

Irrigation water quality assessment of a trans-state river basin in western part of Malaysia by integration of hydrochemical and chemometric analysis

ABSTRACT

This study aims to assess the monsoon effect on the chemical composition of water samples collected from Langat River, a trans-state river basin and to evaluate the suitability of the water for irrigation purposes. In-situ parameters (pH, salinity, electrical conductivity and total dissolved solids) and major ions (Ca, K, Mg, Na, HCO₃, NO₃, SO₄, Cl) were determined. The water quality status for irrigation was determined based on the sodium adsorption ratio, salinity hazard, sodium percentage, magnesium hazard, residual sodium carbonate, Kelly's ratio and permeability index. Graphical presentation such as Wilcox diagram, Gibbs diagram, Schoeller diagram and Piper diagram were incorporated to display a wide range of water quality data. About 50% of the water samples collected from 30 sampling stations were beyond the good irrigation water class. The water quality at downstream was mostly unsatisfactory for irrigation purposes compared to water quality upstream, significantly proved at $p < 0.05$. Cluster analysis revealed two different clusters of similarities between the points for both seasons, reflecting different chemical properties and irrigation water quality in the studied river.

Keyword: Cluster analysis; Evolving help basin; Indices; Irrigation water quality; Langat River; Wilcox diagram