

## Pollution of sediments by heavy metals in Lagos Harbour - sources, pathways and management

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The coastal zone is influenced by human activities such as fishing, industries and shipping and can become vulnerable due to these persistence anthropogenic actions. Often enclosed and semi-enclosed marine areas such as harbours can become polluted, and this is detrimental to sediment quality. The basin of Lagos Harbour, Nigeria, is an area with restricted water circulation and typifies this situation. This study aimed to investigate the concentrations of heavy metals in sediments within the Lagos Harbour and Lagoon system. A total of twenty-six sampling stations were established, with more pristine Apese Lagoon serving as the control area. The different stations were selected according to their related anthropogenic activities and hence likely to have varying contaminant sources and types. Surface (1-5 cm) sediment samples were collected using a Van Veen grab on two occasions; during the wet (September 2013) and dry (February 2014) seasons. The sediment underwent two acid digestion (1M HCl or aqua regia) procedures according to the Canadian National Water Research Institute guidelines and the United States Environment Protection Agency (Method 3050B). The digests were analysed for the heavy metals: arsenic, chromium, copper, iron, lead and zinc. Some of these were selected due to their persistence, toxicity and potential to bio accumulate in organisms. The resultant digests were analysed using both inductively coupled plasma mass spectrometry and optical emission spectro photometry to give the bio available and extractable metal fractions. Total metal concentrations were measured using X-ray fluorescence. The concentration of metals was shown to be higher using the *aqua regia* method in the dry season compared with the wet season in all the locations including the control area. High concentrations for three metals (As=23, Cr=38, Zn= 144 mg/kg) were found. The concentrations were higher in the Lagos Harbour and urbanised part Lagos Lagoon, where there is an high intensity of anthropogenic activities compared with the control zone. These data are useful for the policy makers to use as part of the baseline data for further investigation and in the development of guidelines for the protection of the marine environment in Nigeria.

**Keywords:** Heavy metals, Lagos Harbour, Nigeria, Sediment contamination, Marine pollution, Analytical techniques.

### Biography:

Currently, Awwal Bamanga is in advanced stage of completing my PhD Degree Programme in Environmental Sciences at the School of Earth and Environmental Sciences (SEES) University of Portsmouth, United Kingdom. He has been researching since the last four years, based on specialty in the field of Marine Sediment Biogeochemistry and Environmental Analysis and Ecosystem in the area of Marine Pollution of the harbour system as a result of shipping, industrial and natural activities. Acquired over twelve years working experience in monitoring and evaluation of pollution control and management in coastal marine and ecosystem within the maritime industry. He possess a range of skills in monitoring marine pollution through identification and detection of Chemical, Biological and Physical pollutants. Analysing and assessing the concentrations of these contaminants using modern advanced environmental equipment, and relate its findings to various sources including quantifications and fluxes from local environment, shipping and industrial activities. The skills also include assessing and evaluating the likely effects of these contaminants on marine environment, marine biota and human health effects in line with global environmental best practices.