

**ASSESSMENT OF POLLUTION LOADS IN RIVER NYANDO  
AND THE CONTRIBUTION FROM MUHORONI SUGAR  
FACTORY**

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## A B S T R A C T

River water pollution is a problem that affects both industrialised and developing countries. In Kenya, industrial growth, agricultural development and urban population are responsible for river and general environmental pollution. River Nyando, for instance, is polluted by siltation and chemicals from agricultural activities in the catchment zone and by effluents from Muhoroni sugar factory and Agro-Chemical and Food Company.

This study assessed pollution loads in the river and the contributions from Muhoroni Sugar Company (MUSCO) and the Agro Chemical and Food Company (ACFC). The pollution load in River Nyando at Ahero before the river enters Lake Victoria and the variation of the pollutants downstream after the discharge points were determined.

Composite samples were taken from eight selected sampling sites over a period of four months. Physico-chemical water quality parameters, organic pollutants and coliform counts were determined by standard methods described in American Public Health Association (APHA, 1992). Heavy metals were determined by an Atomic Absorption Spectrophotometer (AAS).

The results indicated that River Nyando had high pollution loads from both diffuse and point sources. The fluxes for alkalinity, hardness, total solids (TS), biochemical oxygen demand (BOD), nitrates, total phosphorus, heavy metals and total coliform were highest in November when the river discharge was also highest. The flux for solids was 853.2 tonnes/day. BOD load was 84.80 tonnes/day and the total coliforms were 502 /100ml in November. Cadmium and chromium metals were not detected in



the river water. Lead was the most abundant with the highest average flux of  $84.26 \times 10^{-2}$  t/day in November.

The lagoons reduced significantly the BOD levels in the ex-factory effluent to 74.95mg/L ( $p < 0.005$ ). The reduction efficiency of the lagoons was 94.58% and 60.82% for total suspended solids (TSS) and chemical oxygen demand (COD) respectively. The lagoons were not very efficient in reducing other pollutants like total nitrogen, conductivity, sulphates and heavy metals in the effluent. Hence an alternative treatment method is recommended. ACFC and MUSCO deposited an average of 663.37 and 28.47 tonnes TS and 15.88 and 4.4 tonnes BOD per month respectively.

To reduce pollution from point and diffuse sources, it is suggested that agricultural inputs be used rationally and soil erosion be controlled in the catchment zone. The collection and treatment of domestic and industrial effluents to permissible standards and the adoption of industrial cleaner production technology as well as frequent assessment of pollution levels in rivers are recommended. The involvement of legal and political frameworks are requirements for adopting pollution reduction measures. A study on the purification capacity and efficiency of the swamp through which River Nyando enters Lake Victoria is recommended.