

## Sensitivity analysis for Water Quality Index (WQI) prediction for Kinta River, Malaysia.

### ABSTRACT

Water quality index (WQI) serves as the basis for environment assessment of watercourse in relation to pollution load categorization and designation of classes and beneficial uses as provided by Interim National Water Quality Standards (INWQS) in Malaysia. This index is calculated based on six parameters DO, BOD, COD, pH, NH<sub>4</sub>-N and SS. This research was needed as it will give the preliminary judgement on the importance of each water quality parameter for WQI calculation at the Kinta River, Malaysia. This study revealed the use of sensitivity analysis based on ANN to evaluate the significance of each parameter for WQI determination. Sensitivity analysis was carried out for seven models (ANN-WQI-AP, ANN-WQI-LDO, ANN-WQI-LBOD, ANN-WQI-LCOD, ANN-WQI-LpH and ANN-WQI-LNH<sub>4</sub>-N) and a model performance criterion ( $R^2$ , RMSE and SSE) was used for model performance evaluation. DO, SS and NH<sub>4</sub>-N were selected as the best input models for WQI prediction. The ANN-WQI-LDO, ANN-WQI-LSS and ANN-WQI-LNH<sub>4</sub>-N model have  $R^2$  values of 0.8301, 0.9265 and 0.9369 respectively; RMSE values of 4.888, 3.214 and 2.978 respectively; SSE values of 3106.534, 1343.286 and 1152.902 respectively. The low  $R^2$  values and higher RMSE and SSE value compared to the ANN-WQI-AP model suggest the importance of these three parameters significantly affect the fitness and residual measurement of the ANN models in WQI prediction. The result also suggests that water quality of Kinta River was affected by agricultural activities and vicinity animal farm. Moreover the use of less parameter for WQI is much more applicable for our water resource management since its time and cost consuming.

**Keyword:** Artificial neural network; Water quality index; Sensitivity analysis; Water quality; River pollution; Kinta River.