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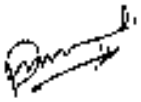
Editorial Note

CSIBER International Journal of Environment (CIJE) offers a venue where relevant interdisciplinary research, practice and case studies are recognized and evaluated. Increasingly, environmental sciences and management integrate many different scientific and professional disciplines. Thus the journal seeks to set a rigorous, credible standard for specifically interdisciplinary environmental research. CIJE is a multidisciplinary journal, publishing research on the pollution taking place in the world due to anthropogenic activities. CIJE welcomes submissions that explore environmental changes and their cause across the following disciplines like atmosphere and climate, biogeochemical dynamics, ecosystem restoration, environmental science, environmental economics & management, environmental informatics, remote sensing, environmental policy & governance, environmental systems engineering, freshwater science, interdisciplinary climate studies, land use dynamics, social-ecological urban systems, soil processes, toxicology, pollution and the environment, water and wastewater management, etc.

We invite authors to contribute original high-quality research on recent advancements and practices in Environment Management. We encourage theoretical, experimental (in the field or in the lab), and empirical contributions. The journal will continue to promote knowledge and publish outstanding quality of research so that everyone can benefit from it.

Er. D. S. Mali
Editor, CIJE



CSIBER International Journal of Environment (CIJE)

CONTENTS

Microplastics: A Global Threat to the Environment

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Abstract

The microplastic generated from various activities represents a real problem of the current environment. Improper management of plastic generated causes a direct health impact on the community, the marine organisms, and even the whole ecosystem. Microplastics (MPs) are primarily formed as a result of environmental weathering and improper discarding. Every day, relatively large amounts of microplastics, nanoparticles, and microbeads are generated in metropolitan cities and even around the world. The problems caused by microplastic tend to be used in all types of personal care products that contain microbeads. Improper disposal of plastic or environmentally weather able plastic materials with fewer microns and exposure to such waste pose a serious threat to the environment and human health. This requires proper treatment and management before its final disposal. The paper aims to create awareness among people about the seriousness of microplastic pollution and to reduce the use of products that ultimately make their way into the creation of microplastic.

Keywords: Microplastic pollution, Microbeads, Nanoparticles, Microplastic control, Health effects.

Introduction

Plastics have propagated worldwide since they were first discovered in the early 20th century. Surpassing iron production after the 1990s, currently plastic is the most used material by humans (D.F. McCall, *et al.*). After being commercially developed, plastics have become increasingly dominant in the consumer marketplace due to their convenience and various advantages (Plastics Europe Plastics – the Facts 2013 Brussels, Belgium Google Scholar). Conversely, as the quantity of plastic used increased, the problem of environmental pollution caused by plastic waste also emerged.

Plastics are synthetic polymers typically prepared by polymerization of monomers derived from oil or gas with the addition of different chemical additives (Thompson *et al.*, 2009). They are one of the most used and multipurpose materials in the worldwide economy. Due to their extraordinary properties such as versatility, lightweight, strength, durability, corrosion

resistivity, and high thermal and electrical insulation (Halden, 2010; Thompson *et al.*, 2009). Due to overuse of the plastic and improper disposal Microplastics are found in the most remote places on land and in the ocean as well as in our food.

Several studies around the globe have now confirmed that they are also present in the air we breathe. Plastic production has correspondingly increased globally from 1.7 to 360 million tons annually within the last 70 years expanding their use across several consumer and construction products, notably in packaging, building and construction, and the automotive industry.
Precisely the first focus was mainly on the biodegradability of synthetic polymer compounds such as plastic bags. At the time, plastics were mainly concerned with waste emission and disposal, as well as the fact that plastics take decades or even hundreds of years to decompose (D. Hoornweg, P. Bhada-Tata). In 2004, it was published in Science that studies have reported increasing microscopic plastics in the ocean (R.C. Thompson, *et al.* 2009). Subsequently, the interest in the consequence of plastic accumulation in nature was heightened. Microplastic was not only found in the marine environment but also various environmental areas such as air, soil, and freshwater. Once plastics are released into the environment, they are eroded and weathered, breaking into progressively smaller fragments over time and transported to different areas.

