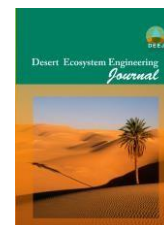




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Change of storage coefficient and transmissivity of Aleshtar plain aquifer due to drought and groundwater overexploitation

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Abstract

Drought and overexploitation of groundwater should control the aquifer properties (e.g. storage coefficient and transmissivity). The role of stress factors is identified when the performance of aquifer hydrodynamic coefficients be studied. Since in the most aquifers, allocation and utilization management is based on the pumping test in the past, it would not be expected the optimal management. In order, in this study, the condition of occurrence of groundwater drought periods was investigated using SGI Index. Afterward, two periods of drought in late 1990s and late 2000s which had the severe and very severe drought status was selected as entered stresses to aquifer system. In these periods, the results of pumping tests in exploitation wells (that had the conditions of complete wells) were used to determine the hydrodynamic coefficients of the aquifer. Estimating of hydrodynamic coefficients in the exploitation wells was done using Moench Model. This model is considered the errors caused by instantaneous drainage, wellbore storage and the lack of compressibility unconfined aquifer. Coefficients obtained were compared with the pumping tests and Geoelectric studies (at the beginning of the study period (in early 2000s)). The Results showed that in both drought periods, the aquifer hydrodynamic coefficients had a reduction in comparison with baseline period. In case of transmissivity of aquifer, most its value has been occurred about 100 to 320 m²/day in late of 2000s in different places of plain. This is indicative the reduction of permeability and decrease of saturated zone thickness of aquifer due to drought and overexploitation. In this period, the results also showed that storage coefficient have been reduced from 3 to 10 percent to initial period. For both parameters investigated (storage coefficient and transmissivity), the results of compare means using t test in confidence level 95% showed that there is a significant discrepancy between values of each parameter during stress period to primarily years. In general, with increasing of drought severity and overexploitation of groundwater, different sections of the Aleshtar plain have been experienced lower hydrodynamic coefficients in wider areas.

Key words: Drought Periods, SGI Index, Hydrodynamic parameters, Moench Model.

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