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**Assessment of heavy metals in oysters (*Crassostrea cucullata*), sediments, and water in selected locations of Negombo estuary**

N. S. Premananda<sup>1</sup>, Y. L. N. M. Arachchige\*<sup>1</sup> and C. K. Hemachandra<sup>2</sup>

<sup>1</sup>Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka

<sup>2</sup>Department of Environmental Technology, Faculty of Technology, University of Colombo  
nadeesha@kln.ac.lk\*

Heavy metal contamination in aquatic environments is a matter of great concern due to its negative effects on both humans and other organisms. The present study was planned to evaluate the concentrations of selected heavy metals, cadmium (Cd), copper (Cu), lead (Pb), selenium (Se), and zinc (Zn), in oysters (*Crassostrea cucullata*), sediment (~1.4 m depth), and water (~0.5 cm depth). The samples were collected from four sites in the Negombo estuary in the dry season (March - April) of the year 2022. The selection of sampling locations was determined based on the presence of oysters. For each site, 20 oyster samples, 3 water samples, and 3 sediment samples were collected. The analysis was conducted following the protocols outlined in EPA (Environmental Protection Agency) methods 3052 for oysters and 3051A for sediments. This involved the use of microwave-assisted digestion and subsequently analyzing the samples with an inductively coupled plasma-mass spectrometer. A comparison was made between the average metal concentrations obtained from four study sites. The concentrations of heavy metals found in oysters were higher than the concentrations found in sediments and water at selected sites. Lead concentrations in oysters were safe for human consumption (21.52 ppb – 151.1 ppb), but zinc levels were higher than the (4834 ppb – 11538 ppb) WHO guidelines. The measured levels of copper (Cu), cadmium (Cd), and selenium (Se) were found to be within permissible limits. Metal concentrations in water were significantly lower than in sediments and oysters for all metals studied. There was no direct correlation observed between the metal levels in nearby sediments and water (The correlation coefficients for the metals are as follows: Cu (-0.466), Zn (0.180), Se (-0.174), Cd (0.036), and Pb (-0.445)). Metal distribution in water inlets of the estuary did not show a clear pattern. Water consistently had lower metal concentrations compared to sediments and oysters. The present study suggests several avenues for future research. Long-term monitoring may reveal temporal variations in metal concentrations, while source identification studies can trace the origin of pollutants. Investigating bioaccumulation factors in oysters and their ecological impacts on the ecosystem is crucial. Developing remediation strategies and conducting human health risk assessments are necessary for mitigating contamination effects. Pursuing these research directions can lead to improved understanding and protection of the estuarine environment and human health.

**Keywords:** Estuary, Heavy metals, Oysters, Sediment, Water