The United Nations Environment Programme (UNEP) defines microplastics as any solid plastic particle of 5 mm or less which are insoluble in water (UNEP PLASTICS IN COSMETICS: ARE WE POLLUTING THE ENVIRONMENT THROUGH OUR PERSONAL CARE United Nations Environment Programme (2015). The International Organization for Standardization (ISO) ISO/TC 61 (Plastic)/SC 14 (Environmental Aspect) defines microplastics as any solid plastic particle insoluble in water with dimensions between 1 μm and 1000 μm in the ISO/TR 21960:2020 standard terms and definitions (ISO(2020), p. 41Google Scholar).

As these polymers are not biodegradable, they accumulate in landfills or the natural environment as well as Microplastics are mostly formed through small plastic pieces less than five millimeters long which can be harmful to the environment. As an emerging field of study, not a lot is known about microplastics and their impacts yet. The polymers mostly deployed are polypropylene (19.4%), polyethylene (low (17.4%) and high (12.4%) density), polyvinyl chloride (10%), polyurethane (7.9%), and polyethylene terephthalate (7.9%) (Plastics Europe, 2020).
Two major sources for the occurrence of these microplastics. First, microplastics are generated directly, Second, those generated from a secondary source. Microplastics are generated when large plastic debris is broken down by weathering owing to physical and chemical effects in

the natural environment. The production of primary microplastics such as microbeads has been prohibited in recognition of the seriousness of their impact on environmental pollution (C.M. Rochman, A.-M. Cook, A.A. Koelmans). However, secondary microplastics have the potential to continue to arise from plastics that have already been discarded and exist in the natural environment (D.M. Mitrano, W. Wohlleben).

Microplastic pollution in aquatic environments, in particular, has attracted the scientific community, with the majority of research to date focusing on MP in surface waters, shorelines, and continental waters including remote places such as Polar Regions (González-Pleiter *et al*., 2020) or deep sea (Zhang D. *et al.*, 2020), as well as in soils and sediments at a global scale (Boucher and Friot, 2017; Claessens *et al.*, 2011; Efimova *et al.*, 2018; GESAMP, 2015). As a consequence, plastic pollution is already a huge environmental problem that is expected to increase: annual waste production is projected to rise to 3.4 billion million tonnes in the next 30 years (Kaza *et al.*, 2018).

Plastic debris can come in all shapes and sizes, but those that are less than five millimeters in length (or about the size of a sesame seed) are called “microplastics.”

.Fig.1. Sources of Microplastic.

Microplastics come from a variety of sources (fig.1), including from larger plastic debris that degrades into smaller and smaller pieces. In addition, microbeads, a type of microplastic, are very tiny pieces of manufactured polyethylene plastic that are added as exfoliants to health and

beauty products, such as some cleansers and toothpaste. These tiny particles easily pass through water filtration systems and end up in the ocean and Great Lakes, posing a potential threat to aquatic life.
In this review article, the current status and toxicity of microplastics in water, soil, and air have been intensively reviewed.

Effects of Microplastics on Water

Contamination of water sources by substances that make the water unusable for drinking, cooking, cleaning, swimming, and other activities is called Water pollution. Pollutants include chemicals, trash, bacteria, parasites, heat, petroleum (oil), and radioactive substances. Water bodies include lakes, rivers, estuaries, oceans, aquifers, reservoirs, and groundwater. All the substances that contribute to the formation of water pollution eventually make their way to water. Air pollution settles onto lakes and oceans. Land pollution seeps into an underground stream, then it travels to the river, and finally meets the ocean.

The key causes of water pollution in India are:

- Urbanization.
- Deforestation.
- Industrial effluents.
- Social and Religious Practices.
- Use of Detergents and Fertilizers.
- Agricultural run-offs- in which insecticides and pesticides are used.

Water pollutants come from either point source or dispersed source. A point sources are those which are used for discharge from an industrial facility or a city sewerage system. A dispersed that is a nonpoint source is a very broad area from which various forms of pollutants enter the water body, such as the runoff from an agricultural area in which insecticides and pesticides are used. The water pollution caused due to Point sources is easier to control than that of dispersed sources as the contaminated water has been collected to one single point where it can be treated. Pollution from dispersed sources is difficult to control, and, despite much progress in the building of modern sewage treatment plants, dispersed sources continue to cause a large fraction of water pollution problems.

