



Implementation of simple strategies and tools to improve water management in arid regions: the case study of Wadi Al Arab wellfield, Jordan

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Groundwater is the main source for drinking water supply in Jordan. Many wellfields have been expanded during the past 30 years to cover increasing demand caused by population growth, development of life standards and as a result of the influx of refugees to Jordan. In particular, northern Jordan groundwater resources along the borders with Syria have been severely affected. The increased groundwater abstraction, with rates much beyond the safe yield, have resulted in rapidly decreasing water levels in recent years. Over pumping caused massive problems for the operation of wells in the North in order to sustain water supply. The main challenge of water suppliers/utilities is to meet water demand and to deliver water to people with adequate quality, quantity and on time. This cannot be achieved without a good data management, a proper maintenance for groundwater wells and management plans. Maintenance had been neglected over the past decade.

The overall available information, required for a proper wellfield management, is still very limited. Essential monitoring data, such as dynamic and static water levels, power consumption and yields are still only limitedly available. A monitoring system for operational purposes was set up for Wadi Al Arab wellfield, which covers around 40% of the drinking water demand of the second biggest city in Jordan, Irbid. It was important to start by educating the technical staff of the local water utility (bottom-up approach) so that they would see the benefits behind a proper wellfield management system.

The new monitoring system enhanced data availability, in comparison to the situation before 2017. For instance, the DWL was measured in the wellfield only 45 times in 2012 and 286 times in 2017. Data on the electricity consumption is now collected monthly for each well, while it was collected as lump sum for all wells and pumping station in the system. Before it was impossible to attribute problems to a specific well. All the existing and the new data which are related to the operation of wells have been entered to a new access database.

An Operational Decision Support Tool (ODST) has been developed and tested in Wadi Arab wellfield as part of wellfield management plans. ODST gives a visual representation of the actual condition of the well. ODST is a simple schematic drawing of all wells that is generated from a simple MS Excel file containing the collected data from the MS Access database. The ODST can also act as an early warning system defining whether an urgent action has to be taken before failure of a well would occur, such as deepening the pump or lowering the discharge. The result shows that the needed time to pull out, repair, install and operate the wells was reduced from an average of 4 days/maintenance/well in 2012 (unplanned maintenance) to less than 1 day/maintenance/well in 2017 (planned maintenance). The applied research shows that it can easily be used as a management tool and has a very positive effect on proper water resources management in the area.