



Set-up of an early warning system for an improved raw water management of karst groundwater resources in the semi-arid side Wadis of the Jordan Valley

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Karst groundwater is an important drinking water resource in the sides Wadis of the Jordan Valley. For the local water suppliers in this semi-arid region, the monitoring of the raw water quality is imperative in order to be able to adapt drinking water treatment accordingly. Major challenge to manage the raw water usage is the highly variable water availability, due to fast hydrologic response characteristics of respective karst aquifers. Moreover, often leaky sewer systems lead to frequent fecal contamination in groundwater. By high-resolution online measurements of precipitation and water quality parameters of karst springs and other components of the local water cycles, a better control to avoid usage of raw water during contamination events was goal within the SMART-MOVE project (Sustainable Management of Available Water Resources with Innovative Technologies - Management Of Highly Variable Water REsources in semi-arid Regions).

Unfortunately, it is not feasible to monitor *E. coli* bacteria continuously by a fixed measuring station. Therefore, a preventive protection concept by usage of a parameter combination, which could indicate bacterial pollution, was established. Electrochemical and optical measurement methods as well as automated combined signal analyzes are used, in the development of an early warning system. The measurement data of the monitoring stations are transferred online to a database. Based on the hydrological and hydrochemical monitoring data, a database algorithm calculates continuously the risk potential in near real time (hourly resolution) and warns about the risk of contamination for spring water quality. The system sends a warning via email in case e.g. a large rain event occurs in combination with distinctive features in turbidity or electrical conductivity measurements in a specific time sequence at a spring station. Thus, affected drinking water suppliers can be informed about a high microbial contamination risk. The measurement data of the monitoring stations is accessible in an online portal every hour. All users of the online portal can search, analyse, and visualize the current and historical data and diagrams. Additionally, the online portal provides various background geodata for the region of Jordan, Israel and Palestine. The online portal provides a user-friendly interface and a reliable data access. Furthermore, the online portal can be modularly integrated into existing data management infrastructures and results can be easily supplemented into the online portal.