It is an important factor of living things; every person or living being is dependent on the Environment. So we must protect it. Plastic is the most prevalent type of marine debris found in our oceans and the Great Lakes. In this paper, in order to understand the problems caused due to microplastics in the water environment, an extensive literature review was carried out on the phenomenon of microplastics in aquatic environments categorized by seawater,

wastewater, and freshwater. We summed up the distribution of microplastics in the water environment and studied the environmental factors affecting them. The potential hazards caused by the aging microplastics are numerous.Studies on microplastics have been primarily carried out in the marine environment. But now, it is necessary to study microplastics in various aspects that can occur in various environmental media, such as surface freshwater, groundwater, air, soil, and sediment. The harmful impacts of microparticles on human health have not been much established yet. Microplastic particles with a size close to nanometers are highly likely to be toxic. (J. Hwang, *et al.*, J.C. Prata, *et al.*).

Microplastics in wastewater directly reflect anthropogenic activity. Microplastics in freshwater have been there because of agriculture and manufacturing industries such as textiles, including worn tire material on highways and roads. The marine industries highly influence the characteristics of microplastics in seawater.The results of microplastic detection in water systems affected by the surrounding industries and environment are summarized and shown in (Fig 3.) Microplastics at the sampling point are mostly affected by adjacent anthropogenic

activities. However, microplastics are not only found in the reagan where sampling point is carried out but also detected far from in the water environment. In order to understand the behavior of microplastics, it is necessary to consider the factors that influence their properties.

Table 1. Results of microplastic detection in water systems affected by the surrounding industries and environment.

SEAWATER	**WASTEWATER**	**FRESHWATER**
Mariculture: buoy, facilities	Urban-related factors: Population	Highway, roads: tire wear, asphalt sealant, cigarette butts
Port and ship: paint chips	Air decomposition	Agriculture: mulching, irrigation water, sludge application
Fishing: fishing gear, nets	Industries: manufacturing, textile	Weather changes: rainfall, winds, typhoons
Thermohaline water structure	Domestic sewage: facial cleansing, laundry	Hydrological influence: water system scale, water level, flow velocity
Bathing at beaches	Effluents of WasteWater Treatment Plants	

Plastic particles found in the environment are not in a manufactured form. They are usually corroded and fragmented due to environmental factors. High concentrations of organic chemicals are absorbed by aged microplastics. Marine waste that sinks into the sediment is challenging to recover. It is indeed a threat to marine ecosystems as it is very toxic in nature. In particular, benthic species can readily ingest plastic waste found on the seabed. When there

is a change in ocean currents or there is an occurrence of some sort of weather event, there is vertical mixing of the seawater layer, and the plastic waste gets realized and it correspondingly moves around.

The final destination for microplastics are the water systems. It is very necessary to regulate various industries and all types of plastic products manufactured and their release in the land in order to prevent the increase in plastic waste in the water systems. There is a need for efficient waste water management and improvement of drainage systems on land. This cannot be solved by regulating one or two countries. A global coalition and regulation will be an excellent start to solving the problem. In addition, microplastic removal technology should be developed for each water environment. These are microplastics' inherent properties such as hydrophobicity, specific gravity, and size, and environmental factors such as biological interactions in the aquatic environment, meteorological phenomena, and industrial facilities near the water system (Fig. 2.).

