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Artificial neural network and mathematical approach for estimation of surface water quality parameters (case study: California, USA)

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ABSTRACT

Determination of salinity, dissolved oxygen (DO), DO percentage, and chlorophyll content of water as four major surface water quality parameters is necessary for environmental and practical purposes. The presented study uses mathematical methods in combination with an artificial neural network (ANN) to represent models that use electrical conductivity (EC), temperature (*T*), and pH values as their inputs to estimate salinity, DO, DO percentage, and chlorophyll content. 3,473 sets of data are obtained from Doughty Cut above Grant Line Canal, California, USA–water quality monitoring station from 6/20/2006 to 8/7/2018. Two mathematical models are used for the estimation of salinity. One just uses EC as the input, while the other one uses both EC and *T* variables. Accuracy rates of 98.6% and 99.1% are achieved from these mathematical models, respectively. In addition, four feed-forward back propagation ANN models are used to estimate the four mentioned parameters. All these models use EC, *T*, pH values as their inputs. The accuracy rates are obtained equal to 99.2%, 94.1%, 93.5%, and 75.9% in these ANN models. Most of the presented models have high and promising accuracies, although in the case of chlorophyll model, the accuracy is low.

Keywords: Salinity; Dissolved oxygen; Chlorophyll; Artificial neural network; Modeling

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