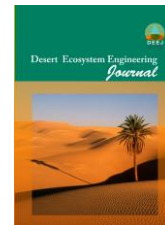




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## Spatial and Temporal Analysis of Meteorological and Groundwater Droughts (Case Study: Northern Mahyar Plain of Esfahan)

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### Abstract

Monitoring of Meteorological and groundwater droughts and determining of the lag time between these two types of droughts in spatial various locations can help in consumption management and protection of the groundwater resources. In this study, spatial and temporal changes of droughts were analyzed using the Standard Precipitation and Groundwater Resource Indices (SPI & GRI) in the northern Mahyar plain located in Esfahan province. The results showed that groundwater drought in most areas of the aquifer have occurred with a longer lag time (48 months). This is due to increase of groundwater depth and probably due to decrease permeability and blocking pores of the alluvium formations as a result of high number of exploitation wells and heavy withdrawal of groundwater resources in the area. In the western part of the aquifer, particularly around the Ajrakh piezometer, there were high correlations between meteorological and groundwater droughts in lag time of 24 months with R2 value of 0.62. In this part of the aquifer, the factors that make relatively fast response of groundwater level to precipitation fluctuations were the high permeability coefficient, input flows from the adjacent aquifer, lateral recharge caused by permeable limestone formations close to the plain, keeping of aquifer effective porosity and control of subsidence phenomenon due to transferred water from Mahyar channel. Also, the results of spatial mapping of meteorological and groundwater droughts showed increase in the amount of lag time between meteorological and groundwater droughts and expansion of drought severity in most parts of the aquifer over time.

**Keywords:** Hydrogeologic Drought, Overexploitation, Propagation Drought Time, Mahyar Plain, Lag time.

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