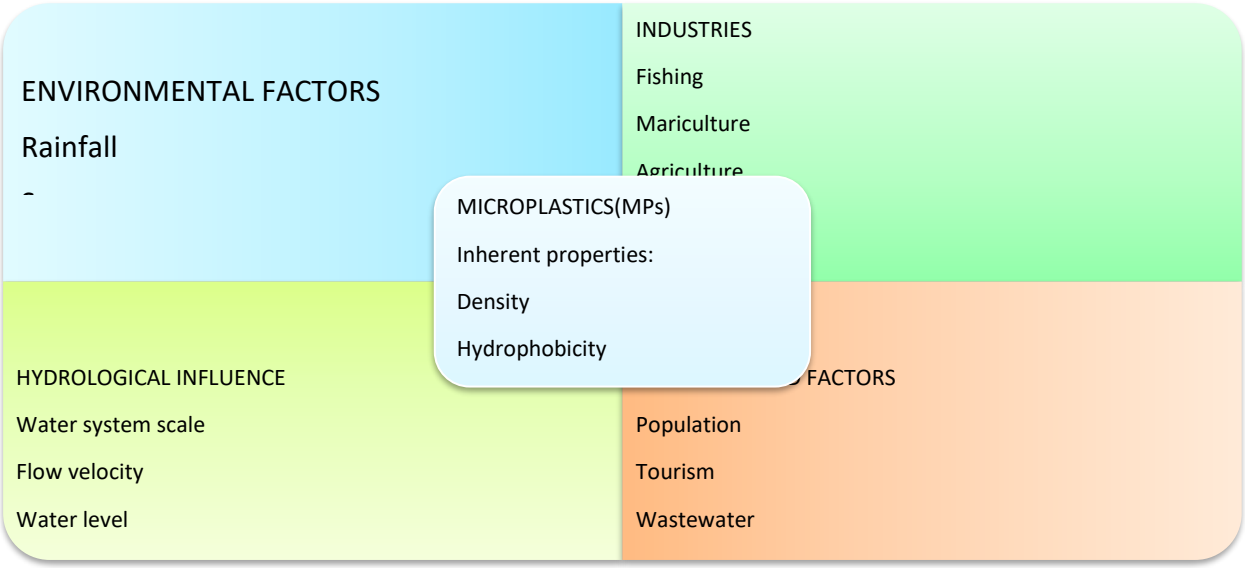

Fig. 2. Factors affecting microplastic analysis.

Effects of Microplastics on Soil

The increasing and uncontrolled plastic production in recent decades has resulted in considerable pollution in the environment. Residual remains of mulching in the form of microplastics cause soil pollution. Microplastics lead to changes in the characteristics of soil flora and fauna. Microplastics act as a trajectory for soil environmental. Owing to their potentially toxic effects, their long life span and persistence, ultimately shows us that the presence of even a small amount of Microplastics is a threat to the soil ecology and ecosystems (Hidalgo-Ruz, 2012). Large quantities of plastic fragments are left behind after the crop is cultivated. Microplastics are responsible for many changes in the soil's physicochemical

characteristics, including porosity, enzymatic activities, microbial activities, plant growth, and yield. Because of their ubiquitous nature, high specific surface area, and strong hydrophobicity, MPs play an important role in the transportation of toxic chemicals such as plasticizers, polycyclic aromatic hydrocarbons (PAHs), antibiotics, and potentially toxic elements (PTEs). MPs may travel deep into the soil and can cause pollution in the underground water.

MPs found in the soil destruction the soil structure and has adverse impacts on the soil water holding capacity. The microplastics found in the soil environment greatly change the porosity of the soil including the structure of the soil. If these residues are found in large masses, these will fill and block the soil pores. Eventually, the soil infiltration capability decreases. This will disturb the soil nutrient cycle. This can even alter microbial structure and ultimately affect crop growth (Dong *et al.*, 2021).There are many harmful effects of MPs on the soil environment. It can cause damage to soil in different means such as enzymatic activities, soil microbes, flora, fauna, and crop production.

Globally, China consumes the most plastics (30%) (NBoSo, 2017). Previous studies have shown that plastic mulch is a productive technique in agriculture (Kader *et al.*, 2017, Zhao *et al.*, 2016), but causes a high concentration of waste plastic in the soil (Mbachu *et al.*, 2021). Plastic mulching was first introduced in the 1970s and saw rapid worldwide growth, as shown in Fig.3. (National Bureau of Statistics, 2015).

