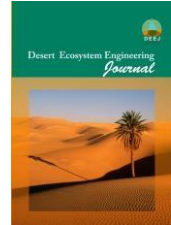




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Assessment of Drought Impact on Groundwater Resources Using SPI Index (Case study: Shahr-e-Babak Plain, Kerman Province)

Afshin Jahanshahi¹, Alireza Moghddam Nia², Mohammad Nohtani^{*3},

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Abstract

Investigation of changes in groundwater resources is of great importance in planning and sustainable management of water resources. Knowledge on the relationship between groundwater and drought is prerequisite for water resources management. In this study, climatic variables including evaporation, temperature, precipitation as well as hydrological variables i.e. discharge and groundwater depth from 50 piezometric wells were used for the period of 1992-2015 in the Shar-e-Babak plain, west of Kerman province. The SPI index, the longest period of drought and the number of years faced drought were calculated at first step. Then, trend of SPI index variation, evaporation, discharge and groundwater depth were determined using Mann-Kendall non-parametric trend test. Correlation coefficient was also investigated between groundwater depth, SPI index, evaporation and temperature. Results showed that trends of groundwater depth, evaporation, discharge and drought index were decreasing in most stations during the past 33 years. Evaporation and temperature were not significantly correlated with groundwater depth, but there was a positive correlation between groundwater depth (dependent variable) and SPI index (independent variable) on the scale of 48 months. The highest correlation and regression coefficients were 0.439 and 0.51, respectively, at 99% significance level indicating direct effect of drought on groundwater level in Shahr-e-Babak plain. Changes in groundwater depth in association with drought severity and duration as well as decreasing trend indicate that all six stations were facing drought. Among the criteria in SPI index, drought duration was recognized as an appropriate criterion for indicating drought conditions in the study area. It was found that in addition to excessive use of groundwater, prolonged drought periods has more destructive effect than shorter periods on drop of groundwater level.

Keywords: Drought, Groundwater, Mann-Kendall, Shar-e-Babak Plain, SPI Index.

1. Ph.D Student of Watershed Management, Sari Agricultural Sciences and Natural Resources University, Iran. (afshin.jahanshahi@yahoo.com)

2. Associate Professor of Hydrology, Department of Range and Watershed, Faculty of Natural Resources, University of Tehran, Iran. (a.moghaddamnia@ut.ac.ir)

3. Assistant Professor, Department of Range and Watershed, Faculty of Water and Soil, University of Zabol, Iran. (Corresponding Author: m_nohtani@yahoo.com)