

## **Comparison and evaluation of the conceptual rainfall-runoff model for estimating flood in the basin with limited data (Case study: Karaj basin)**

### **Abstract**

Rainfall-runoff simulation process has spatial importance on water resources management, river engineering, control structures and etc. in the basin catchment area. Reaction to the phenomenon of basin rainfall is very complex because of various hydrological factors. Runoff depends to geomorphologic basin properties such as geometry, vegetation, soil type and climatic basin characteristics such as rainfall, temperature, etc. Each of these factors influence on the runoff production is completely non-uniform. Many models have been proposed for simulation process as yet. On the other hand, many of these models have a complex structure. So a large part of the hydrological researches is dedicated to calibrate these models.

In this study, five models of Tank, SimHyd, Sacramento, SMAR and AWBM compared in rainfall-runoff process simulation. For this study the Karaj basin data have been used. The basin has 840 square kilometers area located in the Alborz Mountains between 51 degrees and 03 minutes to 51 degrees and 35 minutes easting, and 35 degrees 53 minutes to 36 degrees 10 minutes Northing. For comparison five models, simulated and actual hydrographs on value of runoff volume and peak discharge were compared and fourth statistics analysis including Kling Gupta Efficiency (KGE), Coefficient of Nash-Sutcliffe (NSE), Coefficient of determination ( $R^2$ ) and Root Mean Square Error (RMSE) on the results of models has done.

This study showed hydrographs resume from Tank model was more accurate. The result of these studies also has shown the inefficiency of the Sacramento in the flood basin simulating than the other four models.

**Keywords:** Rainfall, Karaj River, Coefficient of Nash-Sutcliffe, Modelling, Hydrograph



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