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Development of a quantitative model for the assessment of Zahedan aquifer, southeast Iran

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Zahedan city is located in south eastern of Iran on Zahedan aquifer. A large amount of water is extracted from the mentioned aquifer for urban, industrial and agricultural demands. According to recent drought and high rate of water extraction, water table has decreasing in recent years. In this research a quantitative model was developed for the assessment of groundwater. By inputting the necessary data such as kind and number of layers, top and bottom of the layers elevation, water table elevation in observation wells and modifying model domain in PMWIN V5.3 software environment, the initial basic structure for the model was made. In the next step according to the provided plain unit hydrograph, water table elevation in December 1998 was imported to the model as initial hydraulic head and model was calibrated for steady state condition. After optimizing the horizontal conductivity coefficient at steady state condition, model was calibrated at transient condition for one year from December 1998 to 1999 and then was verified for three years from 1999 to 2002. By performing these steps and considering suitable values, the horizontal hydraulic conductivity and specific yield coefficient of aquifer were optimized. Horizontal hydraulic conductivity was estimated to maximum of about 43m/day in the northwest and a minimum of about 18m/day in the northeastern part of the plain. The specific yield was calculated maximum about 0.24 in the northwestern part and minimum about 0.08 in the southeastern part of the plain. Prediction was started after optimizing the specific yield and urban sewage water recovery coefficient (estimated about 60%).Using available previous increasing rate of population, population growth of the above mentioned city was studied and then was estimated for few next years. Considering individual water consumption pattern and calculating urban water demand for each days of year that

changes monthly and seas only, the injected sewage water in aquifer was calculated and then was imported to the model, considering monthly population increasing. Prediction was performed for three assumed situations with 10%, 30% and 70% annual precipitation of 50 recent year's average precipitation. Model outputs show variation in water table in every three assumed situations and also in different parts of the aquifer.