

Rainfall-runoff modeling of lake Tana basin [a case study of Gumara and RIBB river catchments]

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System type (LPM), Lumped conceptual (SMAR & NAM) and Semi-distributed (HEC-HMS) rainfall-runoff models were applied to model the rainfall-runoff relation on the selected catchment of the lake Tana basin. The selected catchment were Gumara and Ribb River catchment situated in the Eastern part of the Lake Basin having the catchment area of 1394 and 1592 km² respectively. Twelve year data (1992 to 2003) were used to run the models, 9 years for calibration and 3 years for verification. Missing rainfall data was filled using normal ratio method. Missing data of river flow was filled using recession curve method and seasonal mean. Spatial inputs for HEC-HMS model was processed by ArcViewGIS using HEC-GeoHMS extension and time series data also converted in to model readable DSS file format using HEC-DSSVue program. The model performance obtained in terms of Nash-Sutcliffe efficiency index, R² (%) for Gumara and Ribb catchment were 76.46 & 84.19 by LPM, 72.42 & 82.77 by SMAR, 64.45 & 17.03 by NAM and 65.79 & 72.08 by HEC-HMS models respectively during calibration period and 79.54 & 80.56 by LPM, 79.54 & 80.83 by SMAR, 82.22 & 2.06 by NAM and 78.43 & 64.14 by HEC-HMS models respectively during verification period. The two catchments are neighbours and most of their physiographic characteristics are “similar”, therefore, comparing the performance of the models, system model (LPM) and conceptual model (SMAR) can be used as forecasting models for both catchments. Having its own advantage in the study of a watershed, HEC-HMS model can also be used as a tool in the study of the two catchments.