

Analysis of heavy metal accumulation of water, sediment, and selected food fish species of brush park fishery in Negombo estuary, Sri Lanka

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Heavy metal contamination mainly due to anthropogenic activities in aquatic ecosystems has become an emerging environmental issue and impact on bio-accumulation specially in marine, brackish water, and freshwater bodies. The brush park is a manmade semi-encloser environment which is one of the important fishing methods and significantly contributed to the yields in the Negombo estuary. This study was carried out to assess the concentration of As, Fe, Cu, Cd, Pb, and Hg in the water and sediment in selected locations peripheral to the brush park fishery area. The muscle tissues of six selected food fish species of *Scylla serrata* (Mud crab), *Liza parsia* (Gold spotted mullet), *Karalla dussumieri* (Dussumier's ponyfish), *Etroplus suratensis* (Pearlspot) *Caranx sexfasciatus* (Bigeye trevally), and *Lutjanus russellii* (Russell's snapper) from selected one brush park fishery in Negombo estuary were also analyzed for the heavy metals. The heavy metal assessment was carried out by using the Inductively Coupled Plasma-Mass Spectrophotometry with microwave-assisted digestion, and metal concentration were expressed as a mg/kg in wet weight basis. The mean concentration ($\mu\text{g/L}$) of As, Cu, Fe and Pb in water were 3.71 ± 1.87 , 14.42 ± 6.99 , $9,047.67 \pm 4077.96$, and 4.78 ± 2.34 respectively. Cd and Hg were not detected. In sediments, the average concentrations (mg.kg^{-1} - dry weight basis) of As, Cu, Fe, Cd, Hg, and Pb were 6.25 ± 4.02 , 3.98 ± 2.61 , $15,043.50 \pm 10,779.90$, 0.02 ± 0.01 , 0.01 ± 0.01 , and 2.04 ± 1.20 respectively. *E. suratensis* was shown the highest concentration of heavy metal for As, Fe, Cu, Cd, Hg, and Pb as 10.79 ± 1.56 , 171.33 ± 20.50 , 0.46 ± 0.11 , ND, 0.16 ± 0.01 and 0.05 ± 0.01 (mg.kg^{-1} - dry weight basis) respectively and fish species order lowest to highest were followed as *C. sexfasciatus* < *S. serrata* < *K. dussumieri* < *L. russellii* < *L. parsia* < *E. suratensis*. According to the results, the concentration of six heavy metals in fish tissue were lowest to highest indicated as Cd < Pb < Hg < Cu < As < Fe. Most of the metal levels in water were not beyond the maximum tolerable limits given by the Central Environmental Authority of Sri Lanka, and *S. serrata* has exceeded the tolerable limits provided by European Commission No. 1881/2006. However, the findings urge for continuous monitoring and management of polluted effluent discharge into the productive estuarine ecosystems.

Keywords: brush park fishery, heavy metals, Negombo estuary, sediments

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