Abstract

Estimating floods in catchment with limited data has always attracted the attention of researchers and engineers in water resource sector, especially in the developing countries. Given the importance of the unit hydrograph in forecasting river floods and due to the fact that extracting the unit hydrograph of the floods requires having concurrent flood hydrograph and rainfall hyetograph, for areas that lack such simultaneously recorded data, hydrologists use synthetic unit hydrograph methods. Studies on modeling runoff hydrograph in basins which have no concurrent recorded data are done in the form of modeling in non-statistical basins. In this regard, relatively diverse methods have been proposed which have been investigated by different researchers. Some of these methods are known in Iran, whereas some others have not been examined yet or are less considered. In the present study, the data gathered from Jong area in Kardeh basin in Khorasan Province were evaluated to determine the performance of some synthetic unit hydrograph methods. These methods include the US soil conservation service (SCS), Snyder, Gary, Clark, Gamma, and Nash. According to the available data, first, on the basis of the hydrograph method, the runoff was estimated. Then, by comparing the observed hydrographs, the performance of each method was evaluated. In evaluating the results of each method, several criteria including RMSE, NS, R^2, PEP, PETP, and PEV were used to analyze the accuracy of each method used in predicting the hydrograph shape, the peak flow, the flood volume, and the time to reach the peak flow. Considering and comparing the results of different methods, the best model, the best excess rainfall way, the best way for extraction of the basic flow were estimated respectively for estimating the flood hydrograph, peak flood flow, the optimum time to reach peak flood flow, and flood volume. They were used to estimate respectively Gamma, Ø, and bf٣, flood peak PEP (Gray, SCS, bf٣), volume of flood PEV (Gray, SCS, bf١), time to reach peak flood PETP (Nash, SCS, bf٢), and flood hydrograph shape (Gamma, Ø, bf٣).

Keywords: unit hydrograph, synthetic hydrograph, Gary, gamma, Clark, Nash, Snyder, SCS

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