

## IMPACT OF PLASTIC LEADING ENVIRONMENTAL POLLUTION

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### ABSTRACT

Plastic waste is a major environmental and public health problem in India, particularly in the urban areas. Plastic shopping or carrier bags are one of the main sources of plastic waste in our country. Plastic bags of all sizes and colours dot the city's landscape due to the problems of misuse and overuse and littering in India. Besides this visual pollution, plastic bag wastes contribute to blockage of drains and gutters, are a threat to aquatic life when they find their way to water bodies, and can cause livestock deaths when the livestock consume them. Furthermore, when filled with rainwater, plastic bags become breeding grounds for mosquitoes, which cause malaria. In addition, plastics take many years (20-1000) to degrade and hence pose a disposal challenge for controlling the plastic wastage effective monitoring and provide various guidelines there is also a need for better education and awareness around plastic waste.

### 1. INTRODUCTION

We know that, a living organism cannot live by itself. Organisms interact among themselves. Hence, all organisms, such as plants, animals and human beings, as well as the physical surroundings with whom we interact, form a part of our environment. All these constituents of the environment are dependent upon each other. Thus, they maintain a balance in nature. As we are the only organisms try to modify the environment to fulfill our needs; it is our responsibility to take necessary steps to control the environmental imbalances. Environmental pollution is defined as the undesirable change in physical, chemical and biological characteristics of our air, land and water. As a result of over-population, rapid industrializations, and other human activities like agriculture and deforestation etc., earth became loaded with diverse pollutants that were released as by-products<sup>1</sup>.

Plastic is now a regular material that is being used on a daily basis. Plastic is everywhere either in the form of food containers, financial transactions (Debit/Credit cards, plastic money), storage, baggage, stationary items, electronic and electrical products and every foreseeable item that a human being can think of. Plastic as a product is now like a regular feature of manufacturing, consumption, and service activities. Plastic waste is a growing concern and the drivers behind it look set to continue. Although recently there has been a slight decrease in plastic production, this is unlikely to be maintained. Plastic is a highly useful material and its applications are expected to increase as more new products and plastics are developed to meet demands. The increased use and production of plastic in developing and emerging countries is a particular concern, as the sophistication of their waste management infrastructure may not be developing at an appropriate rate to deal with their increasing levels of plastic waste. Plastic pollution is defined as the accumulation of the different types of plastic material on land, as well as in water bodies like rivers, oceans, canals, lakes, etc. As a commodity, it is used on a large scale all around the world. Basically, it is a synthetic polymer that consists of many organic and inorganic compounds, and is mostly derived from petrochemicals like olefins. Plastic generally degrades in about 500 - 1000 years, though we may never know its actual degradation time, as this material has been in long-term use only since the last century. During its manufacture, many hazardous chemicals are emitted that can lead to dreadful diseases in humans as well as other animals. Ethylene oxide, xylene, and benzene are some of the chemical toxins present in plastic, which can have hazardous effects on the environment. It is not easy to dispose it off, and it can cause permanent harm to living beings. Several additives found in plastic such as phthalates, adipates, and even alkyl phenols have been recognized as toxic materials. Vinyl chloride, which is used in the manufacturing of PVC pipes, is classified as a carcinogen<sup>2</sup>.

### 2. USES OF PLASTICS:

Plastics are widely used in:

- Packaging industry
- Construction industry
- Disposable cutlery
- Storage, etc.

### 3. CAUSES

- As plastic is less expensive, it is overused. When it is disposed of in landfill sites, it does not decompose at a fast rate, and hence pollutes the land or soil in that area.
- Most people tend to throw plastic bottles and polythene bags away, even after a single use. This drastically increases its pollution rate on land as well as in the oceans, mainly in the developing and underdeveloped countries.
- Plastic bags, plastic bottles, discarded electronic components, toys, etc., clog the water bodies like canals, rivers, and lakes, especially in the urban areas.
- Every year, about 100 million tons of plastic are produced all over the world. Out of this, 25 million tons of non-degradable plastic gets accumulated in the environment.
- Out of the entire quantity of solid municipal wastes in the US, about 20% consists of plastic and associated harmful polymers. About USD 50 million is the value of the US plastic industry.

