

## **Abstract**

One of the most important problems encountered by human being, particularly in recent years, has been water crisis and drought. As such, drought monitoring plays a very important role in optimal water management. Objective of the present research is to investigate meteorological and hydrological droughts and groundwater in various time scales (1 to 48-month) including annual intervals. In the present research, information from five rain gauge stations and three hydrometric stations with appropriate distribution, groundwater depth data across Baft Plain during 2012-2015, and also groundwater quality data during 2002-2014 were used. Once finished with omitting outliers and reconstructing the data, a 30-year statistical period (1984-2014) was considered as the common statistical period for all meteorological and hydrometric stations. Standardized Precipitation Index (SPI), Stream-flow Drought Index (SDI), and Groundwater Drought Index (GRI) were utilized in GIS environment. In order to zonate the distribution of droughts, IDW method was used. The relationship between the indices was examined using Pearson's correlation index. Investigation of the relationship between meteorological and hydrological drought across Baft Plain indicates a significant ( $p < 0.01$ ) relationship between meteorological and hydrological droughts, with an increasing trend of drought with time in almost everywhere across the plain. All of the stations exhibited significant and positive relationships, Investigation of correlation coefficients show that, in 63.88% of the cases, quality parameters were significantly ( $p < 0.01$ ) related to SPI. Correlation coefficients were positive in some wells and negative in some others. The results indicated that, in most cases of quality parameters, with increasing the time base of SPI, the corresponding correlation coefficient increases. Regarding the relationship between meteorological drought index and quality parameters, the highest correlation coefficient and significance were those of the parameters pH, Na<sup>+</sup>, and Ca<sup>+</sup>, with the lowest correlation coefficient being that of Mg<sup>2+</sup>. Drought zonation maps indicated that, meteorological drought has no particular spatial trend, while groundwater droughts may not happen randomly across the region. Application of Schöller and Wilcox diagrams showed that, the drought has imposed no significant effect of the quality class for groundwater using in agricultural and drinking applications.

**Keywords:** Baft Plain, drought, SDI, SPI, GRI.



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