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Water Resources under Global Change: Process-Based Hydrological Modelling for the Lower Catchment of the Jordan River

Jens Lange[1], Lucas Menzel[2]

[1] *University of Freiburg, Institute of Hydrology, Germany*
[2] *University of Kassel, Center for Environmental Systems Research, Germany*

Abstract

Downstream of Lake Kinneret the climatic regime of the Jordan river catchment changes to semiarid or even arid conditions. Hence specific tools are required to cope with enhanced spatial and temporal variability of rainfall and adequate modelling of generated overland flow by saturation or infiltration excess.

To simulate climatological variability, historical extremes (dry and wet seasons) are modelled using C-band rainfall radar data as model input. A parsimonious model concept (the ZIN-model) was successfully tested in a neighbouring 680 km^2 catchment. It was run both in a single event and continuous mode using a constant set of field derived parameters. When model runs were started at high antecedent moisture conditions, single event simulations were promising, while longer term continuous simulations were less accurate both under- and overestimating the catchment scale runoff response. For the Jordan River it is envisaged to couple this process-based approach with the hydrological model TRAIN. This model focuses on the continuous simulation of processes at the interface between soil, vegetation and atmosphere and thus helps to identify e.g. water use from vegetated surfaces and related water stress conditions. The model combination leads to improved simulations of longer term components (evapotranspiration, soil moisture, ground water recharge) of the water cycle. As such, detailed patterns of available water resources for historical extremes are expected. These will be correlated to climatic change scenarios to arrive at sound estimates of induced changes in water availability all across the lower Jordan river, which will finally be used as input for the central integration tool WEAP of the GLOWA-Jordan river project.

Keywords: Jordan River , process-based modelling, rainfall radar, runoff generation

Contact Address: Jens Lange, University of Freiburg, Institute of Hydrology, Fahnenbergplatz, 79098 Freiburg, Germany, e-mail: jens.lange@hydrology.uni-freiburg.de