

Pollution menacing Lake Victoria: Quantification of point sources around Jinja Town, Uganda

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Abstract

Lake Victoria is Africa's largest tropical freshwater lake, important as a source of drinking water and as a source of food for the population in the surrounding region. Due to increased human activities in agriculture and industry during the past decades a continuously increasing inflow of agricultural runoff has been observed, and lately there have also been increased discharges of municipal effluents and industrial wastewater into Lake Victoria. This paper summarises the results of a one-year (1997 to 1998) environmental and ecological study of industrial wastewater point sources in the Jinja (Uganda) catchment area. Main industries concern food processing, textile, leather and paper production and metallurgy. One fish-filleting factory showed the highest annual nutrient loads with 0.13 t NO₃-N, 0.20 t NH₄-N and 0.77 t PO₄-P, while another disposed of annual loads that amounted to 0.10 t NH₄-N and 0.49 t PO₄-P. From food-processing industries, the highest annual load of organic matter (COD) discharged to the lake amounted to 36.8 t. A tannery in Jinja released effluent with an extremely high mean concentration of the very toxic chromium⁺⁶ of 264 mg·l⁻¹, which results in an estimated annual load of 2.2 t of Cr⁺⁶. Concentrations of nitrogen and phosphorus from fish-filleting industries and chromium⁺⁶ from the tannery were far above the allowed effluent limits in Uganda, leading to enhanced eutrophication and bioaccumulation of Cr⁺⁶ in Napoleon Gulf, Lake Victoria.

The study provides information on point sources of effluent derived from Jinja's industrial sector in an effort to force resource users to move towards a more sustainable pattern of environmental management. The most appropriate way to reduce the ongoing eutrophication and pollution of Lake Victoria would be to reduce the releases of nitrogen, phosphorus, organic compounds and chromium into Napoleon Gulf by on-site pretreatment, so that they remain within non-critical levels. Industries must be required to monitor their effluents before these are discharged into Kirinya National Water and Sewerage Corporation oxidation ponds and finally into Kirinya West urban wetlands.

Keywords: industrial pollution, point sources, heavy metals, potential loads, hot spots, Lake Victoria, on-site pretreatment