World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:12, No:05, 2018

Multivariate Analytical Insights into Spatial and Temporal Variation in Water Quality of a Major Drinking Water Reservoir

Authors : Azadeh Golshan, Craig Evans, Phillip Geary, Abigail Morrow, Zoe Rogers, Marcel Maeder

Abstract : 22 physicochemical variables have been determined in water samples collected weekly from January to December in 2013 from three sampling stations located within a major drinking water reservoir. Classical Multivariate Curve Resolution Alternating Least Squares (MCR-ALS) analysis was used to investigate the environmental factors associated with the physico-chemical variability of the water samples at each of the sampling stations. Matrix augmentation MCR-ALS (MA-MCR-ALS) was also applied, and the two sets of results were compared for interpretative clarity. Links between these factors, reservoir inflows and catchment land-uses were investigated and interpreted in relation to chemical composition of the water and their resolved geographical distribution profiles. The results suggested that the major factors affecting reservoir water quality were those associated with agricultural runoff, with evidence of influence on algal photosynthesis within the water column. Water quality variability within the reservoir was also found to be strongly linked to physical parameters such as water temperature and the occurrence of thermal stratification. The two methods applied (MCR-ALS and MA-MCR-ALS) led to similar conclusions; however, MA-MCR-ALS appeared to provide results more amenable to interpretation of temporal and geological variation than those obtained through classical MCR-ALS.

Keywords : drinking water reservoir, multivariate analysis, physico-chemical parameters, water quality
Conference Title : ICWPT 2018 : International Conference on Water Pollution and Treatment
Conference Location : London, United Kingdom
Conference Dates : May 14-15, 2018