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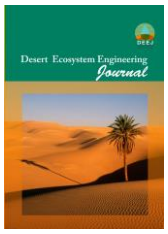

Meteorological and hydrological drought communication in Salmas Plain

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Extended Abstract

Introduction: The occurrence of droughts in a region is closely related to water supply. Since water supply in each region is related to the climatic regime of that area, so the definition of droughts varies according to the conditions of each region. Drought can be attributed to a period of abnormally dry conditions that is sufficiently long to produce an imbalance in the hydrologic state of an area. Monitoring systems play an important role in the management of drought plans. The beginning of droughts is due to the occurrence of the meteorological drought caused by the precipitation shortages. The hydrological droughts are usually more delayed than the meteorological or agricultural droughts.

Materials and Methods: The purpose of this study is investigating the effects of the meteorological and hydrological droughts of Salmas Plain on the fluctuations of the groundwater level in the period of 1986-2017. In this study, the data synoptic stations and hydrometric stations, as well as aquifer level of Salmas plain, were obtained from Regional Water Company of West Azerbaijan. After sorting the data, SPI, SRI and GRI drought indices were calculated. The effects of drought on the Groundwater fluctuations are investigated with calculating three indicators, Standardized Precipitation Index (SPI), Standardized Runoff Index (SRI) and Groundwater Resources Index (GRI) in the case study of Salmas plain. The Pearson correlation coefficient and Paired-Samples T Test were calculated between SPI and GRI, and SRI and GRI. These indicators are almost appropriate indicators for investigating the effects of drought on the groundwater resources.

Results: The results showed the significant relation between SPI-12 and SRI-1 with GRI index. These results indicate that meteorological drought has a significant relation with hydrologic drought, especially in the short-term scale and lags occur between the hydrological and groundwater drought. According to the results from the beginning of the statistical period of the study until 2009, the Metrological and hydrological and groundwater droughts have a direct relation with each other; however, after 2009 despite the favorable condition of rainfall, groundwater level is not in a favorable situation, which can because of the excessive water use of groundwater. SPI indicates a drought with a moderate intensity during the statistical period. This

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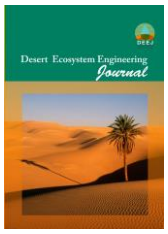

index shows the drought in the region during the years of 1998-2003 and 2008-2010. SRI was calculated only for three stations that located upstream of dams in the Salmas plain. According the SRI, the drought has happened in the period of 2001-2017. GRI in Salmas plain shows the groundwater drought from 2000 to 2017.

Discussion and Conclusion: Salmas plain is a drought-sensitive region in Urmia lake basin and due to the development of agriculture in this region and the exploitation of the groundwater resources for agricultural and even drinking purposes. Undoubtedly, one of the reasons for Groundwater decline is the usage of these resources to provide water for various sectors. The groundwater drought has been influenced by the other factors more than the meteorological drought and hydrological drought. One of the reasons could be Groundwater depletion that is primarily caused by sustained groundwater pumping. Other factors such as the geological structure of the region and the soil permeability of the Case study also play a significant role. The results of the research in the region showed that there is a 1-Month delay between the meteorological drought and groundwater drought and the 6-Month delay between the hydrological drought and groundwater drought.

Keywords*:* Groundwater, Drought, Salmas Plain, SPI, SRI, GRI.