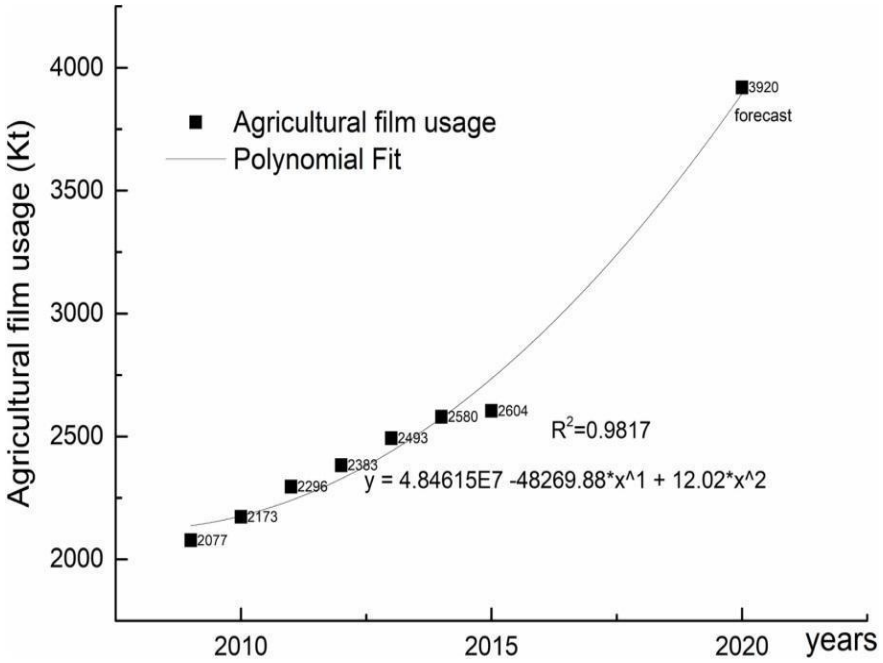

Fig. 3. Yearly production of agricultural plastic film (National Bureau of Statistics 2015).

The role of MPs as a contaminant in the soil environment is appropriately explained in Fig.4.

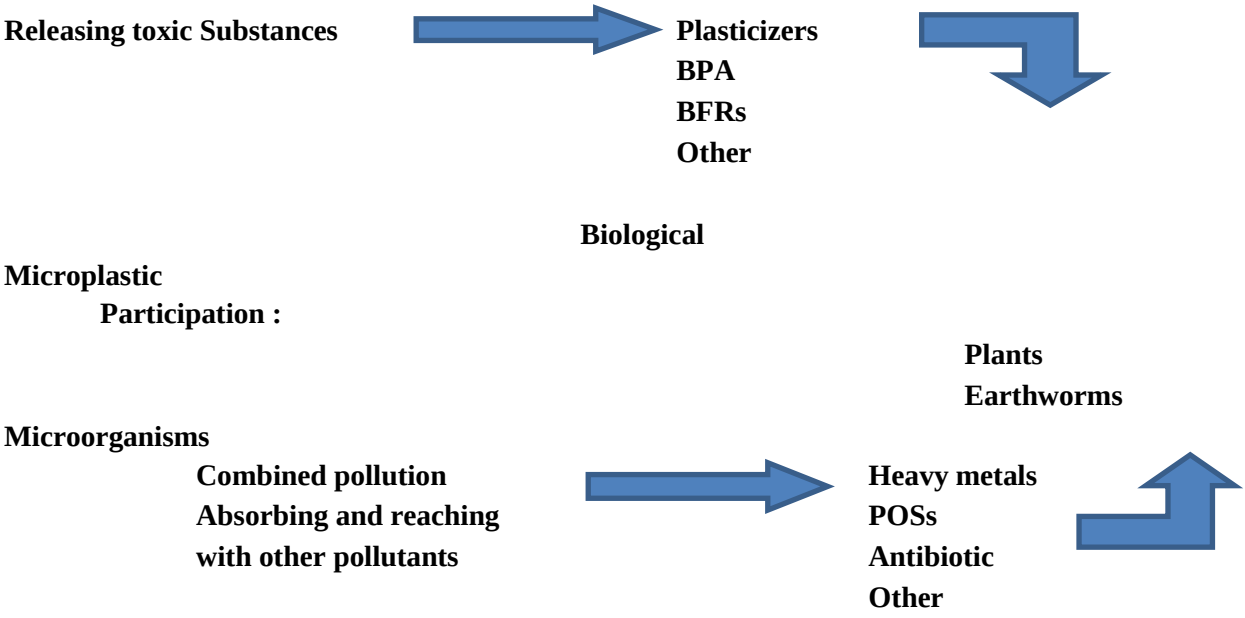

Fig.4. Microplastics found as contaminants in the soil system.

Agricultural and urban soils are thought to be the most important reservoirs for MPs (Hurley and Nizzetto, 2018). Plastic residues found in the soil due to mulching are converted into MPs by the passage of time and environmental activities. The resulting MPs mix into the soil and combine with other pollutants such as heavy metals, pesticides, and persistent organic pollutants (POPs), which causes toxic effects on flora and fauna of the soil. These MPs may be eventually make their way to rivers, oceans, and other water bodies by agricultural water runoff causing water pollution in lakes (Sighicelli *et al.*, 2018), rivers (Anderson *et al.*, 2017), and the sea (Yu *et al.*, 2016, Zhang *et al.*, 2017).
The most important sources of MPs in agricultural soil are the residual plastic fragments from mulching, sewage sludge, municipal waste, and plastic coat fertilizers (Blasing and Amelung, 2018, Rodriguez-Seijo *et al.*, 2017, Liu *et al.*, 2018).

