

Exposure of the endangered Milky stork population to cadmium and lead via food and water intake in Kuala Gula Bird Sanctuary, Perak, Malaysia

ABSTRACT

The Milky stork is listed as an endangered species endemic to the Southeast Asia region. In Malaysia, the population is currently being reintroduced back into the wild. However, the increase of anthropogenic activity throughout the coastal area might expose the population to hazardous chemicals such as heavy metals. This study highlights the contamination of cadmium (Cd) and lead (Pb) in the Milky stork's diet. Additionally, this is the first time an integrated exposure model being used to assess heavy metal exposure risk to the population. Lead level ($5.5\text{--}7.98\text{ mg kg}^{-1}$) in particular was relatively high compared to Cd ($0.08\text{--}0.33\text{ mg kg}^{-1}$). This was probably related to the different niches occupied by the species in the aquatic environment. The results further show that the predicted exposure doses (through intake of both food and water) for all metals are much lower than the Tolerable Daily Intake (TDI) values. The total exposure dose for Cd was $0.11\text{ mg kg}^{-1}\text{ d}^{-1}$ with TDI value of $0.54\text{ mg kg}^{-1}\text{ d}^{-1}$ while Pb total exposure dose was $0.31\text{ mg kg}^{-1}\text{ d}^{-1}$ with TDI value of $0.64\text{ mg kg}^{-1}\text{ d}^{-1}$. Several possible factors that could lead to the observed pattern were discussed. In conclusion, there is an urgent need to improve the current habitat quality to protect the endangered species. The authors also emphasized on the protection of remaining Milky stork's habitats i.e. mudflats and mangroves and the creation of buffer zone to mitigate the negative impacts that may arise from pollution activity.

Keyword: Milky stork; Heavy metals; Exposure dose; Integrated assessment; Ecotoxicology; Pollution