

Changes in pollution indicators in Lake Victoria, Kenya and their implications for lake and catchment management

Rodrick Kundu¹, Christopher M. Aura², Chrispine Nyamweya², Simon Agembe³, **Lewis Sitoki⁴**, Henry B. O. Lung'ayia⁵, Collins Ongore², Zachary Ogari² and Kenneth Werimo²

¹Lake Victoria Environmental Management Project –Phase II Kisumu, Kenya, ²Kenya Marine and Fisheries Research Institute Mombasa, Kenya, ³University of Eldoret, ^{4*}**The Technical University of Kenya**

⁵ Masinde Muliro University of Science and Technology

Abstract

Monitoring of aquatic pollution is important for ascertaining the relationship between fisheries and the general ecosystem health of a lake. This study evaluated the use of changes in pollution indicators in Lake Victoria, Kenya, as a decision support tool for fisheries management and productivity. Principal component analysis (PCA; $R^2 \geq 0.5$, $P < 0.05$) of physical and chemical parameters delineated sampling sites into ecological cluster zones consisting of the inner gulf (C1), mid-gulf (C2) and open lake (C3). Test results for lead (Pb) and mercury (Hg) levels in the Nile perch tissues were found to be compliant with EU standards. The inner and mid-gulfs of the Winam Gulf had high levels of total (1818.8 ± 102 – 1937.78 ± 94 cfu 100 mL^{-1}) and faecal (390 ± 21 cfu 100 mL^{-1}) coliforms attributable to urban sewage and industrial effluents exceeded WHO standards. Similarly, Winam Gulf was more polluted than the open lake, with higher total phosphorus and nitrogen concentrations, turbidity levels and electrical conductivity. Low phytoplankton biovolume and a low number of macroinvertebrates genera, and high zooplankton densities and pollution-tolerant catfishes (e.g., *Schilbe victoriae*; *Clarias gariepinus*) were observed in Winam Gulf. Faecal coliforms and dissolved oxygen influenced the abundance of tolerant fish species (e.g., *S. victoriae*) in the lake. This study indicated a declining trend of ecological integrity in the Winam Gulf, compared with the open waters of Lake Victoria. An integrated management approach directed to minimizing pollution levels, especially in the Winam Gulf, is recommended to enhance fishery production.

Lake and reservoirs sciences, policy and management for sustainable use Vol.22 (3) pp. 199-214 (2017)

See more at: <https://onlinelibrary.wiley.com/doi/full/10.1111/lre.12187>