

# Trace metals in tissues of the tiger prawn *Penaeus monodon* and mangrove sediments of the Tanzania coast: is there a risk to marine fauna and public health?

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Mangroves and other intertidal ecosystems provide essential linkages for the overall functioning of coastal areas (Mohammed, 2002). These ecosystems support a large number of marine fauna and most coastal communities in Tanzania depend on them for their livelihood and other economic activities. The expanding coastal urban population observed in recent years has increased the intensity of such activities and resulted in mangrove degradation in urban areas along the coastline (Wang *et al.*, 2003). Although industrial development in the country is relatively low, few industries have waste water treatment facilities. As a result, many industries release effluents to rivers leading to pollution of coastal waters. Only a small proportion of the urban population is connected to the sewage system and even the collected sewage is usually released to coastal waters without treatment (Mmochi and Francis, 2003). These activities introduce trace metals to coastal waters, which accumulate in mangrove sediments and threaten fauna and public health, especially if such contaminants accumulate in edible fauna. Levels of trace metals above background levels have been reported in Dar es Salaam and Rufiji (Rumisha *et al.*, 2012). The present study analyses the concentration of trace metals in sediments along the whole coast of Tanzania. The concentration of trace metals in tissues of tiger prawns was also measured in order to assess whether levels are within the recommended standards for human consumption. Sediments and 160 tiger prawns were collected at nine stations along the coast and dried in a lyophiliser. While dried sediments were digested in a CEM MARS 5 microwave with HCL (30 %) and HNO<sub>3</sub> (65 %), dried tissues were digested with HNO<sub>3</sub> (65 %) and H<sub>2</sub>O<sub>2</sub> (30 %). All digests were diluted 10x and trace metals were analysed with a HP-ICP-MS. Low to moderate degree of trace metal contamination was observed along the coast. Mangrove forests in Pangani, Saadani and Rufiji were the most contaminated. These are generally forests associated with estuaries of very large rivers. When mangrove forests associated with estuaries of small rivers were compared, Dar es Salaam was the most contaminated. Our results also show that the levels of As, Cr, Hg and Ni were above the sediment quality guidelines and that sediments in Pangani, Saadani, Dar es Salaam, Rufiji and at Mpirani in Tanga, have a probability of 21% of being toxic to marine fauna. Moderate ecological risks of Cd were also observed at Raskazone in Tanga. High levels of trace metals were also observed in tiger prawns from Saadani, Dar es Salaam, Rufiji and Lindi, although the levels did not exceed the maximum allowed levels for human consumption. Given that significant enrichments were recorded at some stations, if measures are not taken, ecological risks are likely to increase. It is recommended that measures should be taken to reduce the level of pollution in these ecosystems. Industries and the local authorities should make a good use of waste treatment facilities and the existing regulations should be enforced to protect mangrove fauna and the prawn fishery industry.

## References

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