

## SIMULATION OF COMBINED IMPACTS OF CLIMATE AND LAND USE CHANGES ON HYDROLOGIC PROCESSES IN THE UPPER OUM ER RABIA WATERSHED (MOROCCO)

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In Morocco, basin hydrologic modeling can sustainably help in planning for the effect of anthropogenic actions and varying climate on scarce water resources. Studies indicate existence of proper policies developed by most resources management agencies. An impact-analysis study was conducted with the aim of investigating and evaluating land use change and climate variability influence on soil hydrological processes using the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS). This work presents model development using HEC-HMS for event-based and continuous-process simulation of the Upper Oum Er Rabia watershed. The use of HEC-Geo HMS facilitated the digital data processing for coupling with the model. The basin's physical characteristics and the hydro-climatic data helped to generate a geospatial database for HEC-HMS model. Modeling focused on reproducing daily observed runoff for the 1980-2011 period using the SCS curve number and the soil moisture accounting (SMA) loss methods. SMA was coupled with the Hargreaves evapotranspiration method. Model calibration focused on reproducing observed basin runoff hydrograph. To evaluate the model performance for both calibration and validation the Coefficient of determination (R<sup>2</sup>), Nash-Sutcliffe efficiency (NSE), Root Mean Square Error (RSR) and Percent Bias (PBIAS) criteria were exploited. The average calibration NSE values were 0.740 and 0.585 for event-based (daily) and continuous-process (annual) respectively. The R<sup>2</sup>, RSR and PBIAS values were 0.624, 0.634 and +16.7 respectively. This is rated as good performance besides the validation simulations which were satisfactory for subsequent hydrologic analyses. It was concluded that the basin's hydrologic response to land use change and climate variability is significant to both positive and negative scenarios.

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