Abstract number - 82 WATER QUALITY MODELING USING ARTIFICIAL NEURAL NETWORK AND DECISION TRES

COUTO, C.
Department of Chemistry, University of Évora, Portugal e-mail: horbite@gmail.com
VICENTE, H.
Department of Chemistry and Chemistry Centre of Évora, University of Évora, Portugal
e-mail: hvicente@uevora.pt
NEVES, J.
Department of Informatics, University of Minho, Braga, Portugal
e-mail: jneves@di.uminho.pt

The water quality at ground zero in a given region largely depends on the nature and the extent of the industrial, agricultural and other anthropogenic activities in the catchments. Undeniably, ensuring an efficient water management system is a major goal in contemporary societies, taking into account its importance to the living organisms health and the need to safeguard and to promote its sustainable use. However, the assessment of the data quality of a dam`s water is being done through analytical methods, which may be not a good way of such an accomplishment, due to the distances to be covered, the number of parameters to be considered and the financial resources that will be spent. Under these circumstances, the modelling of water quality in reservoirs is essential in the resolution of environmental problems, and has lately been asserting itself as a relevant tool for a sustainable and harmonious progress of the populations. This work describes the training, validation and application of Artificial Neural Networks (ANNs) and Decision Trees (DTs) to forecast the water quality of the Odivelas reservoir, located in the south region of Portugal, over a period of 10 (ten) years. Two different strategies were followed to build predictive models for water quality. One of them used chemical parameters data (strategy A) while the other one used hydrometric and meteorological data (strategy B). In terms of the former strategy, the input variables of the ANN model are Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), Oxidability and Total Suspended Solids (TSS), while for the DTs one the inputs is, in addition to those used by ANNs, the Water Conductivity and the Temperature. The performance of the models, evaluated according to the coincidence matrix, created by matching the predicted and actual values, are very similar for both models; the percentage of adjustments relative to the number of presented cases is 98,8% for the training set and 97,4% for the testing one. Following the strategy B, the input variables of the ANN model are humidity, wind speed, air temperature, precipitation, radiation, volume of water stored in reservoir and the pH, while for the DT model the inputs are pH, wind speed, precipitation, humidity and air temperature. The performance of the models, evaluated in terms of the coincidence matrix, are 91,1% for the training set and 91,7% for the testing one for the ANN model and 89,3% and 88,0% for the DT model.