Abstract

This study assessed seasonal variations in physicochemical water quality of the Athi river basin, Kenya. Water quality data was collected for eight months, covering dry and rainy seasons. The study used ten physicochemical parameters (pH, EC, TDS, NO3, K, PO4, BOD, COD, Cd and Cr) to determine the seasonal water quality for Athi River. Independent T test was used to compare the mean levels for physico-chemical parameters between dry and rainy seasons. In addition, multiple linear regression was employed to model the influence of physico-chemical parameters on BOD, COD, Cd, and Cr, while Pearson correlation was performed to establish the relationships amongst the parameters. Results revealed statistical significant variations between dry and rainy seasons. The scrutiny of the results indicated that the Athi river water quality is more polluted in the dry season as compared in the rainy season. This can be attributed to large accumulation of pollutants from industries, agriculture, water treatment plants, as well as reduced river flow, weathering processes, and sediment resuspension driven by sand harvesting. Multiple linear regression analysis indicated that the physico-chemical parameters predicted 62% and 70% of BOD and COD variation in the water (R2= 0.62 and 0.7). Similarly 36% of both Cd and Cr variations in the water (R2 = 0.36) was influenced by the physicochemical parameters. Pearson correlation analysis indicated strong correlations between EC and TDS, EC and BOD5, TDS and BOD5, Cd and K, Cr and K, Cd and Cr, pH, BOD5 and COD, NO3, and PO4 and NO3. These correlations indicated that these parameters have a common origin in the environment. The seasonal variations in Athi river water quality parameters highlighted persistent pollution challenges, induced by both natural and anthropogenic processes. Consequently, parameters such as EC, TDS, PO4, K, BOD5, COD, Cr, and Cd persistently exceeds WHO permissible drinking water limit, indicating adverse health effects of water and aquatic consumptions in the river basin. Therefore, the Kenya Government in collaboration with non-governmental organizations should establish buffer zones within the riverbanks to restrict industrial and agricultural operations near waterways. Enacting and strengthening regulations on agricultural practices, urban waste management, and industrial discharges will help reduce the pollutant loads entering the river.