- Approximately 70000 tons of plastic are dumped in the oceans and seas globally. Discarded fishing nets and other synthetic material are eaten by terrestrial as well as aquatic animals, by mistaking them for jellyfish or food, leading to the bio-accumulation of plastic inside their bodies. This can cause choking in them, ultimately leading to their death. Scores of fish and turtles die every year because of this.

#### **4. EFFECTS**

- The rural areas are more prone to this type of pollution and the related effects, as a majority of the people from these areas use plastic on a large scale.
- Many stray animals end up eating plastic bags and bottles due to improper disposal systems, and this can cause their death.
- During the rainy season, the plastic rubbish that has fallen on the road gets washed away into the nearby water reservoirs, canals, and drains, leading to their choking up and overflowing. Also, the water quality gets spoiled due to the addition of these synthetic materials.
- When dumped in landfills, plastic materials interact with water and form hazardous chemicals. If these compounds seep down towards groundwater aquifers, they degrade the water quality, leading to groundwater pollution.
- Plastic pollution in marine water bodies leads to innumerable deaths of aquatic animals, and this also affects the aquatic plants to a considerable degree.
- Blockage due to plastic accumulation may form shelters for the breeding of mosquitoes and other harmful vectors insects, which might cause numerous diseases in humans.
- The quality of drinking water on our planet is deteriorating, as plastic releases some toxic chemicals such as Styrene Trimer, Bisphenol A, and a by-product of Polystyrene. These products are worsening the drinking water situation with every passing day. Bisphenol A is a harmful chemical that damages the reproductive system of animals.
- Bio-accumulation of plastic inside animals is one of the most recent effects of plastic pollution. Over many years, the accumulated plastic releases harmful chemicals, and also breaks down into small pieces, causing extreme discomfort to the animals. After their death, the body might decompose, but the plastic fragments may remain as a threat to other animals.
- Wind carries and deposits plastic from one place to another, increasing the land litter. It also gets stuck on fences, trees, towers, buildings, etc., and any animal that comes in its vicinity might even get tangled and suffocate to death.
- Burning plastic leads to contamination of the atmosphere, due to the release of poisonous chemicals, leading to air pollution. Recycling requires laborers, who are at the risk of developing skin and respiratory problems due to inhalation of toxic chemicals<sup>3</sup>.

#### **5. SOLUTIONS AND PREVENTIVE MEASURES**

- Though commodities made of plastic are handy, it is time to become aware of the harm that plastic causes to life on Earth. Before the picture turns even uglier, it is better that you take some effective preventive measures to reduce this type of pollution.
- To bring a decline in its usage, start using paper or cloth bags for shopping and other purposes as much as possible, and avoid bringing plastic bags at home.
- Understand the severity of the problem of plastic pollution, and know the consequences of dumping plastic in water and on land.
- Ensure proper disposal of plastic.
- Plastic which is disposed of can be recycled and used in many different ways such as for tote bags, wallets, or pouches. There are biodegradable plastic bags available, which can help to a considerable extent.

These changes might be gradual, and even less appealing against the problem; but taking small steps can greatly contribute to the reduction of plastic pollution. It is time for us to take some preventive steps, and ensure a better life for the future generations<sup>4</sup>

#### **6. ENVIRONMENTAL HAZARDS DUE TO PLASTIC**

Littering of the landfills and other open spaces with plastic garbage becomes unhygienic and ugly, Once they are used, most bags go into landfill, or rubbish tips. Each year, more and more bags are ending up littering the environment. Once they become litter, plastic bags find their way into our waterways, parks, beaches, and streets. And, if they are burned, they infuse the air with toxic fumes.

1. Littering of plastics in the form of plastic bags causes blocking of the cities, municipalities sewerage systems leads to spreading of water borne diseases and increasing the cost of sewage maintenance systems.
2. Soil fertility is also affected due to plastic material as it forms part of manure remaining in the soil for years without natural degradation.
3. Death of animals due to suffocation, stomach and intestine related diseases is a common feature mostly in developing economies due to improper disposal of plastic food bags that are eaten by these animals. About 100,000 animals, such as dolphins, turtles whales, penguins are killed every year due to these bags. Many animals ingest plastic bags, mistaking them for food and therefore, die. And worse, the ingested plastic bag remains intact even after the death and decomposition of the animal. Thus, it lies around in the landscape where another victim may ingest it.

