribution of relative vulnerability to drought have been obtained at the level of HRU. The HRUs with higher value of IDVI represent the areas with relatively high degree of vulnerability to drought and vice versa. The maps thus obtained have been validated using the documented information. The present methodology provides better insight for drought mitigation actions.