

## **Assessment of Guinea Savanna River system to evaluate water quality and water monitoring networks**

### **ABSTRACT**

The analysis of changes in water quality in a monitoring network system is important because the sources of pollution vary in time and space. This study utilized analysis of the water quality index calculation, hierarchical cluster analysis, and mapping. This was achieved by assessing the water quality parameters of the samples collected from Galma River in Zaria, Northwestern Nigeria in wet and dry seasons. The Analysis shows that sampling point number 15 located downstream of the river has the largest number of water quality index of 105.77 and 126.34, while sampling points 1 located upstream of the river has 62.71 and 78.09 in both wet and dry seasons respectively. This indicates that all the monitoring sites were polluted and the water could be utilized for industrial and irrigation specified due to the purposes only. Hierarchical cluster analysis and mapping revealed consistency and variations. For both networks, cluster 1 is located in the middle of the river watershed, while clusters 2, 3 and 4 show variations within the river watershed. 3 sampling points in wet season located at the upstream of the river were specified for Irrigation and Industrial uses, while the rest of the sampling points in both seasons were specified for irrigation purpose only. From this study, water quality index and multivariate techniques for environmental management can be employed in monitoring river resources, and research of this kind can help inadequate planning and management of the river system.

**Keyword:** Hierarchical cluster analysis (HCA); Galma River; Mapping; Statistical analysis; Water quality index (WQI)