



**A CONCEPTUAL, REGIONAL HYDROLOGICAL MODEL FOR BENIN (WEST AFRICA):
VALIDATION, UNCERTAINTY ASSESSMENT AND ASSESSMENT OF APPLICABILITY FOR
ENVIRONMENTAL CHANGE ANALYSES**

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ABSTRACT: A conceptual, hydrological model is proposed to simulate the water fluxes of the regional scale Térou catchment in central Benin (West Africa). Although the conceptual model UHP has a simple model structure the calculated regional water balances as well as the hydrological seasonality is well reproduced.

In order to check the applicability of the model in the target region a comprehensive uncertainty analysis is performed as validation data are rare in tropical West Africa. Both, the spatial resolution of input data as well as the model parameters have a significant impact on the model performance. Calibration improves the overall model performance but leads to a hidden uncertainty within the modelling system as model calibration also calibrates data errors and incorrect model assumptions.

Validation is carried out by a split sampling test using stream flow time series of the Térou river. Additionally a multi site validation is performed using discharge data of six additional gauge stations (Térou river, Donga river and upper Ouémé river). The model performance for all gauge stations is good without calibrating the model again.

Due to the fact that both, mean behaviour and the variability of discharge, are well reproduced by the model, validation was successful. The model is sensitive to environmental change (e.g. rainfall amount and soil loss) and therefore can be used for scenario analyses concerning climatic and environmental change. A first example shows, that an exact definition of scenarios based on regional knowledge about changing processes and a changing environment is required as the model (and the hydrological system, too) reacts sensitively to changes of the boundary conditions and system properties.

KEYWORDS: Conceptual hydrological model, uncertainty analysis, validation, regional scale, West Africa, environmental change