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Preliminary Investigation of Chemical Composition of Ballast Water Sediments in Selected Ships within the Lagos Harbour, Nigeria

Ballast water is important for safe and efficient operation of vessels, helping to maintain stability during voyage in seas and docking in harbours. However, ballast pose considerable environmental challenges because they are often laden with polluted sediments and invasive species. The Lagos Harbour, which houses in largest port in West Africa, receives about five thousand vessels annually which discharges ballast water and sediment into the water with the potential to cause environmental pollution. In the Nigerian context there is high potential for pollution due to weak regulations, poor enforcement and limited research of this kind in other to understand their composition, fate and impacts. This study aims at characterizing the chemical composition (Heavy metals- Arsenic, Cadmium, Chromium, Copper, Lead & Zinc, as well as carbon and nitrogen content) of the ballast sediment because of their positive correlation with the survival of invasive species in the ballast water and sediment tanks. A total of four ships (2 cargos and 2 tankers) were surveyed within Lagos Harbour and surface (1-5 cm) sediment samples were scooped using a specialized grab for sampling ballast sediments. The sediments were transferred in specialized cool boxes to the University of Portsmouth in United Kingdom for analysis. Total metal concentrations were analysed using X-ray fluorescence (XRF). They were subjected to two acid digestions: Aqua regia (AR) and 1 M hydrochloric acid (1 M HCl) following the procedures set out by the Canadian National Water Research Institute (NWRI) and the United States Environment Protection Agency (US-EPA Method 3050B). Total carbon and nitrogen contents were determined using an in-line Yanaco MT-5 CHN analyser. The results obtained were compared with established guidelines and subjected to correlation and Principal Component Analysis (PCA). The findings indicated high concentrations of Arsenic, Lead, Cadmium, Carbon and Nitrogen in the sediments. Tanker vessels contained relatively higher concentrations of the pollutants than cargo vessels. The findings from this study provides

interesting baseline data which will guide a more intensive investigation of chemical composition of ballast water and sediments for effective comparison with what is obtainable elsewhere in the world. The maritime industry needs to pay close attention to ballast management particularly in developing countries like Nigeria where there is limited regulation for management of coastal areas with respect to shipping activities as a potential source of marine pollution. The IMO needs to direct further effort at investigating the non-biological components of ballast water and sediments in other to protect valuable biodiversity.

Biography

Awwal Bamanga holds a Ph.D. Degree in Marine Environmental Sciences from the University of Portsmouth, United Kingdom with specific research interest in harbour management. He has over seventeen (17) years working experience with the Nigerian Maritime Administration and Safety Agency (NIMASA) which is the focal agency implementing ports and flag states responsibilities for Nigeria. My responsibility with maritime safety administration involves regulating shipping activities in relation to ensuring safer seas and protection of marine environment in line with the International Maritime Organization (IMO) Conventions and Protocols as well as the Nigerian Merchant Shipping Act. Over the years, he has developed keen interest in the management of coastal environments, with respect to domestication of IMO conventions and protocols in order to promote trade, safety and security as well as prevent marine pollution. Also, he has interest in port development and services, as well as enhancing network of coastal ports to hinterlands via inland water channels. Considering these, he had participated in numerous international meetings and conferences of maritime concerns such as Marine Environment Protection Committee (MEPC) working groups on chemical tracking, International Oil Pollution Compensation (IOPC) fund, Ballast Water Management Conventions (BWMC), amongst others. With my experience in the maritime industry, he has the capability to engender effective regional collaboration and ensure private-sector participation in enhancing port development, shipping operations, vessel traffic and security on a regional scale.

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