A numerical approach for the evaluation of sustainable yield of shared aquifer basins: a case study from the Mediterranean Countries

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ABSTRACT

The aim of this research is to illustrate that developing steady-state models for shared aquifer basins will provide an opportunity to better manage these shared aquifers by realizing the transboundary fluxes between sharing countries. This study addresses a case study in the Eastern Mediterranean Countries. The addressed case study is a source of high level of disputes between sharing countries with regards of water rights. Therefore, this study provides an important methodology to evaluate the sustainable yield of the shared aquifers in order to help develop optimum utilization plans especially for domestic and agricultural uses. An understanding of the regional scale hydrogeological processes and assessing their impact on the aquifer basins will lead to a significant improvement in the determination of the sustainable yield of the shared aquifer basins. A numerical model (GMS-MODFLOW) was developed for the shared aquifer addressed in this study which is the Western Aquifer Basin (WAB) in Eastern Mediterranean Countries. The model was calibrated using historic and recent data. The sustainable yield of the WAB has been considered as the calibrated long-term discharge of the main springs (Timasah and Ras Al-Ain) of the aquifer basin before its development. The results of the study show that the steady-state sustainable yield of WAB was 357.9 Mm^3/y, respectively.

Keywords: Steady-state flow model; Sharing countries; Utilization plans; Springs discharge