

Abstract:

Drought is one of the natural phenomenon that has a significant impact on the quantity and quality of water resources, especially groundwater. The aim of this study was to investigate the effect of drought on the quantity and quality of groundwater in the Iranshahr plain in Sistan and Baluchestan province. For this purpose, at first, we analyze the drought condition by using of SPI and RAI indices. The level of groundwater measured in 14 piezometric wells located in Iranshahr plain aquifer during the statistical period of 2004-2016 in order to investigate the variation during the statistical period. Selection of the best fitted experimental model in the GS+ 5.1 environment was performed with four superior spherical, Gaussian, linear and exponential models for interpolation of water quality parameters. Then In order to zoning of qualitative changes of groundwater in the Iranshahr plain aquifer SAR, EC, PH, TDS, Hco₃, Na⁺, K⁺, Mg⁺⁺, So₄⁻, Ca⁺⁺ in all samples from 14 wells analyzed and were mapped by using of Arc GIS 10.4.1 software. Also, the qualitative statue of the groundwater of the plain in terms of drinking and agricultural water during the statistical period of 2005-2016, was analyzed using Schuler and Wilcox classification in Chemistry software. Results showed, 4 classes of drought including: poor, moderate, severe, and very severe drought based on RAI drought index. Also, study area passed 4 classes including: moderate. Normal, wet and very wet based on SPI drought index at synoptic station of Iranshahr during the period of 1987-2017. The results also showed that during the statistical period, the water level drop by 3.45 m. interpolation of water quality parameters showed the best accurate with Gaussian and spherical models also water quality parameters have exacerbated during the period. Comparison results between Schuler and Wilcox classification diagram showed that there was no significant change in the quality of potable and agricultural water during the statistical period. Finally, the results of dependent T test for the mean comparison of quality parameters in dry and normal years indicated a significant difference between pH, TDS, HCO₃, SO₄⁻, TH, SAR, K⁺ and Mg⁺⁺, and no significant difference between Na⁺, Ca², EC, Cl, total Cations and total Anions were in level of 95%. Correlation among drought indices and qualitative parameters also groundwater level showed that SPI with RAI indices was significant in level of 5%. The SPI and RAI indices did not correlate with any of the qualitative parameters. Levels of groundwater were also significant with HCO₃ by 99% and with Mg by 95% respectively.

Key words: Drought, SPI Index, RAI Index, Iranshahr plain, Groundwater quality



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**The Thesis Submitted for the Degree of M. Sc
In the field of Watershed Management**

**Studying the Effects of Drought on the Quantity and Quality of
Iranshar Plain Ground Water Using SPI and RAI Indices**

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January 2018