7-2008

Impact of Pumping on Saltwater Intrusion in the Gaza Coastal Aquifer, Palestine

Abdelhaleem Khader
Utah State University

Abstracts of presentations given in Session 5 of the UCOWR conference.

IMPACT OF PUMPING ON SALTWATER INTRUSION IN THE GAZA COASTAL AQUIFER, PALESTINE

Abstract

The Gaza Coastal Aquifer (GCA) is the major source of water in the Gaza Strip. The GCA is a transboundary aquifer, shared by approximately 600 Israeli wells and more than 3000 Palestinian wells. Recent studies show noticeable deterioration in aquifer water quality: chloride, nitrate, sulfate, and fluoride concentrations exceed the maximum contaminant levels in most of the wells in the Gaza Strip. Many agricultural wells are no longer used due to high salinity. This high salinity is an indication of saltwater intrusion, which appears mainly in coastal aquifers due to excessive pumping.

This study is an attempt to determine the impact of pumping on the hydraulic head at the coastline of the Gaza Strip. To do so, a groundwater flow model was developed for GCA using MODFLOW-2000 based on data from the Palestinian Water Authority (PWA). The model was calibrated using head observations obtained from PWA and piezometric contour maps from the literature. The calibrated model was used to simulate the effects of pumping, recharge, and injection on water table elevation. The results show that GCA is sensitive to the above mentioned parameters.

Pumping has a great impact on water table elevations. A small decrease in total pumping (pumping from all of the wells) results in a noticeable decline in the areas that have water table elevations below mean sea level (MSL), which is in essence an indication of saltwater intrusion. Similar results were found when decreasing municipal and agricultural pumping.

Two potential solutions were simulated that included pumping polices on both Palestinian and Israeli wells: reduction in pumping and the injection of water through wells. These two options eliminated the problem of saltwater intrusion. However, a thorough future analysis should include an economic feasibility study.