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Development of a new modelling tool as starting point for water management in the lower Jordan river catchment

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The development of sustainable and cooperative management practices for the Middle East requires profound, scientific knowledge of the vulnerability of water resources in the Jordan River Basin under global change conditions. Reliably estimating natural available water resources in this basin, as it is the aim of the interdisciplinary GLOWA Jordan River project, has to be based on adequate, process-based modelling tools developed for the specific conditions found in dryland hydrology.

The hydrological model ZIN was developed specifically for arid areas and simulates runoff generation and lateral water fluxes, but focuses on single runoff events. For addressing long term water balances, the ZIN model was coupled with the SVAT model TRAIN which simulates vertical water fluxes that dominate in longer time scales, e.g. evapotranspiration.

Through the coupling, the resulting modelling tool simulates fluxes of blue water and green water likewise. Processes represented in the model include different aspects of evapotranspiration (e.g. transpiration, interception and soil evaporation) and different types of runoff generation processes as well as groundwater recharge and flood routing. Because these processes dominate on different spatial and temporal scales, a flexible temporal and spatial resolution is among the special features of the coupled model.

Within the framework of the multinational GLOWA Jordan project, the coupled

SVAT/hydrological modelling framework is applied to the Lower Jordan River catchment from the outflow of Lake Kinneret to the Dead Sea. Applying the model in this extensive area of 16,000 km^2 results in a large model structure, e.g. including more than 11,000 stream links and sub basins. Since precipitation data with high temporal resolution is of primary importance for the project, rainfall radar data is used as model input. However, first results indicate that careful data revision prior to ground calibration is necessary to obtain a uniform data set of radar reflectivity.

In a nested approach, experiences from an application in smaller catchments within the basin are used for improving the quality of the modelling. A first application in a small dryland catchment in Israel focused on hillslope processes, the runon-runoff concept and changes in soil moisture content.

In combination with the model output of other disciplines in the project, e.g. simulations of vegetation and socio-economics, the calculated water fluxes will be visualized in an integration tool in the project and used for scenario analysis and as decision support tool for local stakeholders.