Fuzzy logic water quality

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A fuzzy logic approach to analyzing water quality could help reduce the number of people in the developing world forced to drink polluted and diseased water for survival. Writing in a forthcoming issue of the *International Journal of Environmental Technology and Management*, an Inderscience publication, researchers from the University of Malaya, explain how a new approach to water quality assessment uses fuzzy logic to combine disparate problems and provide a more accurate indicator of overall quality.

Rivers are often the main source of freshwater resources for citizens of developing nations. Their social well-being, economics and political development float on the availability and distribution of these freshwater resources. However, in many parts of the world dam construction, irrigation development, and flood mitigation have led to an increased incidence of diseases, such as malaria, Japanese encephalitis, schistosomiasis, lymphatic filariasis and others.

Water quality assessment is an essential part for maintaining good water quality, explained by Ramani Bai Gopinath and Mohamad Rom Tamjis. They explain that a river ecosystem and the quality of the water depend mainly on pH (acidity), levels of dissolved oxygen (DO), biochemical oxygen demand, suspended solids, and the presence of chemicals including chlorides, phosphates, nitrates and sodium.

The researchers have developed a data mining approach to water quality assessment that uses a Fuzzy Inference System (FIS) to extract patterns of river water quality from water sampling data. They have demonstrated

the efficacy of this approach using data collected from the river Kerayong of the Klang river basin in West Malaysia.

The principle of "fuzzy" analysis is based on using approximations in the calculations rather than precise values to give a broad and potentially more useful response. Moreover it allows disparate parameters to be combined in a meaningful way even though their values may not be related. Just as apples and oranges are different but all represent the quality of fruitiness, so biochemical oxygen demand and chemical concentrations, for instance, may represent a particular aspect of water quality and so can be combined through fuzzy analysis.

In the present study, the fuzzy analysis of the river Kerayong reveals that it is highly polluted river with a very low water quality index, despite superficial analysis of individual parameters are necessary. This suggests that the quality of life of those relying on the river as a freshwater source could be improved considerably by addressing the individual pollution problems.

"We recommend further studies on data mining capabilities of the Fuzzy Inference System using more than six indicators of water quality," the researchers conclude.

Source: Inderscience Publishers