

Multivariate statistical techniques for the assessment of seasonal variations in surface water quality of pasture ecosystems

ABSTRACT

This study investigates the applicability of multivariate statistical techniques including cluster analysis (CA), discriminant analysis (DA), and factor analysis (FA) for the assessment of seasonal variations in the surface water quality of tropical pastures. The study was carried out in the TPU catchment, Kuala Lumpur, Malaysia. The dataset consisted of 1-year monitoring of 14 parameters at six sampling sites. The CA yielded two groups of similarity between the sampling sites, i.e., less polluted (LP) and moderately polluted (MP) at temporal scale. Fecal coliform (FC), NO₃, DO, and pH were significantly related to the stream grouping in the dry season, whereas NH₃, BOD, Escherichia coli, and FC were significantly related to the stream grouping in the rainy season. The best predictors for distinguishing clusters in temporal scale were FC, NH₃, and E. coli, respectively. FC, E. coli, and BOD with strong positive loadings were introduced as the first varifactors in the dry season which indicates the biological source of variability. EC with a strong positive loading and DO with a strong negative loading were introduced as the first varifactors in the rainy season, which represents the physiochemical source of variability. Multivariate statistical techniques were effective analytical techniques for classification and processing of large datasets of water quality and the identification of major sources of water pollution in tropical pastures.

Keyword: Cluster analysis; Discriminant analysis; Factor analysis; Multivariate analysis; Tropical pasture ecosystems