

Analysis of surface water quality upstream Niger Delta System

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The delta region is a complex, but fragile, natural endowment environment that occupies about 1% of the global land surface and is home to about 500 million people. The region is characterized by varied interaction between the fluvial (river) and marine systems with vibrant ecosystems, which make the region an environmental and economic hot spot. Deltas are also the end-products of catchment processes involving water supply, sediment delivery and water quality elements that are fast changing over time as a result of both of human influences and changes in climatic drivers.

The Niger Delta is an end-product of Lower Niger River catchment processes and is rich in a luxuriant diverse mosaic of ecological systems, with a wide-ranging culture and heritage system, with a population growth rate of about 2.7% per annum. It is therefore necessary to assess the quality of upstream surface water quality input to the Niger Delta, upon which the growing population depends highly and to consider the unsustainable water resource usage and water abstraction activities among the riparian states. In addition, studies on water quality in Nigeria are usually conducted at local scales and limited to restricted numbers of chemical contaminants with scarce data on trace metals (including arsenic) concentrations.

This study focuses on analysis of surface water resources quality of selected locations sampled for major ions and trace elements concentration, and provides an update of trace metal and arsenic concentrations in water of the River Niger basin and of the region of Lagos, Nigeria. For standardization and comparison, WHO maximum allowable concentrations in drinking water and mean annual European Quality standards (EQS) for priority metals in surface water were adopted; the dissolved trace element concentrations in the Seine, Rhone, Thames and Lena rivers are also provided for comparison (Elbaz-Poulichet *et al.*, 2006).

The water quality assessment reflects the fact that the water resource from the Niger and Benue river basins is moderately contaminated upstream of their confluence (Lokoja), with the exception of Pb. Downstream of their confluence, particularly around the Lagos region, drinking water exceeds the WHO quality standards for Mn, and to a lesser extent Al. Manganese is neurotoxic and can provoke Parkinsons disease (Centeno *et al.*, 2005). The arsenic concentrations are lower than the drinking water quality standards and are safe for consumption and irrigation upstream of the Niger Delta (Figs 1 and 2).

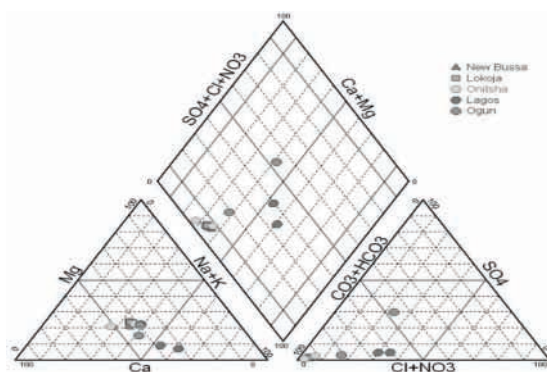


Fig. 1 Piper diagram of sampled water of Lower Niger River basin and part of Lagos region.

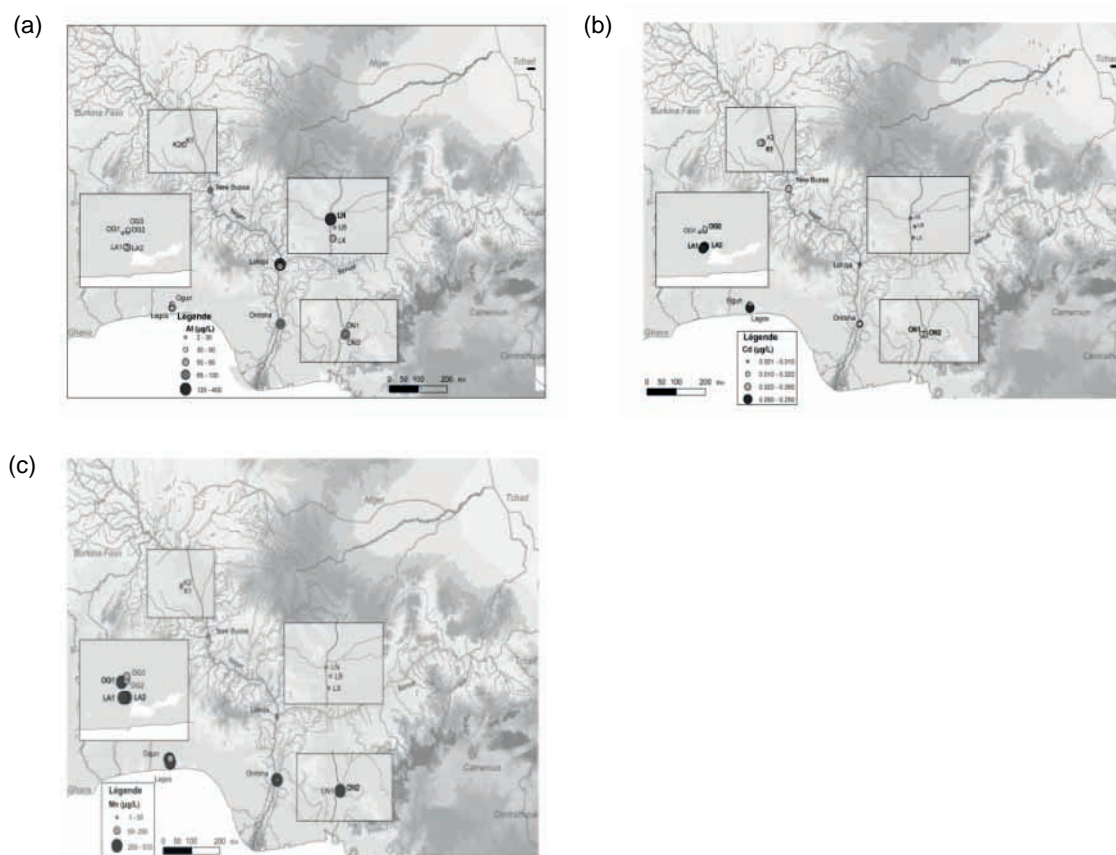


Fig. 2 Dissolved aluminium (a), cadmium (b) manganese (c) in selected water bodies.

In addition, there is a need for further water quality assessment analyses in water draining other rock formations in Nigeria, especially in the northeast and northwest regions, as well as the Niger Delta, a region where some of the geologic conditions that are usually responsible for the geogenic contamination of water by arsenic are present.

Acknowledgements this study was funded by the cooperation between the French Embassy in Nigeria, HSM Laboratory in Montpellier and BFP Niger project (CGIAR Challenge Program on Water and Food).

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