

Groundwater Flow Assessment Based on Numerical Simulation at Omdurman Area, Khartoum State, Sudan

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Abstract : Visual MODFLOW computer codes were selected to simulate head distribution, calculate the groundwater budgets of the area, and evaluate the effect of external stresses on the groundwater head and to demonstrate how the groundwater model can be used as a comparative technique in order to optimize utilization of the groundwater resource. A conceptual model of the study area, aquifer parameters, boundary, and initial conditions were used to simulate the flow model. The trial-and-error technique was used to calibrate the model. The most important criteria used to check the calibrated model were Root Mean Square error (RMS), Mean Absolute error (AM), Normalized Root Mean Square error (NRMS) and mass balance. The maps of the simulated heads elaborated acceptable model calibration compared to observed heads map. A time length of eight years and the observed heads of the year 2004 were used for model prediction. The predictive simulation showed that the continuation of pumping will cause relatively high changes in head distribution and components of groundwater budget whereas, the low deficit computed (7122 m³/d) between inflows and outflows cannot create a significant drawdown of the potentiometric level. Hence, the area under consideration may represent a high permeability and productive zone and strongly recommended for further groundwater development.

Keywords : aquifers, model simulation, groundwater, calibrations, trail-and- error, prediction

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