

Title: Bioaccumulation and sources of metal(loid)s in fish species from a subtropical river in Bangladesh: a public health concern

Author Names: Mir Mohammad Ali, Khadijatul Kubra, Edris Alam, Anwar Hossain Mondol, Md. Saiful Islam, Ehsanul Karim, A. S. Shafiuddin Ahmed, Md. Abu Bakar Siddique, Guilherme Malafaia, A. S. Shafiuddin, Md. Abu Bakar Siddique, Md. Zillur Rahman, Md. Mostafizur Rahman & Abu Reza Md. Towfiqul Islam

Abstract: Toxic metals and freshwater fish's metalloid contamination are significant environmental concerns for overall public health. However, the bioaccumulation and sources of metal(loids) in freshwater fishes from Bangladesh still remain unknown. Thus, the As, Pb, Cd, and Cr concentrations in various freshwater fish species from the Rupsha River basin were measured, including *Tenualosa ilisha*, *Gudusia chapra*, *Otolithoides pama*, *Setipinna phasa*, *Mystus vittatus*, *Glossogobius giuris*, and *Pseudeutropius atherinoides*. An atomic absorption spectrophotometer was used to determine metal concentrations. The mean concentrations of metal(loids) in the fish muscle (mg/kg) were found to be As (1.53) > Pb (1.25) > Cr (0.51) > Cd (0.39) in summer and As (1.72) > Pb (1.51) > Cr (0.65) > Cd (0.49) in winter. The analyzed fish species had considerably different metal(loid) concentrations with seasonal variation, and the distribution of the metals (loids) was consistent with the normal distribution. The demersal species, *M. vittatus*, displayed the highest bio-accumulative value over the summer. However, in both seasons, none of the species were bio-accumulative. According to multivariate statistical findings, the research area's potential sources of metal(loid) were anthropogenic activities linked to geogenic processes. Estimated daily intake, target hazard quotient (THQ), and carcinogenic risk (CR) were used to assess the influence of the risk on human health. The consumers' THQs values were < 1, indicating that there were no non-carcinogenic concerns for local consumers. Both categories of customers had CRs that fell below the permissible range of $1E-6$ to $1E-4$, meaning they were not at any increased risk of developing cancer. The children's group was more vulnerable to both carcinogenic and non-carcinogenic hazards. Therefore, the entry of metal(loids) must be regulated, and appropriate laws must be used by policymakers.

Keywords: Metal(loid) contamination Freshwater fish Bioaccumulation Rupsha River Atomic absorption spectrophotometry Human health risk assessment Seasonal variation Bangladesh

<https://link.springer.com/article/10.1007/s11356-023-31324-8>