**PRIOR ART SEARCH**

**The Use of a Neural Network Technique for the**

**Prediction of Water Quality Parameters**

**Mafia J. Diamantopoulou I , Dimitris M.Papamichail 2, Vassilis Z. Antonopoulos**

**Abstract**

This paper is concerned with the use of Neural Network models for the prediction of water

quality parameters in rivers. The procedure that should be followed in the development of such

models is outlined. Artificial Neural Networks (ANNs) were developed for the prediction of

the monthly values of three water quality parameters of the Strymon river at a station located

in Sidirokastro Bridge near the Greek - Bulgarian borders by using the monthly values of the

other existing water quality parameters as input variables. The monthly data of thirteen

parameters and the discharge, at the Sidirokastro station, for the time period 1980-1990 were

selected for this analysis. The results demonstrate the ability of the appropriate ANN models

for the prediction of water quality parameters. This provides a very useful tool for filling the

missing values that is a very serious problem in most of the Greek monitoring stations.

Keywords: Neural Networks; water quality parameters; missing values; Strymon river.

**Methods**

The Artificial Neural Networks (ANNs) are information-processing systems consisting of many nonlinear and densely interconnected processing elements called neurons .Neurons in an ANN are arranged in groups called layers. Each neuron in a layer operates in logical parallelism. Information is transmitted from one layer to others in serial operations (Fausett, 1994; Haykins, 1994; Dowla and Rogers, 1995; Patterson, 1996; Gurney, 1999). The basic structure of an ANN, usually, consists of three distinctive layers, the input layer, where the data are introduced to the ANN, the hidden layer or layers, where data are processed, and the output layer, where the results of ANN are produced. The ANNs are designed by putting weights between neurons, by using a transfer function that controls the generation of the output in a neuron, and using adjustable laws that define the relative importance of weights for input to a neuron. In the training, the ANN defines the importance of the weights and adjusts them through an iterative procedure. In this study, the training of ANNs was achieved by the cascade correlation algorithm (Fahlman and Lebiere, 1990) which is a supervised algorithm in the multilayer feed-forward ANNs. The Cascade part refers to the architecture and its mode of construction entails adding hidden units once at a time and always connecting all the previous units to the current unit.