Abstract

Climate change is one of the most important issues in the 21st century environmental researches. Every kind of climate change on the terrestrial earth is the beginning a chain of reactions whose direct effect on hydrological processes can be observed. *Qara Su* Basin catchment located in Kermanshah Province is one of the important sub – basins of Karkheh, which in terms of agriculture and food security is considered as an important area in the province. Due to the effects of climate change on intensifying water shortages, analyzing the implications of this phenomenon on the agricultural sector and maximizing the use of changes in temperature and rainfall cycles which effective on better manage irrigation water seem quite necessary.

In this regard, achieving reliable methods of predicting the river flows in order to plan proper operation of water resources has become increasingly important. , In this study, SDSM model is used to measure the large -scale data of the atmospheric general circulation model (*HadCM3*) in two local climate change scenarios, A2 and B2, for the meteorological parameters of temperature and precipitation in the basin of *Qara Su*. Then, considering the data of rainfall, temperature and flow rate during the baseline (1971-2000) and the fine- scale model outputs exponentially in the period (2011-2040), an artificial neural network is used in *MATLAB* 2012 to calculate the river's discharge during the future period, and ultimately, to simulate the condition of water resources and water allocation within the forthcoming period using evaluation model and programming *WEAP* water resources.

Climate model results indicate an increase in temperature and a decrease in rainfall within the desired course relative to the base period (2000-1971). Thus, on average, under A2 and B2, scenarios, a 1.6 º C rise in temperature and a % 1.77 decrease in rainfall under scenario A2 and a % 1.1 decrease in precipitation under scenario B2 are expected in the region. Consequently, this increase in temperature and decrease in rainfall will lessen the discharge rates of *Qara Su* river so that compared with the base period, from 2011 to 2040, %32.62 and %33.40 discharge losses are expected respectively under scenarios A2 and B2. *WEAP* model results, used for those climate scenarios with the existing agricultural level, represent an increased unmet need for agriculture in the region.

Keywords: Artificial Neural Networks, Climate Change, *HadCM3*, *QaraSu Basin*, *SDSM*, *WEAP*