

Comparison of model performance and simulated water balance using NASIM and SWAT for the Wupper River Basin, Germany

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Under the framework of the Horizon 2020 project BINGO (Bringing INnovation to onGOing water management), climate change impacts on the water cycle in the Wupper catchment area are being studied. With this purpose, a set of hydrological models in NASIM and SWAT have been set up, calibrated, and validated for past conditions using available data.

NASIM is a physically-based, lumped, hydrological model based on the water balance equation. For the upper part of the Dhünn catchment area – Wupper River's main tributary – a SWAT model was also implemented. Observed and simulated discharge by NASIM and SWAT for the drainage area upstream of Neumühle hydrometric station (close to Große Dhünn reservoir's inlet) are compared. Comparison of simulated water balance for several hydrological years between the two models is also carried out.

While NASIM offers high level of detail for modelling of complex urban areas and the possibility of entering precipitation time series at fine temporal resolution (e.g. minutely data), SWAT enables to study long-term impacts offering a huge variety of input and output variables including different soil properties, vegetation and land management practices. Beside runoff, also sediment and nutrient transport can be simulated. For most calculations, SWAT operates on a daily time step.

The objective of this and future work is to determine catchment responses on different meteorological events and to study parameter sensitivity of stationary inputs such as soil parameters, vegetation or land use.

Model performance is assessed with different statistical metrics (relative volume error, coefficient of determination, and Nash-Sutcliffe Efficiency).