Microplastic Contamination of Selected Fish Species in the Mangrove-Associated Ecosystem: A Case Study of the Kalu River Basin, Sri Lanka

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Microplastic (MP) pollution has become a major environmental concern affecting aquatic ecosystems. Mangrove-associated estuaries are important sinks for microplastics due to inputs from both riverine and marine sources, exposing fish communities to contamination. This study investigated the occurrence and characteristics of microplastics in three fish species collected from the mangrove-associated Kalu River estuary, Sri Lanka, in April 2024. Three fish species: *Oreochromis mossambicus*, *Etroplus suratensis,* and *Heteropneustes fossilis* were collected from the local fishermen from the Kalu River estuary. Three individuals of each species (n=3) were analyzed. MPs were extracted from muscle digested using 30% potassium hydroxide (KOH), followed by density separation with saturated sodium chloride (NaCl). The extracted particles were filtered through 1.2µm glass fiber filters and examined under a stereomicroscope for enumeration and characterization as colour, shape, and type of microplastics. Microplastics were detected in all examined fish species, confirming the widespread occurrence of plastic contamination in edible fish tissues. *H. fossilis* exhibited the highest mean microplastic abundance (0.47±0.09 MPs/g), followed by *O. mossambicus* (0.42±0.11 MPs/g) and *E. suratensis* (0.40±0.05 MPs/g). Filament-shaped particles were the predominant morphology, accounting for 71.9% of the identified microplastics, followed by irregular (26.3%) and round particles (1.8%). Regarding microplastic types, fibers were the most dominant category, representing 62.1% of the total identified particles, followed by films (19.0%) and fragments (17.2%). The most dominant microplastic colour was blue (34.5%), followed by black (32.8%), transparent (15.5%), green (8.6%), red (5.2%), and other colours (3.4%). The predominance of filamentous microplastics indicates that synthetic textile fibers and fishing-related materials are likely the primary sources of contamination in the Kalu River. The presence of microplastics in edible fish tissues highlights the potential for trophic transfer and human dietary exposure. These findings provide baseline evidence of freshwater fish contamination in Sri Lanka and underscore the need for sustained monitoring and effective management strategies to mitigate plastic pollution in inland aquatic ecosystems.

Keywords: *Brackish water fish, Mangrove ecosystems, Microplastic pollution, Muscle tissues, Kalu River basin*