Forecasting Annual Extreme Flows Rate of Karkheh River using Stochastic Models

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Abstract

Limited available water resources, increased demand and water sources pollution in recent decades have increased the need for water resources management. In this regard, prediction and modeling of hydrologic systems are considered as important management tools to predict the future values of these systems. Stochastic methods can be mentioned as such models. In this study, we forecasted the annual extreme flow rate values such as annual peak and maximum discharge of Karkheh River in Khuzestan province using stochastic modeling. The models presented in this study included AR, MA, ARMA and ARIMA for modeling annual extreme flow rate data. The ARIMA(4,1,1) model satisfied all tests and showed the best performance for this series. The model forecasted streamflow for ten leading years showed the ability of the model to forecast statistical properties of the streamflow in short time in future. The SAS 9.2 and SPSS 20 softwares were used to implement all of the above models.

Key words: Water resources, Stochastic model, Karkheh River, Hydrologic systems.

1.Introduction

Over the last few decades, predicting future values of hydrologic systems have come to the focus of the researchers' consideration for planning and management of water resources. For this purpose, various methods including stochastic models can be used as a management tool to predict future values of these systems. The methods proposed by Box and Jenkins (1970) have been used more widely, which are based on the combination of auto-regressive moving average (ARMA) methods [1]. Meanwhile, similar efforts have been made on using auto-regressive models and ARMA approaches for modeling of hydrological processes [2]. Hamidi machekposhti et al. (2017) studied the stochastic model to inflow of Karkheh dam at Iran and suggested ARIMA(4,1,1) is the best model for