ASSESSMENT OF MICROPLASTIC POLLUTION AND PHYSICOCHEMICAL FEATURES IN THE SURFACE WATER AND SEDIMENT OF KAPTAI LAKE, BANGLADESH

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A thesis submitted in the partial fulfillment of the requirements for the degree of Master of Science in Fisheries Resource Management

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June 2024

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List of Abbreviation

ABBREVIATION	FULL FORM
MP	**Microplastic**
MT	**Metric Ton**
Kg	**Kilogram**
g	**Gram**
mg	**Milligram**
mL	**Milliliter**
m^3	**Meter Cube**
SPSS	**Statistical Package for the Social Sciences**
Km	**Kilometer**
%	**Percent**

Abstract

Microplastics (MPs) have emerged as a significant worldwide contaminant due to its extensive dispersion and possible harm to ecosystems. However, the occurrence of MPs in lakes is relatively unrevealed in comparison to other aquatic bodies. This study was conducted to evaluate the abundance, distribution, attributes, and risk of MPs in Kaptai Lake during January to August, 2023. A total of 36 samples (18 water and 18 sediment) were collected from 18 sampling sites MP particles were extracted by density separation, enumerated and characterized by a stereomicroscope and imaging software and analysis of polymer was performed by Fourier Transform Infrared (FT-IR) spectroscopy. The highest and lowest abundance of MPs both in water and sediment samples were detected at tourist (water = 5.69 ± 2.42items/m^3, sediment = 43.06 ± 7.92 items/kg) and non-tourist spots (water = 2.69 ± 0.62 items/m^3, sediment = 23.34 ± 5.27 items/kg), respectively. Fragment was the dominent type of MPs in water (43.16%) and sediment (47.01%). MPs with an irregular shape prevailed at 48.5% and 48.33% in water and sediment, respectively. Transparent (29.5%) and black color (28.13%) were dominated correspondingly in water and sediment. In both samples, MPs between 300 to<500 μm was the dominating size categories, accounted for 46.38% and 50.64% of water and sediment. Six polymer compositions were found, polystyrene (12%) was only present in the water sample. Polyethylene was found in the highest proportion at both water (24%) and sediment (26%) samples. Moreover, the risk assessment indicated that both samples in all three categories were polluted with MPs (pollution load index, PLI> 1; PLIzone = 2.03 and 2.06 for water and sediment samples, respectively. This study laid the foundation for future research and management and control of MPs pollution by providing new insights on the status of MPs in the water and sediment of Kaptai Lake

Key words: Microplastic, Pollution, Kaptai Lake, Risk assessment