

Abstract

This paper presents the use of Artificial neural networks (ANN) as a viable means of predicting water turbidity. This was based on the experimental data collected from a physical settling basin model, which was set up at the Civil Engineering Department in Jomo Kenyatta University of Agriculture and Technology. High turbid water has contributed to low water application efficiencies in Kiriku-Kiende project. Lack of adequate detention time for sediment settlement in the basin has resulted to sediment being released in to irrigation network. To have an optimal settling basin design, then prediction of hourly water turbidity is paramount. The turbidity of the water at the inlet and outlet of the settling basin in Kiriku-Kiende irrigation project in Embu Sub-County was determined. Samples collected were analyzed and more data collected from the physical model. Two variables (flow rate and settling Time) were used in this analysis as input variables and water turbidity as output variable. Four hundred ANN models were developed out of which four best models were used to identify the most effective model. Sensitivity analysis (SA) was carried out by using leave one out approach to assess the effect of the parameters of ANN on the prediction of turbidity of raw water in a water-settling basin. The ANNs developed were successfully trained and tested using the experimental data sets and the performance of ANNs models were determined using various statistical measures. Results show that using the five statistical measures, the ANN-PN204 with a nomenclature of 1- 9-1 gave the best prediction for water turbidity. This demonstrates that ANN is capable of modeling hourly turbidity levels with good accuracy when proper variables, their previous time step on sediment settling and their discharges are used as inputs of networks.