Microplastics enter the soil through many sources, including landfill dumping, plastic mulching, and recycling operations of wastewater sludge (Rillig, 2012). These approaches usually involve high temperatures. They often produce supplementary contaminants after the plastics are broken down into tiny pieces by heat, wind, and rain. The resulting fragments do not vanish naturally. When they are mixed with the soil ecosystem they cause a decline in soil quality. Reduction in the soil-plant nutrient transfer may cause malnutrition in plants, reducing

crop growth and yields. Even, soil organisms can take up mulched particles from plastic (Lwanga *et al.*, 2018), and eventually transfer these into plants and animals, which may lead into a high rise of risk to human health (Ng *et al.*, 2018).The soil has become the ultimate sink for residual plastics.

Effects of Microplastics on Air

Environmental air pollution from microplastics (MPs) is growing day by day causing human health implications. Microplastics are tiny fragments shed during the degradation of larger pieces of plastic. They are light to get transported by the wind over large distances. Especially high microplastics concentration can be found in indoor air due to the erosion and breakage of consumer, domestic, and construction products. Airborne microplastics can be directly inhaled through air environments. This is in part because sampling and analysis of airborne MPs is a complex and multistep procedure. Although the techniques used are not yet standardized.

Recently we expected airborne microplastics would scatter sunlight. But they act like tiny disco balls and reflect sunlight to space. This provides a cooling effect on Earth's climate. Most types of aerosols in the atmosphere scatter light. Airborne microplastics are efficient at scattering sunlight. It implies a cooling effect on climate. They can also absorb radiation emitted by the Earth, which means they contribute, in a very small way, to the greenhouse effect.

Microplastics are heterogeneous in terms of chemical composition, diameter, shape, specific density, and color (Amato-Lourenço *et al.*, 2020). They include 1-D fibers (one larger dimension), 2-D fragments (flat particles), and 3-D spherules (Dris *et al.*, 2015). It can be primary or secondary in origin.

Primary Microplastics are purposefully produced and enter the environment as particles usually less than 0.5 mm used for example as abrasives in cosmetic products or 'scrubbers' used to blast clean surfaces. Whereas secondary Microplastics originate from the larger plastic fragmentation present in the environment. The most common process of generating secondary Microplastics is weathering which occurs when plastic is exposed to solar UV radiation (GESAMP, 2015) that catalyzes the oxidative degradation of polymers (Andrady *et al.*, 1996; Celina, 2013).

During degradation plastic usually loses mechanical integrity, discolors, weakens and surface cracks are formed (Cooper and Corcoran, 2010; GESAMP, 2015; Pegram and Andrady, 1989). In addition to UV radiation, there are other mechanisms e.g., mechanical stress by wind and waves, heat, hydrolysis, and the enzymatic processes of microorganisms aiding plastic degradation and fragmentation (Andrady, 2011; GESAMP, 2015).

Moreover, they are easily transferred through the food chain and thus make their way to humans (Chen *et al.*, 2020a). During the last few years, more attention has been sealed to other

environmental compartments (Dris *et al.*, 2016; Evangeliou *et al.*, 2020; Zhang Q. *et al.*, Q. 2020). We are still unknown that far up into the atmosphere microplastics have reached.

The analysis of microplastics in the air is the beginning. The physicochemical properties of airborne microplastics are not well characterized. The consequent health effects of inhaled microplastics are rarely understood. Interest in the presence of microplastics in the air is increasing nowadays. Airborne particles can be directly inhaled into the human body (Prata, 2018). The distribution and behavior of microplastics suspended in the atmosphere are like those of other airborne pollutants: their concentration, transport, dispersion, and removal depend on the emission sources, meteorological conditions, and long-range transport among other factors. Higher levels of microplastics were found in urban environments than those found in rural environments. Recent studies have found the presence of microplastics in outdoor and indoor air. Although the presence of MPs in the air is a fact, human health risks due to their inhalation remain unclear (Wright *et al.*, 2020). Many questions remain unanswered in this field.

