

Dioxin-like PCBs and PCDD/Fs in surface sediments near the shore of Winam Gulf, Lake Victoria.

Solomon Omwoma¹, Joseph O. Lalah^{*2}, Munir Virani^{3, d}, Karl-Werner Schramm⁴, Bernhard Henkelmann⁵

¹ Department of Chemistry, Maseno University,² ***Department of Chemical Science and Technology, Technical University of Kenya**, ³ The Peregrine Fund, 5668 West Flying Hawk Lane, Boise, ID 83709, USA⁴ Ornithology Section, Department of Zoology, National Museum of Kenya, ⁵ Helmholtz Zentrum München, German Research Center for Environmental Health, Institute of Ecological Chemistry, Ingolstädter Landstraße 1, D-85764 Neuherberg, Germany

Abstract

Winam Gulf of Lake Victoria is considered to be contaminated with toxic chemicals emanating from anthropogenic activities, especially near large industrial towns such as Kisumu. This has recently caused concerns about its water quality and impact on aquatic organisms and human beings. This study was justified by the need to generate baseline concentrations of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and dioxin-like polychlorinated biphenyls (dl-PCBs) in surface sediment from selected sites in the lake and determine the influence of activities on their concentrations and potential risks to fish-eating birds living near the lake. Surface sediments (<30 cm) from three different fish landing beaches, located 200 m from the shore of Winam Gulf of Lake Victoria near Kisumu city, Homa Bay and Mbita (control) towns, were analysed. The total mean concentrations (in pg g^{-1} dry wt) were found to range from 17.4–812 (Σ dl-PCBs), 36.6–813 (Σ PCDDs) and 1.45–46.4 (Σ PCDFs). The calculated Toxic Equivalents ($\text{TEQ}_{\text{WHO}(2005)}$) ranged from 0.001–0.43 (Σ dl-PCBs) and 0.09–31 (Σ PCDD/Fs). The fish landing beaches at Kisumu city were found to be contaminated with respect to dl-PCBs and dioxins, followed by Homa Bay and Mbita. The relatively high levels of octachlorodibenzo-p-dioxin (OCDD) and octachlorodibenzofuran (OCDF) influenced the TEQ and the Σ PCDFs/ Σ PCDDs ratios indicated chemical processes as partial sources of the dioxins. The levels of contaminants obtained in this study showed potential exposure to aquatic organisms and fish eating birds through food chain transfer.

Keywords: Lake Victoria; Kisumu; Homa Bay; Polychlorinated dibenzo-p-dioxins; Dibenzofurans; Polychlorinated biphenyls

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