ASSESSMENT OF SEASONAL VARIATION IN GROUNDWATER QUALITY OF KELANI RIVER BASIN BY MULTIVARIATE ANALYSIS

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Kelani river is considered as one of the major river and it is the second largest river basin in Sri Lanka. It contributes mainly for drinking water supply, recreation, irrigation and livestock of the country. Multivariate statistical methods support the interpretation of complex data matrices to better understand of water quality and allows for identification of the possible factors that are responsible for the variations in water quality. The present study was focused to analyze the seasonal variation of ground water quality in the Kelani river basin by using multivariate analysis. Fourteen vital physico-chemical and microbial parameters (pH, TDS, nitrate, nitrite, electrical conductivity, salinity, hardness, COD, DO, BOD, phosphate, total coliform and feacal coliform) were used for thirty ground water sampling locations in the river basin from 2013 to 2014. The highest values of total phosphate, nitrate, nitrite and COD were detected during the rainy season, where high electrical conductivity, salinity, hardness and BOD were recorded in dry period. The lowest pH and the highest DO were recorded during the intermediate period of the study. PCA analysis of 14 variables showed that the differentiation between each season and it is symbolized seasonal changes of water quality changes in each location of the river basin. PC scores in to General MANOVA test was done to confirm differentiation between each season and that indicated significant difference ($p<0.05$) between each season. Cluster analysis of variables was done to determine correlation of variables and indicated four clusters according to their correlation. 1st cluster represent the ionic compounds and organic matter content measuring variables in water, 2nd cluster related to chemical compound variable in water, 3rd cluster symbolized microbial quality parameters in water and 4th cluster explained dissolve oxygen of the water respectively. The overall statistical analysis of ground water in the Kelani river basin revealed that there is a clear seasonal variation in ground water quality.

Keywords: Kelani river basin, Ground water, Physico-chemical and microbial parameters, PCA and cluster analysis, Seasonal variation