Application of environmetric methods to surface water quality assessment of Langkawi Geopark (Malaysia).

ABSTRACT

Cluster analysis (CA), discriminant analysis (DA) and principal component analysis (PCA) were applied to evaluate the spatial variation in the river water quality data matrix of Langkawi Geopark. The CA result rendered two groups based on their similar properties. Group 1 comprised the sampling sites LG1, LG2, LG3, LG4, LG5, LG6, LG7, LG9, LG10, LG11, LG13, and LG14; Group 2 was further divided into two groups: Group 2(i) consisted of LG8, LG15, LG17, and LG19 while Group 2(ii) consisted of LG12, LG16, and LG18. DA revealed that COD, Cr and SO_4 were the most significant parameters for discrimination between Group 1 and Group 2. The PCA results extracted seven components for Group 1 and six components for Group 2. Agriculture and sand mining were identified as the main latent pollution sources contributing to Group 1, while recreational activities constituted the major pollution source contributing to Group 2. This study illustrates the usefulness of environmetric techniques in the interpretation of complex data, optimizing monitoring networks to a lower cost mentoring program and controlling the degradation of surface water quality in Langkawi Geopark.