Spatiotemporal assessment of water quality monitoring network in a tropical river

ABSTRACT

Managers of water quality and water monitoring programs are often faced with constraints in terms of budget, time, and laboratory capacity for sample analysis. In such situation, the ideal solution is to reduce the number of sampling sites and/or monitored variables. In this case, selecting appropriate monitoring sites is a challenge. To overcome this problem, this study was conducted to statistically assess and identify the appropriate sampling stations of monitoring network under the monitored parameters. To achieve this goal, two sets of water quality data acquired from two different monitoring networks were used. The hierarchical agglomerative cluster analysis (HACA) were used to group stations with similar characteristics in the networks, the time series analysis was then performed to observe the temporal variation of water quality within the station clusters, and the geo-statistical analysis associated Kendall's coefficient of concordance were finally applied to identify the most appropriate and least appropriate sampling stations. Based on the overall result, five stations were identified in the networks that contribute the most to the knowledge of water quality status of the entire river. In addition, five stations deemed less important were identified and could therefore be considered as redundant in the network. This result demonstrated that geo-statistical technique coupled with Kendall's coefficient of concordance can be a reliable method for water resource managers to identify appropriate sampling sites in a river monitoring network.