

GROUNDWATER SIMULATION IN THE EL QAA PLAIN, SOUTH SINAI, EGYPT

FUJISAKI, K. Independent Consultant, Matsudo, Japan

The El Qaa Plain with an area of 1,930km² is located in the southwestern part of the Sinai Peninsula, Egypt. It is largest Quaternary groundwater basin in South Sinai. Thick Quaternary deposits in the plain consist of mainly sand and gravel with clay. Annual average precipitation is less than 30mm. However, the Quaternary aquifer is highly exploited for domestic and irrigation uses. It is supposed that the aquifer is recharged from eastern Precambrian mountains through fissures and fault planes. In the northwestern part of the plain, salinity of groundwater is relatively high. At the coast, seawater intrusion is recognized.

The Quaternary aquifer was modeled in finite difference three-dimensional manner. Aquifer constant, pumpage, and recharge rate were inputted for each cell, manipulating from hydrological and hydrogeological studies. No variation of water level has been observed since 1989, steady-state flow was calibrated with the model. Salinity is major problem in this plain, so then TDS was selected as water quality index. Average distribution of TDS was simulated by the solute transport model.

According to future developing plan, five cases of groundwater extraction were predicted. Drawdown and TDS concentration changes were calculated for 120 years. The prediction results were evaluated with following criterions; water balance, water quality, environmental impact, and effect to existing wells. Based on the evaluation of predicted results, groundwater development potential in the El Qaa Plain was estimated.