

Lake Naivasha, one of the Ramsar site in Kenya, is currently experiencing severe environmental problem as a result of pollution from agricultural wastewater effluents and urban sewage, uncontrolled water abstraction and proliferation of wetlands' invasive species. The problem is exacerbated and compounded by changes in climate and inadequate conservation intervention. To deal with pollution problem some flower farms around the lake have adopted constructed wetland technologies to treat their wastewater prior to release into the lake's ecosystem.

This study was conducted to evaluate the efficiency of one of the largest constructed wetland, the Kingfisher flower farm constructed wetland, which is a combined system of subsurface horizontal flow and surface flow system. The study commenced from October, 2009 to March, 2010. Wastewater samples were analyzed for changes in physical-chemical characteristics, nutrient levels, organic matter and 'heavy metals at 9 sampling sites from the inlet to the outlet. Further, benthic invertebrates near the outflow were sampled from 5 sampling sites in order to assess the suitability of the treated wastewater in supporting life forms. Results showed significant reduction ($P < 0.05$) in mean water temperature (23.1 to 18.3 °C), conductivity (722 to 514 $\mu\text{S cm}^{-1}$), total dissolved solids (357 to 260 mg/l), total suspended solids (233 to 23 mg/l), BOD (138 to 72 mg/l), COD (569 to 186 mg/l), total nitrogen (5.1 to 2.0 mg/l) and total phosphorus (5.5 to 2.6 mg/l).

Heavy metal concentrations (Copper, lead and manganese) at the inflow and outflow effluents were' very low implying that they are of little significance as a pollution source. Their concentration however, declined though not significantly. Outlet sampling sites were colonized by 4 groups of benthic macroinvertebrates: Chironomidae, Oligochaeta, Coleoptera and Odonata. Observations of the planktonic community at the outflow effluents showed luxuriant growth of zooplanktons including Cladocerans and Copepods suggesting improved water quality. This study has shown that constructed wetlands are an important intervention strategy in curbing water pollution in Lake Naivasha basin. There is immense potential for upscaling constructed wetland technology to other parts of Kenya.

Key words: pollution, flower farms effluent, efficiency, constructed wetland, benthic invertebrates.