ABSTRACT

Metal and Polycyclic Aromatic Hydrocarbon (PAH) Contamination in the Caroni Swamp, Trinidad, West Indies

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Chemical contamination is a key environmental issue which has the potential to adversely affect ecosystem health and human well-being. Mangrove ecosystems which straddle the terrestrial and marine environments are particularly susceptible to contaminants originating from both environments.

This study focused on the Caroni Swamp, the largest mangrove ecosystem in Trinidad. The aims of this study were: (i) to investigate the extent of metal and PAH contamination in the swamp and (ii) to assess the threat which metals and PAHs potentially posed to aquatic life and human health. Metal (Zn, Cd, Cu, Pb, Cr, Ni) and PAH (USEPA 16 priority pollutant PAHs) levels were measured in sediment, mangrove oysters (*Crassostrea rhizophorae*) and Madamango sea catfish (*Cathorops spixii*) at 10 sites in the Caroni Swamp and at 1 site in the Nariva Swamp (comparison site). The potential threat to aquatic life by sediment metals and PAHs was assessed using the Canadian Sediment Quality Guidelines. Local/international guidelines proposed for fish/fishery products, the target hazard quotient (THQ) and the incremental lifetime cancer risk (ILCR) were used to evaluate the human health threats posed by metals and PAHs in biota.

Metals and PAHs were detected in the sediments, *Crassostrea rhizophorae* and *Cathorops spixii* of the Caroni Swamp. Results suggest that sediment metal levels pose a low to medium risk to aquatic life in the swamp. Zinc levels in oyster tissues at all sites exceeded local guidelines for this metal in fishery products. The non-carcinogenic risks for zinc were unacceptable for extreme oyster consumers (THQ>1) but were acceptable for average consumers (THQ<1). Sediment PAH levels in the swamp pose a low risk to aquatic life in the swamp. Benzo[a]pyrene levels in oyster tissues at all sites exceeded international guidelines proposed for this PAH in shellfish. Overall, the ILCR of consuming carcinogenic PAHs in

oysters from the swamp exceeded the acceptable level of risk (1×10^{-6}) at all sites for average and extreme oyster consumers. Results of this study clearly show that metal and PAH contamination in the Caroni Swamp poses a threat to aquatic life in the swamp and more importantly to the health of human consumers of shellfish.

Keywords: La Daana Kada Kanhai; Metals; Polycyclic Aromatic Hydrocarbons (PAHs); Caroni Swamp; Contamination; Pollution; Oysters; Sediment; Trinidad.