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Conjunctive Use Modeling of Groundwater and Surface Water

PDF (Size: 621KB) PP. 726-734 DOI : 10.4236/jwarp.2011.310083

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ABSTRACT

In this study, conjunctive use of surface and groundwater in the Maraghe area was investigated. The objective function used for the overall conjunctive use model was maximizing sum of relative yields of crops in the command area. Declining groundwater levels was selected as criteria of groundwater limitation. The simulation was done for four years and began by a dry year to normal year. GMS software was used to simulate groundwater aquifer. In this model, different well discharges in the study area for different scenarios were used and decline in groundwater level at the end of simulation time was calculated. In order to model surface water and calculate the objective function, a program in Visual Basic was developed. Two types of scenario, annual and seasonal, were defined by specifying the ratio of the allocation of surface water to that of groundwater pumping at the crop level for entire irrigated area. For different scenarios, declining groundwater levels and objective functions were calculated. With attention to maximize objective function that the water table drawdown is not greater than the limited criterion, the best scenario was obtained. In annual scenarios, The results showed that in scenario of 75 - 25 (75% surface water to 25% groundwater), the purpose function rate was 12.2 and water table draw down was 2.6, which was lower than allowable limitation. Therefore, it was chosen as a selective scenario. Also in seasonal scenarios, The best scenario was chosen 100-40-60 (the percentage of surface water share in spring, summer and fall & winter respectively), which amount of purpose function was 12.57 and the water table draw down was around 3 m at the end of the simulation period.

KEYWORDS

Conjunctive Use, Relative Crop Yield, Surface and Groundwater Resources, Model

Cite this paper

 H. Mahjoub, M. Mohammadi and M. Parsinejad, "Conjunctive Use Modeling of Groundwater and Surface Water," *Journal of Water Resource and Protection*, Vol. 3 No. 10, 2011, pp. 726-734. doi: 10.4236/jwarp.2011.310083.

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