Evaluation of the self-purification power of the river using the QUAL2KW model (case study: Qezel Ozen River)

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Abstract
The quantitative and qualitative study of rivers is one of the most important factors that must be investigated because rivers are the most accessible source of water needed for the use of different sectors. Due to the entry of various pollutants, there are many concerns about the quality protection of rivers. Modeling and evaluation of effective factors on the changes in water quality parameters are one of the first steps of river water quality management. As the main source of water supply, the water quality of the Qezel-Ozan River is of special importance due to its abundant agricultural consumption. The purpose of the current research is to evaluate the self-purification capacity of the Qezal-Ozan river and to simulate the quality of the river water using the Qual2kw model. In this research, using the qualitative one-dimensional model Qual2kw, the qualitative condition of the 208 km long Qezal-Ozen river was measured during 4 periods March 1996, October 1997, July 1997, and December 1997. In this regard, 9 main parameters of water quantity and quality including discharge, flow rate, water temperature, electrical conductivity, total solids, dissolved oxygen, biochemical oxygen demand, nitrogen, and total phosphorus were considered in 8 stations. In order to determine the error between the observed and simulated data in the calibration and validation stage of the model, statistical indicators were used in the order of mean absolute error (MAE), root mean square error (RMSE), and mean skew error (MBE). Also, the amount of self-healing power in the river was calculated for specific quality parameters DO, BOD, TP and TN. The Qual2kw model showed that this model has good accuracy in simulating the water quality parameters of the Qezel- Ozan mountain river. The results of examining the temperature values showed that the temperature value increased in July in most of the study stations and due to the decrease in flow rate and the increase in temperature, the amount of BOD and TSS also increased significantly. The results of the analysis of the qualitative parameters showed that the highest self-purification power of the Qezel- Ozan River occurred for the parameters of dissolved oxygen (DO) 96%, biochemical oxygen demand (BOD) 91%, total phosphorus (TP) 80% and total nitrogen (TN) 66%. Also, the best simulation related to pH and total phosphorus parameters and the worst simulation of EC and TSS parameters were obtained with average values of RMSE, MAE, and MBE. The evaluation of the results showed that the Qezel- Ozan river has the ability to self-purification at the moment of entering the sub-branch.

Keywords: Ghezel Ozan River, Water Quality, Self-Purification, QUAL2KW Model.