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## Plastic Pollution: A Global crisis

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### Abstract

Plastic is a strong, anti-moist, flexible, lightweight, durable, quite low cost and greatly useful material. These versatile qualities of plastic direct us to over consumption of plastic products in day to day life which leads to assemblage of remarkable plastic debris. The over consumption and production of plastic products is a great concern of disposal and deterioration of plastic waste because of sluggish and resistible quality of plastic towards natural biodegradation processes, it requires approximate 450 to 800 years to fully decompose to a plastic product. Thus, the plastic products are supposed to be everlasting and plastic is made up of toxic elements therefore agglomeration of plastic waste becomes a great concern of an undeniable problem which causes great harm to the air, land and marine life on the Earth. From destruction and disruption of different environmental components to transformation of animal hormones, the exponential augmentation of plastics debris is threatening the survival of the Earth.

**Keywords:** Plastic pollution, environment pollution, bio degradation, plastic debris

### Introduction

Plastic consists of carbon, hydrogen, silicon, oxygen, chloride and nitrogen. It is derived from different sources such as oil, coal and natural gas. The word plastics derived from the Greek word "plastikos" means "fit for molding," which refer to the plasticity of these materials during their manufacture (Liddell *et al.* 1968) [6]. Plastic is a non-biodegradable man made material which is used worldwide on a large scale. It is a main ingredient of the global polymer industry synthesized of various organic and inorganic compounds generally derivative of petrochemicals like olefins. Due to the absence of efficient methods for degradation of these synthetic polymers, their accumulation posing an ever-increasing ecological threat to flora and fauna (Bhardwaj *et al.*, 2012) [1]. Plastic can be molded and modified in different shapes and sizes according to the requirements to manufacture products of daily usage.

Plastic have typical characteristics of flexibility and durability and also less expensive than other materials that render them so useful and one of the most commonly used materials in day to day life thus makes a great proportion to all products debris.

Over the past years global production and consumption of plastic products have rising. When plastic products are discarded into the ecosystem they can persevere for very long periods of time due to their nearly infrangible morphology. Plastics can dangerously affect the environment and responsible for the environmental degradation i.e. the deterioration of the environmental natural characteristics through depletion of resources such as air, water and land. Plastic pollution is the assemblage of plastic debris in the environment that harmfully affects life on Earth. Microorganisms which are responsible for decomposition of the other material do not recognize plastic as a food consequently the microorganisms cannot decompose the plastic substances as a result there is no natural method to break them down however ultra violet rays can fragment the plastic products into smaller trashes over long period of time. Plastic debris negatively impacts the natural environment and creates hazardous problems for plants, wildlife and human life as plastic is made up of toxic compounds which has the potential to cause great harm for survival of living organism. The exponential consumption and disposal of plastic products is threatening the survival of our planet.

### Causes of Plastic Pollution

- **Reckless dumping of plastic waste**

Plastic is used almost everywhere as construction materials, packaging material, computers, cell phones, televisions, microwaves, electronics, helmets, protective padding, disposable goods, food wrappers and containers, furniture, cars and countless other things. Plastic

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products are among the easily disposed items due to their lightweight and least use period so plastic products get discarded easily. Due to extensive use and disposal of plastic over the whole world, it is quite risky to make our environment polluted with plastics debris.

- **Population explosion and urbanization**

With the population explosion, the demand for cheaper and readily available materials increases. The plastic industry solves the problems of availability of such products which fulfills the requirements of different consumer demands i.e. construction material, electronics goods, healthcare products and textiles etc. According to the CPCB estimates, urban India generates close to 62 million tonnes of municipal solid waste (MSW) annually with the organic fraction in the range of 40%–60%. 80% of plastic pollution generates from land-based sources with the rest coming from ocean-based sources (fishing nets, fishing ropes) (Sebille, *et al.* 2016) [8].

- **Plastics are cheap and affordable**

Plastics and its products are the cheapest and most affordable materials to the consumer and manufacturer both; so, plastic has been used to make almost every product. The manufacturing process and waste generated, leads to the damaging consequences for human health, natural ecosystems and the climate.

- **Non-biodegradable characteristics**

Plastic is a non-biodegradable polymer. This factor contributes to the persistence of plastic debris for a longer period of time. Plastics take hundreds of years to fully decompose as they have strong chemical bonds that basically make them everlasting. As new plastic products are continued to be manufactured, they will persevere to exist throughout the world contributing to plastic pollution.

- **Overuse of plastic products**

As plastic is an inexpensive and durable material, it is one of the most extensively available and overused material in the world. Plastic products get thrown away after a use the toxic pollutants present in plastic have more of a chance to enter the ecosystem and do harm.

- **Fishing nets**

Commercial fishing industry has contributed to the plastics pollution in the oceans in several ways. The fishing nets used for large-scale trolling operations are usually made of plastic. They often get broken up or lost which threatens the marine life and also ensures that pollutants enter the water.

