IDENTIFICATION AND QUANTIFICATION OF MICROPLASTICS AT AVAYMITRA GHAT OF KARNAPHULI RIVER, CHATTOGRAM, BANGLADESH

Zannatul Bakeya

Roll No. 0120/14

Registration No. 866

Session: 2020-2021

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

Department of Fisheries Resource Management

Faculty of Fisheries

Chattogram Veterinary and Animal Sciences University

Chattogram-4225, Bangladesh

AUGUST 2022

AUTHORIZATION

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The Author

August 2022

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Shahida Arfine Shimul	**Dr. Sk. Ahmad Al Nahid**
Supervisor	**Co-supervisor**

Dr. Sk. Ahmad Al Nahid

Chairman of the Examination Committee

Department of Fisheries Resource Management

Faculty of Fisheries

Chattogram Veterinary and Animal Sciences University

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LIST OF ABBREVIATIONS

Acronym	Definition
MT	Metric ton
Km^2	Kilometer square
Particles/m^3	Particles per meter cube
Items/g	Items per gram
m	Meter
cm	Centimeter
cm^2	Centimeter square
µm	Micro meter
ml	Milliliter
mm	Millimeter
M	Molar
g	Gram
L	Liter
g/cm^3	Gram per cm^3
m^2	Meter square
df	Degrees of freedom
F	F-value
t	t- value
Sig.	Significance
Diff	Difference
SE	Standard error
e.g.	Exempli Gratia
ANOVA	Analysis of Variance

ABSTRACT

Bangladesh is one of the countries that could be at risk from microplastic pollution. Only a few studies on microplastics have been conducted in Bangladesh. This is the first study on the identification and characterization of microplastics, the abundance of microplastics, and seasonal variation of microplastics in the surface water of the Karnaphuli river near Avaymitro Ghat, Chattogram. Sampling was conducted on a monthly basis from July 2021 to February 2022 by using a 200 μm mesh size manta net. This study has shown that the abundance of microplastics was highest in the month of July (140370 ± 19586 particles per km^2), when the average rainfall was highest, and lowest in the month of January (54815 ± 9220 particles per km^2), when the average rainfall was lowest. The findings also reveal that the abundance of microplastics was 1.55 times higher during the rainy season (114639 ± 8845 particles per km^2) than it was during the dry season (73796 ± 6817 particles per km^2). Heavy rain and extensive riverine freshwater input in the rainy season transport greater terrestrial plastic trash into the riverine ecosystem, resulting in a higher average microplastics concentration in surface water. Characteristics of the microplastics (types, colors, shapes, size) were also quantified in this study. Six different types of microplastics were identified, of which fragments (39.30%) and filaments (33.40%) were the most dominant. Ten different colors of microplastics were observed, of which red (27.64%) and green (21.63%) colors were the most dominant. Six different shapes of microplastics were examined, with irregular (39.15%) and elongated (37.21%) shapes being the most dominant, and five different size classes of microplastics were found, with the 1mm to <2mm (32.97%) size class being the most dominant. Identification and quantification of microplastics gives an indication of the level of microplastic pollution in the study area, which will be very useful information for the concerned departments and stakeholders in order to start mitigating efforts.

Keywords: Microplastics, Abundance, Seasonal variations, Characteristics, Karnaphuli river