

Drought monitoring in Esfahan province(IRAN) by comparison of Standard Precipitation Index(SPI) & Reconnaissance Drought Index(RDI)

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Abstract:

Drought is one of the natural disasters that causes a lot of losses and because of its creeping characteristics unlike another natural disasters prediction of its onset and end is very difficult. Nowadays SPI is used operationally for drought monitoring in different organizations in IRAN and only precipitation is considered for calculation. The new Reconnaissance Drought Index (RDI) that was created by Prof. Tsakiris (2005) consider potential evapotranspiration in addition to precipitation for drought monitoring. The goal of this research was annual drought monitoring of Esfahan province(IRAN) by those methods and investigation of new method operational application. In this research the data of 10 synoptic stations of Esfahan province including precipitation, temperature, relative humidity, wind and sun duration during 13 years of 1992-2005 were used and potential evapotranspiration was calculated by Thorntwaite and Penmann-Monteith methods by CROPWAT(ver.8) and Qbasic softwares. Then the annual mean values of SPI and RDIst were compared by non-paired T test and Mann-Whitney and correlation test was done by Spearman and Pearson methods. The obtained results showed that RDI index could show intensity of drought more pronounced than SPI index but the mean differences between RDIst and SPI (3-6-12 monthly basis) is not significant. For determination of differences between Thorntwaite and Penman-Monteith methods for potential evapotranspiration calculations the Mann-Whitney test was used and according to this test differences between two methods was not significant. For more investigation, zoning of SPI and RDI indices for 3, 6 and 12 monthly basis in severe drought condition(1999-2000) and (1996-1997) of Esfahan province, ArcGIS software was used. The schematic of two indices was similar but drought zone area of RDI in north, center and north east of province specially in Natanz district was more than SPI and degree of drought in Naeen district was more in RDI compare with SPI. According to the obtained results mean differences between RDIst and SPI (3, 6 and 12) was not significant and according to availability of data, easy calculation of procedure and same accuracy, drought monitoring by SPI on annual basis is recommended.

Keywords : RDI, SPI, Drought monitoring