Numerical Simulation of Operation Effect of Chahnimeh Reservoirs on Groundwater Table in Sistan Plain Using MODFLOW

Abstract

Agriculture development is one of the main conditions for supplying the food needs of world growing population. One of the main policies to protect water and soil resource is to prevent forming salty and swampy lands. Groundwater simulation by mathematical models can indirectly reduce costs of groundwater manegment. MODFLOW is the most common mathematical model using for simulation of groundwater systems in the world. Chahnimeh reservoirs are located on the eastern upper part of Sistan plain and Hamun lake is located in lower part of this plain. In this study, upon calibration and verification of MODFLOW model, the mean hydraulic conductivity of studied area is determined to be about 2 m/day, reducing from the east to the west. Specific yield is varied between 0.011 to 0.17 from center of area to the vicinity Sistan river. In this reaserch the effects of water levels of Chahnimeh reservoirs together with those of the Hamun lake on groundwater table are studied by MODFLOW for different scenarios . The results indicate when Chahnimeh reservoirs and Hamun lake are in maximum levels, the groundwater head of the plain is increased. In such a conditions, based on Arc GIS maps, the groundwater depth reaches to less than one meter for 33.5% of the land area. Therefore, operation of the Chahnimeh reservoirs with the maximum level in the long terms leads to increase the swampy area. Hence, such operations are not recommended.

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