Physical mechanisms such as sedimentation, impaction, interception, or diffusion are involved in the deposition of MPs in terminal bronchioles, alveolar ducts, and alveoli (Amato-Lourenço *et al.*, 2020; Prata, 2018). Nevertheless, the human body has defense mechanical methods to prevent MPs deposition such as sneezing, mucociliary escalator, phagocytosis by macrophages, or lymphatic transport to avoid the persistence of MPs (Bank and Hansson, 2019; Gasperi *et al.*, 2018).

Microbeads

Little bits of plastic, also known as microbeads found in many cosmetic products, like face wash, have been at the center of an environmental campaign. Microbeads are manufactured solid plastic particles of less than 1 mm in their largest dimension. Due to the damage they cause when fish eat them once they're washed down our drains and enter the sea. They are most often made up of polyethylene but can also be prepared from other petrochemical plastics such as polypropylene and polystyrene. Most of the products in their label range of beauty products contain microbeads.

They are used in health science research, toothpaste, exfoliating personal care products, and biomedical. Microbeads can cause water pollution due to plastic particles and lead to an environmental hazard for aquatic animals not only in freshwater but also in the ocean. In the US, the Microbead-Free Waters Act of 2015 phased out microbeads in rinse-off cosmetics by July 2017. A number of countries have banned microbeads from rinse-off cosmetics, inclusive of Canada, France, New Zealand, Sweden, Taiwan and the United Kingdom.They can vary in chemical composition, size, shape, density, and function. Microbeads are manufactured for

specific purposes, including for use in personal care products such as scrubs, bath products, facial cleaners, and toothpaste. They may also be used in product cleaning, toners of most of the printers, etc. In industrial products such as oil and gas exploration, textile printing, and automotive molding. Other plastic products such as anti-slip, anti-blocking applications and medical applications microplastic is widely used.

Microbeads are manufactured solid plastic particles of less than 1mm in their largest dimension. They are first created and are typically created using materials such as polyethylene (PE), polyethylene terephthalate (PET), nylon (PA), polypropylene (PP), and polymethyl methacrylate (PMMA) ("Microbeads – A Science Summary July 2015").
Microplastics are organized according to their source, i.e. whether they are manufactured on the micrometer(µm) size or are the result of breakdown processes such as weathering, photodegradation, etc. (GESAMP, 2015).

For this summary:

- Microbeads are defined as synthetic polymer particles that, at the time of their manufacture, are greater than 0.1 µm and less than or equal to 5 mm in size. This includes different forms of particles including solid, hollow, amorphous, solubilized, etc.
- Secondary microplastics are synthetic polymer particles that originate from the breakdown of larger plastic items (Andrady, 2011).
- Microplastics include microbeads and secondary microplastics.
- A personal care product is defined as a substance or mixture of substances that is generally recognized by the public for use in daily cleansing or grooming.

Globally, microbeads have been found to have use in personal care products, other consumer applications, and various industrial applications. Microbeads may also be found in products including cleaning products and printer toner (Norwegian Environment Agency, 2014). Some products contain substantial quantities of microbeads. Based on the information presented in scientific literature considering personal care products, microbeads have been found in scrubs, bath products, facial cleaners, , eye shadows, blush powders, hair sprays, mascaras, creams, deodorants, makeup foundations, nail polishes, shaving creams, hair colorings, insect repellants, toothpaste, baby products, lotions, and sunscreens.Microbeads are used in medical applications that are biotechnology and biomedical research (Leslie, 2014; Norwegian Environment Agency, 2014). Microbeads are also used in industrial products such as abrasive media, industries such as oil and gas exploration, textile printing, and automotive molding, other plastics products include anti-slip and anti-blocking applications, etc.

Microbeads can be composed of a variety of synthetic polymers depending on the required functionality. Table.2. lists the function of typical polymeric particulates found in personal care and cosmetic products (Leslie, 2014). In the sense of microbeads, the most common polymers used are polyethylene, nylon poly (methyl methacrylate), polypropylene polytetrafluoroethylene and polyethylene terephthalate (Norwegian Environment Agency, 2014).

Table.2. lists the function of typical polymeric particulates found in personal care and cosmetic products (Leslie, 2014).