### Effects of Plastic Pollution

- **Threats to living organisms**

Chemical toxins such as ethylene oxide and benzene present in plastic have hazardous effects on the environment. According to Central Pollution Control Board, India, and plastic production to cross 150 million tonnes per year globally. It operates more than 30,000 processing units, of which 85 to 90 per cent are small and medium enterprises (Mahesh P B, 2014) [7]. Plastic manufacturing emitted large quantities of harmful chemicals, which can lead to terrible diseases in humans as well as in other living organisms. Highly toxic chemicals produced during plastic manufacturing such as benzene and vinyl chloride which can cause cancer and others like gases and liquid hydrocarbons

spoil the land and air. Synthetic poisonous chemicals like ethylene oxide, benzene and xylenes are also emitted during the manufacturing of plastic. Now plastic is omnipresent. Bio-accumulation of plastic portion inside living organisms is one of the most hazardous effects of plastic pollution. Plastic releases dangerous chemicals which causing intense discomfort to the humans and other living organisms. Even after the death of living organism containing plastics fragments may decomposed but plastic trashes remain non-decomposed and become a threat to other organism also. When plastic may throw away even after a single use in landfill sites, it does not decay in a rapid time, this drastically increases pollution rate on land. Stray animals may eat polythene bags and other plastic refusals, discarded fishing nets and other plastic materials are eaten by aquatic animals, this can cause choking, finally leading to innumerable deaths of animals.

- **Challenge to conservation of natural resources**

Plastics are typically synthesized from oil, natural gas or coal and these all are limited natural resources that must be conserved. Plastics are used in almost every field in day to day life, creates more requirement of availability of natural recourses to manufacturing the plastic products.

- **Water pollution**

Discarded plastic bottles, bags, toys, electronic items, surgical materials, construction materials etc. enters in the water bodies like canals, drains, water reservoirs, rivers and lakes which makes water quality gets deteriorated due to the unnecessary addition of toxic chemicals released by the plastics such as Styrene, Trimer, Bisphenol A and Polystyrene. Bisphenol A is a harmful chemical that damages the reproductive system of animals. Micro plastics once entered the aquatic system can travel vast distances floating in seawater or residue to the oceanic (Xanthos D and Walker T R, 2017) [9]. It has been reported that in India, 0.60 million tons of plastic waste, out of 5.6 million tonnes, end up in seas annually. Water conservation is a great concern for whole world whereas plastic waste disposal in different water reservoirs creates great threat for availability and quality of water. Groundwater is also at risk to be noxious due to plastic generated toxins. When hazardous chemicals presents in plastic materials seep underground through rain water or with other water resource, they degrade the underwater quality.

- **Land pollution**

When plastic is disposed in landfills, wind carries and deposits plastic materials from one place to another place which increases the land debris and deteriorate the soil quality and make soil less productive in perspective of flora in that plastic polluted area.

- **Air pollution**

Manufacturing process and burning of waste plastic material in the open air, leads to air pollution due to the release of toxic chemicals. The polluted air when inhaled by humans and other animals adversely affects their health.

- **It enters in the food chain**

Micro particles of plastics even affect the world's smallest organisms i.e. plankton, the other animals that dependent on them for food, when eat them, plastics reach into their body and each step further along the food chain.

### Solutions to Plastic Pollution

"Be the change you want to see in the world." - Mahatma Gandhi.

- Plastic products are easy to use, durable and less expensive but these are risky to survival of life on Earth. It is already too late to control plastic pollution, However it is better to take some effective preventive measures to control plastic pollution; such as –
- Always reuse plastic bags. Avoid plastic bags as much as possible. Use paper, cloth or jute bags instead of plastic bags. Educate and encourage people to carry their own bags other than of plastic bags.
- Do not dump plastic waste in water and on land. Ensure proper disposal of plastic. Plastic waste can be recycled and used in many different ways such as for tote bags, wallets, or pouches.
- Use biodegradable plastic products, which can help to a significant extent especially in large-scale applications. Biodegradable plastic or Bio-plastics or organic plastics are a form of plastic derived from renewable organic sources, such as vegetable oil, corn starch and pea starch. These plastics are capable of being decomposed by bacteria or other living organisms (Mahesh P B, 2014) [7].
- Select products that come in non-plastic recycled and recyclable packaging. Use proficiently before disposal of plastic products. In fact, recycling is not reducing plastic amounts or exposure. Recycling plastic means that it is still plastic, just being used for a different purpose.
- Educating and encouraging people across the world to support the governments and corporations to regulate and reduce plastic pollution.
- Make aware and informed to people to take personal responsibility to control the plastic pollution by reduce, refuse, reuse, recycle and remove plastic products. If can't reuse it, refuse it.

These changes might be gradual but taking small steps can significantly contribute to the reduction of plastic pollution.

### Conclusion

Although plastics are very useful, inexpensive and durable but environmental effects of plastic materials are significant because they not only affect the environment, but also affect humans and other living organisms as well as threaten the life on Earth. Plastics are extremely dangerous to the environment because mostly used once then are thrown out take hundreds of years to be fully decomposed.

Rising rates of plastic consumption is continuously increasing globally which leads to hazardous effects on ecosystem which causes loss of biodiversity. The Earth is much better for survival of living organism when plastic pollution is kept at a minimum or completely eradicated. This requires for efficient use and design of biodegradable natural alternatives of plastic products which can meet the consumer as well as industrial demand. Sustainable solutions and alternatives must be formulated and implemented in accordance to ensure the Plastic waste management.

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