

Determination of heavy metal levels in fishes from the lower reach of the Kelantan River, Kelantan, Malaysia

ABSTRACT

This study aimed to assess the concentrations of cadmium (Cd), nickel (Ni) and lead (Pb) in the tissues of fish collected from the lower reach of the Kelantan River, Malaysia. Fishes were collected using gill nets during the dry and wet seasons. A total of 78 individual fish were caught and comprised 6 families, 11 genera and 13 species. The dorsal muscle was analysed using a graphite furnace Atomic Absorption Spectrometer (AAS). The mean concentration of Cd in *Chitala chitala* (0.076 mg/kg) was above the critical limit values of the European Commission (EC), World Health Organization (WHO) and Food and Agriculture Organization (FAO). The mean concentrations of Cd in *Barbonymus gonionatus* and *Tachysurus maculatus* were already at the level of concern, whereas the other species were approaching the limits of permissible levels. No fish samples were found to have a Ni level higher than the permissible limit of 0.5–0.6 mg/kg set by the WHO (1985). *Osteochilus hasseltii* (0.169 mg/kg) and *T. maculatus* (0.156 mg/kg) showed high Pb concentrations. The concentrations of heavy metals were found to be elevated in the wet season ($p < 0.05$). Omnivorous fish were detected with elevated concentrations of Cd and Ni, whereas carnivorous fish had the highest concentration of Pb. The concentrations of Cd and Pb in fish tissues were positively correlated with fish weight ($p < 0.05$). This study determined that the fish species caught in the Kelantan River were contaminated with non-essential metals (Cd, Ni and Pb). Nevertheless, the heavy metal concentration in the fish tissues, with the exception of *C. chitala*, *O. hasseltii* and *T. maculatus*, did not exceed the EC, FAO, Malaysian Food Act (MFA) or WHO guidelines.

Keyword: River; Heavy metals; Fish tissues; Kelantan; AAS