Hydrogeological assessment of a managed aquifer recharge site at the Wala reservoir, Jordan

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Introduction

- Managed aquifer recharge (MAR) plays an important role in the implementation of Integrated Water Resources Management (IWRM) in the Lower Jordan Valley.
- The Wala reservoir stores flood water since 2002 during winter season and recharges the underlying karst aquifer. This counteracts falling groundwater tables and increases the productivity of Hidan wellfield 7 km downstream (Fig. 1).

Objective

- Assessment of the impact of reservoir infiltration on the karst aquifer and development of a conceptual groundwater flow model of the test site.

Results and discussion

Water balance of Wala reservoir and Hidan wellfield from 2002 to 2012 in million cubic meters (MCM).

- 136 MCM inflow
- 84 MCM storage
- 52 MCM loss via the spillway
- 8 MCM evaporation
- 129 MCM abstraction


Conclusions

- Chemical data shows the mix of old and high mineralized groundwater with recent and less mineralized surface water at Hidan wellfield.
- The proportion of reservoir infiltration on the total amount of abstraction at Hidan wellfield counts about 57% from 2002 to 2012.
- Sedimentation continuously reduces the infiltration rate from the reservoir.
- Intensified karstification along the wadi corridor is assumed.

References:


Methods

Evaluation and interpretation of hydrochemical and isotopic data, recharge, abstraction and water level records from Wala reservoir and the karst aquifer. This included:

- Calculation of the water balance of Wala reservoir.
- Electrical conductivity (EC) analysis of the groundwater as an indicator for salinity changes.
- Detection of reservoir water in the wellfield using Tritium.
- Calculation of mean groundwater residence time with C-14 dating.