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Assessment of Heavy Metal Concentrations in Avian Feathers at the Karadiyana Solid Waste Disposal Site**Kasthuri Shashipraba^{1,2}, Reinurshan Kanagaratnam², Sandun Sandanayake², Sanjaya Weerakkody⁴, Meththika Vithanage^{2,3}, Chaamila Pathirana^{1*}**¹*Department of Forestry and Environmental Science, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*²*Ecosphere Resilience Research Centre, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*³*Department of Geochemistry, Geological Survey of Denmark and Greenland, Copenhagen, Denmark*⁴*Southeast Asia Biodiversity Research Institute, Chinese Academy of Sciences & Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Mengla 666303, Yunnan, China***Chaamila@sjp.ac.lk***Abstract**

Rapid urbanization and poor waste management have increased heavy metal contamination around municipal dumpsites, posing long-term risks to wildlife and surrounding ecosystems. This study aimed to assess heavy metal contamination at the Karadiyana solid waste disposal site using avian feathers as non-destructive biomonitoring indicators and to evaluate bioaccumulation patterns across different bird species. Concentrations of seven heavy metals (Cu, Zn, Cd, Cr, Ni, Mn, and Pb) have been assessed in the feathers of 3 bird species: the house crow (*Corvus splendens*), feral pigeon (*Columba livia*), and cattle egret (*Bubulcus ibis*), from the Karadiyana solid waste disposal site and compared them with the reference sites. Samples were cleaned, dried, and digested using microwave-assisted acid digestion (HNO₃ and H₂O₂), followed by heavy metal analysis through Microwave Plasma Atomic Emission Spectrometry (MP-AES). Bioaccumulation factors (BAF) were calculated using sediment data from previous research, and correlations between metal concentrations and feather dimensions were examined. All these heavy metals were detected in all the bird species, except Cd. Cadmium was below the detection limits for house crow and feral pigeon feathers collected from the Karadiyana dumpsite. The order of concentration of metals in the feathers collected from the Karadiyana dumpsite is Zn>Cu>Mn>Pb>Cr>Ni>Cd. House crow feathers collected from the Karadiyana dumpsite showed higher Zn (505.75±189.97 µg/g), Ni (1.88±0.46 µg/g), Cr (3.26±1.06 µg/g), and Mn (20.57±10.6 µg/g) concentrations compared to the reference site (Dharmapala Park in Galle). The cattle egret feathers also showed elevated concentrations for Zn (109.4±13.62 µg/g), Ni (2.25±0.51 µg/g), and Pb (4.7±1.5 µg/g) at the Karadiyana dumpsite compared to the reference site (Hikkaduwa paddy field), whereas feral pigeon feathers did not show notable differences, possibly due to their more limited exposure and feeding behavior. The BAF values follow the order Zn>Cd>Cu>Mn>Cr. The negative correlation between metal concentration and feather dimension in the house crow and feral pigeon contrasts with the positive correlation in cattle egrets, suggesting species-specific physiological mechanisms of metal accumulation during feather growth. Furthermore, heavy metal content was higher in tail feathers compared to the flight feathers. This study suggests that bird feathers can serve as effective, non-destructive biomonitoring indicators for assessing heavy metal concentrations in municipal solid waste disposal sites.

Keywords: *Biomonitoring, Heavy metal, Avian feathers, Solid waste*