



Title: Evaluation of Groundwater Resources In Kufr-Dan Area Using Groundwater Modeling

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Abstract:

Ground water is the main source of drinking water in Palestine. It is also one of the most important resources for agriculture. The increase in the population has an impact on groundwater resources and has created problems in aquifers such as declining water tables and also deterioration of water quality. Palestine is facing a serious problem in managing groundwater due to its limited availability and the excessive pumping of groundwater. The acute shortage of groundwater has an adverse impact on the agricultural production which leads to a stagnant economy.

This study has been conducted in the village of Kufr-Dan which aims at studying the shallow aquifer in the area which is Eocene Aquifer.

This study used Groundwater Modeling System (GMS) to develop a conceptual model on the basis of data from cross section and several boreholes and to calibrate a numerical Model.

Seven wells were selected for model calibration. The difference between the simulated and observed wells was less than 8 meters. After adjusting the permeability value in the model for the study area, we found that there is an amount of 2,500 m³/day that enters the northern part of the study area after doing the calibration. IV

The groundwater table ranges from 50m a.s.l in the northern part to 170m a.s.l in the southern part, where the groundwater flow is towards the north eastern side.

The model has 73 wells tapping the Eocene aquifer. Most of them are dry due to over pumping. The boundary of model is classified in to: flow boundary and non-flow boundary. The total input is 0.43 MCM/year from boundary of the model, the total output is 0.85 MCM/year from the boundary of the model.

The total quantity of recharge water for model is determined from rainfall (88%), leakage from network water (0.5%), the quantity of infiltration water from cesspits (1.4%), and the quantity of residual water that passes through irrigation (10%) is 2. MCM. The total input and output from model was 2.98 MCM/year 2012/2013. The well abstraction from the model is 2.13 MCM/year which is about 70% of the aquifer budget.

Four scenarios have been applied based on the model. The climate change has been taken into account in which the rainfall has decreased by 30% composed with average amount of rainfall for the previous years. The total amount water input and output in the model is 1.86 MCM, and the amount of abstracted water is 1.3 MCM.

In another scenario, the rainfall has been increased by 10% based on the previous years. We did not notice any noticeable change in the input and output in the model, which is 3.19 MCM, and the amount of abstracted water was 2.34 MCM. V

The third and fourth scenarios were based on abstraction.

The third scenario is based on addition of three new wells in the northern part of the study area each of them has a capacity of 40 m /h.

The fourth scenario is based on artificial recharge, where seven dry wells have been selected to be injected with 3,750 m /day treated wastewater from nearby Jenin wastewater plant. The yield of the wells in the area has improved to 4.85 MCM, which is enough to meet the water demand of the farmers in the area. The water output and input of the model was 4.89 MCM.

It was concluded that another well could be digged in the northern part of the study area which can have a capacity of 20m /h, and the water input and output of a model well increase to 5.00 MCM/year.