4. Plastic waste is finding its way into the rivers, oceans and seas of the world due to which the rich marine life is facing serious health hazards. Marine animals like fish, sea birds, otters and other marine species are swallowing these plastic wastes as food items that are leading to a premature death of these precious marine species.
5. Pollution of environment by industries manufacturing the plastic materials is another serious issue that is facing the environmentalists and the governments globally. The manufacturers of plastic materials are polluting the environment by disposing of the plastic waste and chemicals used in the process of manufacturing plastic material into nearby water channels and open spaces thereby causing health hazards as well as environmental pollution in a vast area.

The laws requiring these manufactures to install anti-pollution machinery at their premises is not being strictly adhered to by these people. Single-use bags have become such a ubiquitous way of life that it seems as if we simply cannot do without them. However, if we have the will, we can start reducing their use in small ways.

- A tote bag can make a good substitute for holding the shopping. You can keep the bag with the cashier, and then put your purchases into it instead of the usual plastic bag.
- Recycling the bags you already have is another good idea. These can come into use for various purposes, like holding your garbage, instead of purchasing new ones.

While governments may be working out ways to lessen the impact of plastic bags on the environment, however, each of us should shoulder some of the responsibility for this problem, which ultimately harms us. From the above paragraphs, you must have understood the gist of the harmful effects of plastic bags on environment. They are not only non-biodegradable, but are one of the major pollutants of the sea. For a clean and green environment, try to use alternatives to plastic whenever and wherever possible. Cut down on your use of plastic, and do your bit to save our planet.

## **7. RECYCLING**

Recycling means making new products out of the waste materials. All types of plastics cannot be recycled. If we recycle the ones that can be, the environment will be saved to some extent. Plastic recycling involves the process of recovering scrap plastic and this waste plastic is then reprocessed to form new materials that may be different from their original state. Compared to other materials like glass and metal, recycling of plastic is expensive and complex. This is due to the high molecular weight of the large polymer chains that build the plastic material. Heating plastic doesn't dissolve the polymer chains and hence a tedious and complex process is essential. Different types of plastic cannot be mixed together because they phase separate. Such a resulting melting product cannot be recycled to make another plastic product. While making plastic products many fillers like dyes and other additives are used. These fillers cannot be separated from the plastic using inexpensive techniques. This makes the process more complex.

### **7.1 Advantages of recycling:**

Recycling plastic has many advantages.

- Use of nonrenewable fossil fuels is reduced by recycling as manufacturing new plastic materials require more of these fuels.
- Consumption of energy is also reduced as already prepared plastic is recycled for new use.
- Amount of plastic that reach the landfill sites are greatly reduced. This will eliminate land pollution to some extent.
- Carbon emissions are reduced as manufacturing units emit more carbon.

Cutting back on global warming, preventing air and water pollution and saving our energy resources, are the reasons why we should recycle. Factories and industries that produce goods that have become an indispensable part of our lives, add an appalling amount of waste to the environment and recycling seems the only way to save our planet. A ton of cans will reduce 70% of CO<sub>2</sub> production in landfills.

**7.2. To Reduce Global Warming:** Carbon dioxide is a greenhouse gas that is a major contributor to global warming. Manufacturing certain products releases a lot more carbon dioxide than recycling them would. Aluminum is the best example of this. Manufacturing new aluminum goods produces 95% more carbon dioxide than recycling old aluminum objects. For each ton of paper that is recycled, 15 trees are saved from being felled! We are aware of the fact that trees use up carbon dioxide from atmosphere to make food through the process of photosynthesis. It is estimated that one tree absorbs almost 250 pounds of carbon dioxide each year. Here are some more points that would explain why recycling is encouraged these days.

**7.3. To prevent air pollution:** We are already aware of the amount of gaseous waste that industries spew out every day. Factories and industries manufacturing items made from plastic and metals release large amounts of toxic gases. With continuous increase in population, demand for these goods also keeps rising. If we do not recycle these objects then we have to set up new industries to manufacture these goods. This means more air pollution.

