



Proposed Water Quality Management System for Euphrates River (A Case Study in Babylon Province)

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Abstract : The approach presented in the study concentrates specifically on aspects related to water quality, with special emphasis on the conditions typically prevailing in Iraq (Babylon Province). The intention is to demonstrate an approach to water quality indices and water pollution control by using expert system component in an intelligent front end. An artificial intelligence (AI) program was built up to develop the water quality management system (WQMS) which includes two parts

- (1) Water quality index system WQIS
- (2) Water pollution control system WPCS

WQIS developed four independent water quality indices for use in the operational management of Euphrates River as follows:

- (a) General Water Quality Index (GWQI)
- (b) Specific Use-Related indices consist of:
 - (i) Potable Water Supply Index PWSI
 - (ii) Industrial Water Quality Index IWQI
 - (iii) Irrigation Water Quality Index RWQI

The data determinant used in Babylon Province the system as monthly mean values for a period of one year from Oct 2014 to Sep 2015 for three sampling sites along Euphrates River (Mussaib, Hindiya, Kifil) and five sampling sites along Shatt Al Hilla (Hindiya, Hilla Center, Hashimya, Shoumaly, Thalya). The overall determinants used in the program are, (T, Tur, TH, PH, EC, DO₂, CL, SO₄, NO₃, PO₄, TDS and SAR). Ten important formulas were used in the program. The user can choose any one of them to develop the final water quality index score.

The system reflects water use thus providing information to operational management for specific water use. The remedial and pollution preventive measures were proposed for enhancing Euphrates River water quality.

The water pollution control system "WPCS" comprises the water pollution control elements and are categorized in three axes:

Axis one – Initial analyses of water quality problems.

Axis two – Establishing objectives for water pollution control.

Axis three – Derivation of management interventions, tools and instruments needed to fulfill the management objective.

Water quality experts in Iraq (Babylon Province) evaluated sixty-two elements of water pollution control processes. WPCS analyzed the responses weighted mean for elements of water pollution control processes in Iraq (Babylon Province) depending upon the "Central Limit Theorem" and determined the faults in the water pollution control system in Iraq and suggested the corrective actions and arranging the corrective actions into three types.

- (1) Actions supporting the development of an enabling environment.
- (2) Actions supporting development of an institutional framework.
- (3) Action enhancing planning and prioritization capabilities.

In the light of results, the corrective actions needed to control the river pollution in Iraq were suggested. Finally, the conclusion on the evaluation of "WQMS" indicated its efficiency to classify the river water quality and to diagnose the faults and the corrective actions for the water pollution control system in Iraq.

Keywords : Water quality management , River pollution , Babylon Province.

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