Polymer name	Function in PCCP formulations
Nylon-12 (polyamide-12)	Bulking, viscosity controlling, opacifying (e.g. wrinkle creams)
Nylon-6	Bulking agent, viscosity controlling
Poly(butylene terephthalate)	Film formation, viscosity controlling
Poly(ethylene terephthalate)	Adhesive, film formation, hair fixative; viscosity controlling, aesthetic agent, (e.g. glitters in a bubble bath, makeup)
Poly (methyl methacrylate)	Sorbent for delivery of active ingredients
Polyethylene	Abrasive, film forming, viscosity controlling, binder for powders
Polytetrafluoroethylene (Teflon)	Bulking agent, slip modifier, binding agent, skin conditioner
Acrylates copolymer	Binder, hair fixative, film formation, suspending agent
Allyl stearate/vinyl acetate copolymers	Film formation, hair fixative
Ethylene/acrylate copolymer	Film formation in waterproof sunscreen, gallant (e.g. lipstick, stick products, hand creams)
Trimethylsiloxysilicate (silicone resin)	Film formation (e.g. color cosmetics, skin care, suncare)

Studies have shown that microplastics, including microbeads, are present in the environment and that they can reside in the environment for a long time. In the environment, it is extremely difficult to differentiate and discriminate between microbeads and secondary microplastics. Microbeads from 'down the drain' products will likely be released into the aquatic environment after wastewater treatment. Microbeads have been shown to elicit both short and long-term effects in laboratory organisms. As most studies report only total microplastic concentrations, it is not currently possible to quantify the contribution of microbeads versus all other plastic litter.We use a broad definition of "plastics" as organic, solid materials based on a matrix of synthetic polymers. The scope is similar to the scope of a recent assessment of sources of microplastics. The group of materials includes traditional plastic materials, synthetic textile

fibers, synthetic rubbers, as well as cured paints, fillers, and similar products based on binders of synthetic polymers.

Conclusion

With a focus on the use and release of microplastics and the presence of microplastics in the surrounding waters, this paper contains a review of existing knowledge on issues related to contamination by microplastics.

The problem of pollution in the oceans due to plastics, including microplastics, nanoplastics and microbeads is not new, but in recent years international attention towards it has increased. There is a growing concern as to whether pollution due to plastics in the long term can have greater effects on the environment than previously assumed.

- Plastics that are released into the environment in the form of microplastics, nanoplastics and microbeads remain in the environment for hundreds and thousands of years before they finally decompose.
- Thousands and tons of microplastic materials originating from homes, hospitals, food stalls, industries, cosmetic materials, howkers, textile industries, marine coatings, road markings, etc. continue to be dumped in open garbage bins and water sources in most parts of the country.
- After disposal of plastic, it degrades into smaller pieces. This means macro-scale plastics degrade to micro-scale plastics. Which further fragment into nano-scale plastics or nano-plastics.
- Global consumption of plastics is increasing, and global emissions are likewise expected to increase unless proper action is taken against these emissions.
- Plastics that reach to the sea through different sources may also be transported over long distances.
- People get exposed to microplastics through food consumption such as fish.
- In almost all levels of the marine food chain organisms microplastics are detected.
- Even the most remote places on the planet and beyond are affected by plastic pollution.
- Potentially having increasing toxic effects on the environment means that the microplastic problem has some characteristics of a "time bomb".

Good health has a positive effect on the community therefore the government should give private importance to the health care of the population and the sustainability of the environment through their policies. For better availability of resources that are slowly depleting from the environment, the government should show interest in the well-being of its citizens. They in turn will also feel more responsible and loyal towards the environment. It improves residents, retention and cuts down on government healthcare costs.The effects of microplastic emissions will only be apparent to us after many years and at that time, the effects may be very difficult to restrict. However, we do not know whether the comparison of microplastic with “time

bomb" is accurate for the situation or not.If anyone can make a difference even a small percentage it gives a lot of benefits to the world.

Acknowledgment

It gives the great pleasure to bring out the review paperwork entitled '**Microplastics: A Global Threat to Environment**' ' I would like to place on record my extreme gratitude to my guide Dr. Yojana Patil for guiding me in the successful completion of the same and School of Nanoscience and Biotechnology department for all support.I am expressing special thanks to my parents and my guardians for co-operating and for their valuable suggestions during paper work without which this would not be possible.I am also thankful to all those who were extremely helpful directly or indirectly in completing this paperwork.

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