**7.4. To solve the problem of scarcity of landfills:** Lot of our garbage is disposed of in landfills. But the rate at which we are producing trash, is overwhelming. We are already running out of areas that could be used as landfills and soon there might not be any left either. This crisis is severe in the cities and suburbs. There, the problem is so pressing that landfills are slowly creeping closer to crowded human settlements. This is making human beings vulnerable to diseases.

**7.5. To Prevent Water Pollution:** This problem is related in part to landfills. The waste that is disposed in landfills is not treated. Contaminants from the products in the landfills seep down to lower levels of the soil where they reach groundwater and pollute it. Other than polluting groundwater, scarcity of landfills and the overwhelming amount of waste that we produce has not left us with any choice but to dump waste in seas and oceans. The devastating effect of release of industrial waste in

these water bodies coupled with civic waste that are being dumped in the seas and oceans, on marine ecology, is well-known to us. Environmental preservation is one of the most important benefits of recycling.

**7.6. To Save Energy:** Another reason why you should recycle is that it saves energy. Recycling most of the products that we use involves much lesser amount of energy than making them anew. For example, recycling paper saves almost 65% energy than making new sheets of paper. If instead of making new products, one pound of steel is recycled then it saves enough energy to light a 60 watt bulb for 24 hours straight!

## **8. RECYCLING FACTS**

- There are reasons enough for us to recycle plastic. One of them is that plastics are a major source of environmental pollution and are much easy to be recycled than generally thought. Do you know that Americans alone throw away 2.5 million plastic bottles every hour?
- On an average, one person uses up two pine trees worth of paper each year.
- To produce one ton of paper, 390 gallons of oil is used up.
- For every ton of glass recycled, one ton of resources used to make it is saved.
- With increase in use of electronic goods, people are also resorting to recycling them. These form a considerable portion of trash that is dumped in landfills. Needless to say that the amount of plastic and other electric components that are used to manufacture these products, are making them a potent source of toxins being released to the environment.

After learning about the various environmental changes that are the direct result of human activity, one should help create awareness about reducing pollution and saving energy. Buying recycled products is an important part of the recycling procedure which helps complete the loop. By doing so, you can take part in the 'Save Earth' campaign and can make it a success. Your contribution is very important for the success of the mission. It can help save the resources and can help keep the earth green, pollution-free and beautiful. You can use 'wet garbage' to produce manure for your garden. Thus, you can save a lot of energy and money. By using wind energy or solar energy, you can save other important resources on the earth. You can easily avoid unnecessary use of plastic bags and bottles. Last but not the least, recycling has helped create millions of new jobs. So, it is beneficial for all. The government has already set up units for the same. However, besides sending all the trash to these units, we ourselves could contribute to the process by reusing used products and checking the amount of waste that we generate.

### **8.1. Basic steps that are involved in the recycling:**

The basic steps that are involved in the recycling of plastic are;

- Step 1: Collecting plastic waste from households as well as industrial wastes as well.
- Step 2: Sorting the plastic waste in different categories such as PET bottles, bags, containers, etc.
- Step 3: The Plastic is cut into tiny pieces.
- Step 4: The tiny pieces are thoroughly washed for any dirt or unwanted particles on them.
- Step 5: The washed pieces are melted and poured into small containers for reuse<sup>5</sup>.

## **9. CONCLUSION:**

Presently India and world facing a problem with the plastic pollution. to control the plastic pollution Effective policy requires effective monitoring and the current state of plastic waste monitoring needs harmonization, which is being put into place by various guidelines on plastic debris in general. There is also a need for better education and awareness around plastic waste. Plastic footprints and labeling on products are possible but need the appropriate education to make them meaningful. Alongside this there could be labelling of products that contain known harmful additives. Banning of some harmful chemicals contained in plastic, such as Bisphenol A and some phthalates, has already occurred, but for others restriction may have to be voluntary. A harmonised industry-wide effort is needed to communicate information about chemicals used in plastic, alongside public education about the chemicals. In terms of addressing existing problems with plastic waste the identification of plastic waste 'hotspots' may prove useful. This can be done by monitoring or by some forms of modeling.

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