PP-12
Microplastic in Aquatic Ecosystem: Context of Narayani River

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Plastic pollution is one of the most emerging concerns in today's age as the study by Vannela, 2012 suggests approximately 20 million plastic enters the marine ecosystem annually and projections indicating that plastic waste will exceed fish biomass by 2050. Microplastics are tiny plastic particles that infiltrate the aquatic ecosystem through the pathways like photodegradation, atmospheric deposition, industrial process, mechanical breakdown, agriculture runoff and wastewater treatment. Microplastics pose significant threats to aquatic life and ecosystems. They are ingested by a range of organisms, from algae to fish, leading to physical harm, reduced growth, reproductive issues, and mortality. Furthermore, microplastics can transfer pollutants and pathogens through food webs, potentially impacting human health and food security.

A study on microplastic discovered that it is found in both marine and freshwater environments as well as remote arctic and high elevations. Microplastics in Phewa Lake, Koshi River, Snow/Stream water (8440 m.a.s.l), Sapta-Gandaki River etc. have been discovered which suggests, there is the presence of microplastic in the natural water bodies of Nepal with microplastic fiber being the dominant form which aligns with our study's findings on the Narayani River water. For the study of the microplastic particles the water samples were taken from the three major location of Narayani river i.e. Devghat (pilgrim area), Narayangardh (urban area) and Shivaghat (agricultural area). The location were intentionally chosen for their individual specialty. The fish samples were perhaps taken from Shivaghat only by the help of the local fishermen. The sampling period was from May to July.

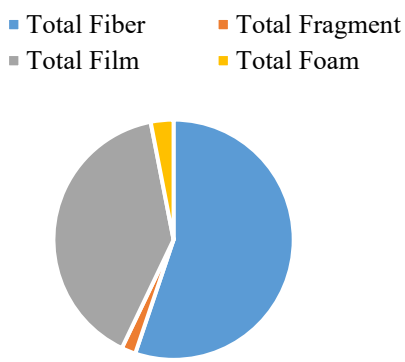

Figure 1. Status of Microplastic in Narayani

Detection and analysis of microplastics involve everal methods, including visual inspection, FTIR spectroscopy, Raman spectroscopy, and thermo-analytical techniques. Each method has strengths and limitations, and a combination of techniques is often required for comprehensive analysis. In this we analyzed microplastic using a spectroscope and the combination of hot needle method to detect its presence in several samples of river water and gut content of fishes. The hot needle method was done to verify the sample of microplastic particles. The microplastic particles were differentiated based on their structure or morphology, identified as fiber, fragment film and foam, on both water and gut samples. Those were further divided on the basis of color. This study identified fibers and film as the dominant form of microplastic in both the water sample and gut sample.

Figure 2. Microplastic Fiber under Spectroscope