Best Sensors Related Poster Presentation at Environ 2023

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Over the recent decade, there have been growing concerns about microplastic pollution including in the freshwater and its negative impacts on human health and a sustainable environment. Plastics are used for several applications including packaging, textile, consumer products, building and construction. This is because of their low-cost, resilience and resistance to degradation, colour, ease of processing and lightweight. However, plastics are not biodegradable, they rather break down to form smaller plastics known as microplastics. Microplastics can occur in the environment for a long time without significantly degrading, making them a serious environmental pollutant.

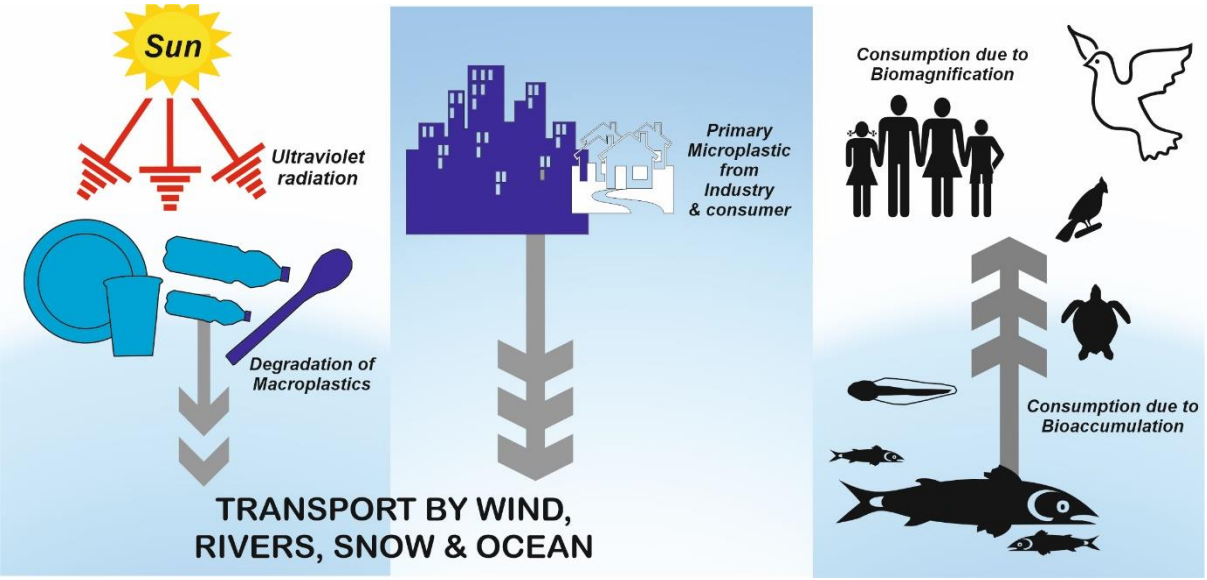

Fig. 1. Microplastic cycle

Because of the small size (less than 5mm) and invisible nature of microplastics, they can be easily ingested directly by drinking water or indirectly from food preparation and bathing or act as a vector for toxic pollutants and microorganisms that can pose risks to human health. Although the direct health impact of microplastics on human health is not well-established, some studies have revealed that microplastics can contribute to cardiovascular diseases, cancer, respiratory, digestive, and reproductive problems. Therefore, it is important to understand the sources, pathways, behaviour, and concentration of microplastics, particularly in the freshwater environment.

The popular method that is currently used to detect and monitor microplastics in freshwater is known as the traditional method. It involves going to the field

to collect water samples or using manta nets to collect microplastic samples. However, this traditional method has several limitations including being time-consuming, tedious, and having a high potential for contamination and errors which can lead to underestimation or overestimation of microplastic concentration in freshwater.

My PhD project is proposing a low-cost method to monitor and detect microplastic pollution in real-time and in the freshwater environment. A network of low-cost microscope cameras will be attached to controllers and will be placed in a freshwater environment. These microscope cameras will collect images of the freshwater and image processing techniques will be used to identify microplastic pollution from the images. With real-time data, we will be able to track microplastic pollution in freshwater and effectively identify the sources, pathways, and behaviour.

The results from this study will aid the government and water managers in land use planning and strategy developments for the maintenance, treatment, and protection of freshwater by selecting, prioritizing, and monitoring current and future sites with high potential risks of freshwater pollution from microplastics.


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