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# Application of Artificial Neural Networks Model as Analytical Tool for Groundwater Salinity

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## ABSTRACT

The main source of water in Gaza Strip is the shallow coastal aquifer. It is extremely deteriorated in terms of salinity which influenced by many variables. Studying the relation between these variables and salinity is often a complex and nonlinear process, making it suitable to model by Artificial Neural Networks (ANN). Initially, it is assumed that the salinity (represented by chloride concentration, mg/l) may be affected by some variables as: recharge rate, abstraction, abstraction average rate, life time and aquifer thickness. Data were extracted from 56 municipal wells, covering the area of Gaza Strip. After a number of modeling trials, the best neural network was determined to be Multilayer Perceptron network (MLP) with four layers: an input layer of 6 neurons, first hidden layer with 10 neurons, second hidden layer with 7 neurons and the output layer with 1 neuron which gives the final chloride concentration. The ANN model generated very good results depending on the high correlation between the observed and simulated values of chloride concentration. The correlation coefficient (r) was 0.9848. The high value of (r) showed that the simulated chloride concentration values using the ANN model were in very good agreement with the observed chloride concentration which mean that ANN model is useful and applicable for groundwater salinity modeling. ANN model was successfully utilized as analytical tool to study influence of the input variables on chloride concentration. It proved that chloride concentration in groundwater is reduced by decreasing abstraction, abstraction average rate and life time. Furthermore, it is reduced by increasing recharge rate and aquifer thickness.

## KEYWORDS

Groundwater, Salinity, Artificial Neural Networks, Modeling, Analytical Tool

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