

Evaluation of Various Rainfall–Runoff Models: A Case Study of the Nakhla Catchment, North of Morocco

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Abstract:

The Mediterranean climate characterized by large variation in rainfall intensity and duration, represents a major challenge for accurate hydrological prediction and simulation. Therefore, we aim by the present study to compare the accuracy of several rainfall-runoff models. We tested several configurations of models in the watershed called Nakhla, located in northern Morocco, over the period from 2004 to 2014, using inputs including the land use, soil and hourly meteorological data. The calibrated results were compared with the observed runoff data from the dam of Nakhla which represents the watershed outlet. The result analysis was made by application of performance indicators including the correlation coefficient, RMSE, R^2 , Pbias, and NSE.

Generally, the results of all models tested showed good performance. However, the analysis revealed that the Smith Parlange model was the most accurate model, while the SCS Curve number was classified in the second range. The Green and Ampt, along with the Initial, Deficit and Constant models showed the lower performances.

The present study provides methodological framework to adopt the appropriate model in different hydrological contexts. In addition, these results could provide decision-making tools for water resource management.

Keywords:

Runoff, loss models, Mediterranean climate, Nakhla watershed.