Spatial variation assessment of river water quality using environmetric techniques

ABSTRACT

The Malacca River provides water resources, recreational activities, and habitat for aquatic animals, as well as serving as a tourist attraction. Nevertheless, the Malacca has experienced water quality changes as a result of urbanization and population growth. Environmetric techniques incorporating hierarchical cluster analysis (HCA), discriminant analysis (DA), and principal component analysis (PCA) have been applied to understand the spatial variation of water quality in nine sampling locations within the river basin. HCA has grouped the nine sampling locations into two clusters based on physico-chemical and biological water quality data and trace elements in water. DA analysis indicated that temperature, salinity, coliform, EC, DO, BOD, COD, As, Hg, Cd, Cr, and Zn are the most significant parameters that reflect the overall river water quality for discrimination in clusters 1 and 2. PCA resulted in six components in cluster 1 and eight components in cluster 2. Agricultural activities and residential areas are the main sources of pollution within cluster 1, while a sewage treatment plant and industrial activities are the main sources of pollution in cluster 2. This study has provided useful information for identifying and investigating the pollutant sources through the water quality variations in the river. However, continuous evaluation of river water quality will help in greater understanding of river water quality for a more holistic management of the river basin.