

**Abstract:**

The quality of a water body is usually characterized by sets of physical, chemical, and biological parameters, which are mutually interrelated. Since August 1997, monthly records of 33 parameters, monitored at 102 locations on the Nile Delta drainage system, are stored in a National Database operated by the Drainage Research Institute (DRI). Correlation patterns may be found between water quantity and water quality parameters at the same location, or among water quality parameters within a monitoring location or among locations. Serial correlation is also detected in water quality variables. Through the investigation of the level of information redundancy, assessment and redesign of water quality monitoring network aim to improve the overall network efficiency and cost effectiveness. In this study, the potential of the Artificial Neural Network (ANN) on simulating interrelation between water quality parameters is examined. Several ANN inputs, structures and training possibilities are assessed and the best ANN model and modeling procedure is selected. The prediction capabilities of the ANN are compared with the linear regression models with autocorrelated residuals, usually used for this purpose. It is concluded that the ANN models are more accurate than the linear regression models having the same inputs and output.