

# Trend of Heavy Metal Concentrations in Lagos Lagoon Ecosystem, Nigeria

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## Abstract

The distribution and occurrence of heavy metals in the sediment, water and benthic animals of the Lagos lagoon during the dry and rainy seasons were investigated over a 7-year period. In the ecological surveys, the main body of the lagoon was divided into five zones, with a built-in bias to separate areas of the lagoon close to entry points of industrial effluents from the areas that were far away from the entry points. Types of heavy metals found to be prominent in industrial effluents were also the types prominent in the significant lagoon media and seasonal variation. The concentrations of the metals detected in the lagoon sediment and water increased by about 2–200 fold over the period of observation. For example, the mean concentration of sediment lead (Pb) increased over 130-fold from 2.38 µg/g in February 1991 to 400.33 µg/g in February 1995. Similarly, the concentration of metals bioaccumulated in the body tissues of benthic animals (*Tympanotonus fuscatus* and *Clibanarius africanus*) increased about 2–4 fold over a time interval of 5–7 years. Furthermore, sediment, water and animal samples collected from zones 1–3 of the lagoon that received most of the industrial effluents generally had higher concentrations than the samples collected from zones 4 and 5, which received fewer or no industrial effluents. The significance of the observed upward trend in the concentration of heavy metals, particularly the need to include benthic animals such as *T. fuscatus* in biomonitoring programmes aimed at controlling lagoon pollution and the potential risk to public health was discussed.

## Introduction

Heavy metals are high priority pollutants because of their relative high toxicity and persistent nature in the environment. Therefore, a knowledge of the changing concentrations and distribution of heavy metals and their compounds in various compartments of the environment is a priority for good environmental management programmes all over the world.

In Nigeria, most investigations of heavy metals pollution have focused on occasional determination of the types and

concentrations of such metals in industrial effluents (Akintola *et al.*, 1981; Bhalerao & Adeeko, 1981; Oyewo, 1998) and some segment of the ecosystem, particularly sediment and water column (Fodeke, 1979; Okoye, 1989; Chukwu, 1991; Ogunsua *et al.*, 1991). There is, however, a significant paucity of records on sustained and co-ordinated measurement of levels of heavy metals at identifiable sampling points of principal media in the recipient ecosystems. As long as human-induced generation of heavy metals continues in industrial and