ABSTRACT

Thiba River Basin provides vital resources and supports high levels of biodiversity. However, human land use including agriculture has led to widespread water pollution, habitat degradation and biodiversity loss, thereby jeopardizing both biodiversity and ecosystem services. In order to meet increasing demand for clean water, sustainable use and conservation of available water resources is therefore paramount. This study assessed the effects of agricultural nutrients influx on water quality, Phytoplankters diversity and fish biomass in Thiba River Basin for proper management and sustainable utilization. The study area was stratified into three distinct agroecological zones based on different anthropogenic activities. Ecological survey design was used in the study. Sampling was done during the wet and dry seasons in seven stations. Water samples were collected and analyzed for temperature, transparency, pH, electrical conductivity (EC), salinity, total dissolved solutes (TDS) and dissolved oxygen (DO). Physical parameters were measured *in situ* using a digital meter model YSI Professional plus, USA. Biological oxygen demand (BOD) was determined using Winkler's five days method. Nutrients analysed were phosphates, nitrates, nitrites and ammonia. These were analysed using standard procedures as outlined by Matsche and Kreuzinger (2001). Identification of the algae was done using standard morphological characterization. Determination of Phytoplankters abundance and diversity was done using the Shannon-Weiner Diversity Index (H^1). The Body Condition Index of fish was assessed using Fulton's Condition Factor (K). The data was analyzed using computer software SPSS version 22.0. The statistical tools used were Ronald Fisher's One Way Analysis of Variance (ANOVA) and Pearson's correlation for the variables. Significant differences were accepted at $p \leq 0.05$. All water parameters showed both spatial and temporal variations with statistically significant differences ($p<0.01$). Temperatures ranged from 13.6^0C to 29.04^0C due to climatic changes along the agroecological zones. The pH ranged from 7.24 to 7.46. Dissolved oxygen values ranged from 6.39 mg/l (Ndindiruku) to 8.58 mg/l. (Kimunye). EC ranged from 21.25 μScm^{-1} at the reference site during the wet season to 163.94 μScm^{-1} at the rice irrigation scheme site during dry season. The pattern of TDS, Salinity and Turbidity values along the river was similar to that of EC. The highest values of BOD (3.49 mg/l) were recorded at the rice irrigation scheme during the wet season and the lowest (0.22 mg/l) at the reference site. There was a high peak of all nutrient levels at the rice irrigation scheme zone which was attributed to the extensive use of inorganic fertilizers. Microalgae from the divisions of Chlorophyta, Cyanobacteria and Charophyta were present in the dam throughout the year though with distinct difference in densities between the wet season when densities were low and dry season when their densities were high. This indicates that distribution, periodicity, diversity and abundance of microalgae are highly influenced by seasonal variations in water physicochemical parameters. Toxic microalgae Genera identified were *Nostoc, Oscillatoria, Anabaena* and *Microcystis*. *Microcystis* and *Oscillatoria* had a very high positive correlation ($r = 1.00$). The mean K-Factors during the wet season were 1.25, 1.89 and 0.70 for Common carp (*Cyprinus carpio*), Tilapia (*Oreochromis niloticus*) and Catfish (*Clarias gariepinus*), respectively. During the dry season the K-Factor increased to 1.42, 2.12 and 1.04, respectively probably due to high levels of agricultural nutrients that increased primary productivity. This study concludes that anthropogenic activities especially agriculture along the study site are the main factors of Thiba River pollution hence a major threat to human, livestock and aquatic organisms. Environmental protection laws should be enforced by the government.