



Assessment of spring water resources of the Faria Catchment, West Bank

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Karst springs constitute a major source of high quality drinking water in the Middle East. Understanding the hydrological processes affecting the spring water availability and knowledge about their actual and future storage dynamics and capacities are of utmost importance for water resources management. However, in the West Bank hydrological data is very limited and not in the public domain, which makes future predictions with highly elaborated distributed models impossible.

Our study site is the Faria catchment, which is located in the northeastern part of the West Bank, Palestine. For simulating the karstic springs in the Faria catchment we developed a "grey box" model whose conceptual structure was adapted to data availability. Its lumped structure was based on established concepts of a karst system consisting of three distinct zones: the soil/epikarst, the infiltration zone and the saturated zone. In order to find the most reliable model, we considered five different model structures and applied each of them to a 30-year time series of observed spring discharges, first at the major water source (Al Far'ah spring). Using an automatic calibration routine (shuffled complex evolution, SCE-UA), we could identify the most appropriate model structure which was then applied to the remaining springs in the Faria catchment. A split-sample test documented model performance at the individual karstic springs. Having proven the stability and physical soundness of the model parameters, we used a set of transient A1B-climate change scenarios obtained by dynamic downscaling as model input. This revealed trends and uncertainties of future spring flow estimates.

We think that our approach is a good tradeoff between realistic system representation and limited data availability. It also shows that projections of future water availability are possible for a data limited region, where those are urgently needed for mid- and long-term decisions in water management.

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