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Occurrence, Characteristics and Human Risk Assessment of Microplastics in Commercial Fishes from An Urban River, Bangladesh

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Microplastics are ubiquitous, posing a growing threat to aquatic life and human health due to their ingestion and accumulation in freshwater species at different trophic levels. Since limited research has been conducted on freshwater fish in urban rivers, this study focuses on four freshwater fish species from the Buriganga River.

However, the fish were dissected to investigate MP contamination in their gills, GIT, and muscle, and they found an average abundance of 4.29 ± 2.16 MPs/g BW with a significant difference ($p < 0.05$). *H. plecostomus* had the highest abundance (6.04 ± 3.22 MPs/g), while *L. catla* had the lowest (2.78 ± 0.99 MPs/g). Regarding the tissue-specific variation, the gills had the highest abundance of microplastics (10.9 ± 4.35 MPs/g), followed by the GIT (7.19 ± 3.98 MPs/g), and the least in muscle (4.41 ± 1.64 MPs/g). The feeding habits showed no significant differences ($p > 0.05$). The majority of ingested plastic particles were fibers (86 %), were violet in color (40 %), and were < 0.5 mm in size (82.4 %). Apart from this, four polymers, such as EVA, ABS, PE, and PP, were identified by μ FTIR, among which EVA (50%) was dominant. Subsequently, a hazard analysis using the polymer hazard index (PHI) revealed that plastic contamination was of distinct hazard categories for different polymer types, ranging from grade I (< 1) to grade V (> 1000). The assessment of the contamination factor ($1 < CF < 3$) and pollution load index ($PLI > 1$) indicated moderate contamination of fish by the ingestion of plastic debris.

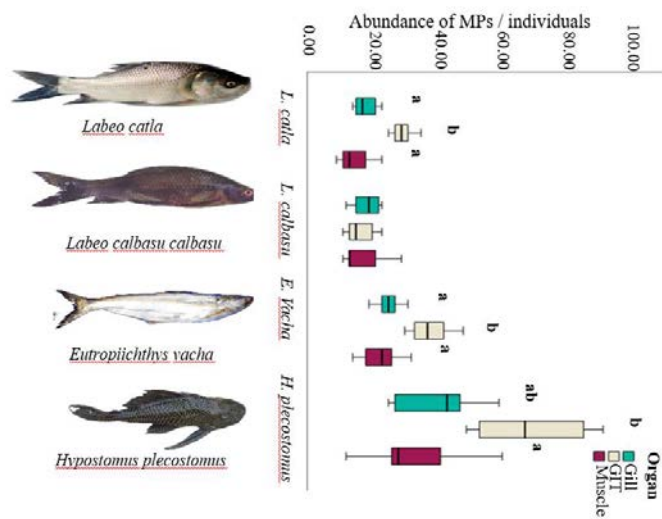


Figure 1. Number of microplastics per individual (MPs/individuals) found in tissues of different fish

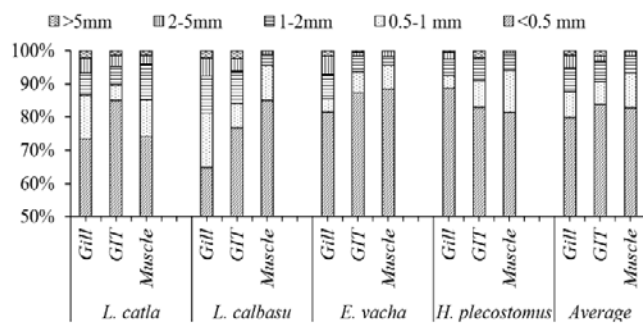


Figure 2. Morphometric distribution (%) sizes from the four examined species of fish.

This study provides the foremost evidence for the presence of microplastics in freshwater fish in the study region, raises concern for public health, particularly among those who consume fish from urban rivers, and suggests further research on adverse effects of human health and aquatic organisms.