

# Plastic Pollution as a Negative Externality

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## Abstract

The main purpose to carry out the study of this research paper was to know the hazardous effects of a day to day material we use in our daily lives. Plastic as a material is very durable and helpful to us. But what happens to the plastic we throw out of our houses every day is a question of great concern. This concern led to the study of this paper. The reasons of plastic pollution, its effects on various spheres of human have been studied in detail in this paper. How plastic acts as an externality also forms a basic part of this paper. Data in this paper have been collected from various compiled sources making its conclusion dependable to a great level.

After going through this paper, one can easily demonstrate the risks involved in the use of plastic in a large quantity. Plastic when used to a controllable extent can be useful but the way it is dumped leads to disastrous effects thereby making it a negative externality. Moreover, this use and pollution can only be controlled with the combined efforts of all and not few.

**Keywords:** Plastic Environment, Plastic pollution, Recycle, Degradation, Toxic fumes, Dumping zones, Greenhouse gases, Externality, Sustainable development.

## Introduction

Plastic is a day to day material found in almost every home, not only in India but across the whole world. It is nothing but a synthetic material made from a wide range of polymers which include polyethylene, nylon and Poly Vinyl Chloride or more popularly known as PVC. It can be moulded into various shapes when it is soft and later sets to become rigid or semi elastic.

It has a wide range of uses and thus it is readily available at very cheap rates all over the world. It is a durable product due to its chemical composition and hence plastic is one of the most widely used products and is used everywhere. Not only this but due to the modern lifestyles of people in this fast changing and dynamic world, there is a trend to use ready made products and plastic gives an easy alternative to it.

Owing to the wide use of plastic in every sphere of human life right from the morning to the very end of the day, its use is also carried out in a large scale. This large scale use of plastic leads to one of the most disastrous way of pollution to the environment which we know as plastic pollution.

## Objective

The main objective of this research paper is to understand the growing plastic pollution throughout the world as a negative externality. This project also aims at explaining the other suggestions and ways in which plastic can be used and recycled to its best possible extent without causing much damage to the environment.

## Hypothesis

If plastic usage and its dumping is carried out in the same scale, plastic pollution will increase and thus lead to negative externalities throughout the globe. Without recycling of plastic, this pollution can lead to adverse effects to the environment and sustainability of the existing resources.

## Review of Literature

1. Plastic Pollution, by Geof Knight, published by Heinemann Library: It describes plastic mainly in the way it effects the oceans and offers suitable solutions.

2. Plastic Ocean, by Charles Moore, published by Penguin, 2011: The largest collection of floating trash, the Great Plastic Garbage Patch and its further evolution is studied in the book
3. Accumulation: The Material Politics of Plastics, by Jennifer Gabrys, Gay Hawkins, Mike Michael, published by Routledge, 2013: It explains the complex nature of plastic and its effects on accumulation.
4. How to Give Up Plastic by Will McCallum, published by Penguin Publishing Group, 2019: It gives a guide on how to eliminate plastic from our lives step by step.
5. Garbology, by Edward Humes, published by Avery, 2013: It discusses trash, how we create it, how it is later managed and recycled.

2. Demand for modern lifestyle: Plastic products are one of the most readily available things in today's time. We have become so much habituated to the modern lifestyles that we directly go for the readymade products thus increasing its demand which also increases its production.
3. Cheap availability: Even in most of the poor countries of the world, plastic is not much expensive. Its cheap availability everywhere further adds to an increase in the pollution caused by it every day.
4. Slow degradation rate: The degradation rate of most plastic materials is so slow that it takes decades for those products to degrade. A normal plastic bottle that we buy to drink water takes 450 years or more to degrade and a diaper degrades at an even slower rate, i.e. up to 250-500 years.
5. Careless disposal: The dumping of plastic is yet another reason of concern to the environment as it leads to huge scale pollution. Plastic when thrown in a haphazard manner leads to heavy damage to the people around it. Burning it also releases toxic smoke and intoxicants into the atmosphere posing another threat of air pollution.

## Findings

**Fig 1: Plastic pollution**



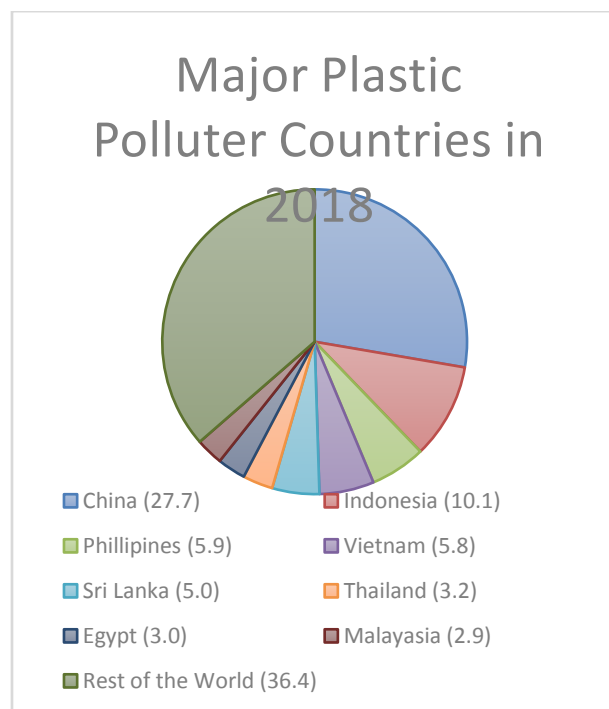
Plastic pollution is nothing but the huge accumulation of plastic materials and objects that has adverse effects on both the environment and the various human beings that exist on it. With the daily use of plastic in more and more quantity and its dumping this accumulation increases with time leading to more disastrous effects, thus making it dangerous.

The chemical composition of plastic is made in such a way that even after the natural processes act on it, they cannot hamper it much. This resistance of plastic acts as a barrier in its degradation by the natural forces acting on it thus increasing its aggregation. This high rise in plastic accumulation is what we call plastic pollution.

Plastic pollution is mainly caused in the environment due to the following reasons:

1. Wide use: Plastic is used in almost every nook and corner of the world. From toothbrushes in the morning to the last thing we use at night, plastic has become a vital part of our day to day lives. Imagining a life without plastic would be next to impossible for us due to our heavy dependence on it.

**Share of various countries in plastic pollution**



**Fig 2: Share of various countries in plastic pollution**

Plastic waste when measured is done in million metric tons (mmt) per year (yr). China becomes the top most plastic polluter in the world contributing about 8.82 mmt/yr, the second is done by Indonesia with a 3.22 mmt/yr, third is Philippines with 1.88 mmt/yr fourth stands Vietnam with 1.83 mmt/yr, fifth is Sri Lanka 1.59 mmt/yr, sixth is done by Thailand with 1.03 mmt/yr seventh stands Egypt with 0.97 mmt/yr, eighth Malaysia with 0.94 mmt/yr ninth is Nigeria with

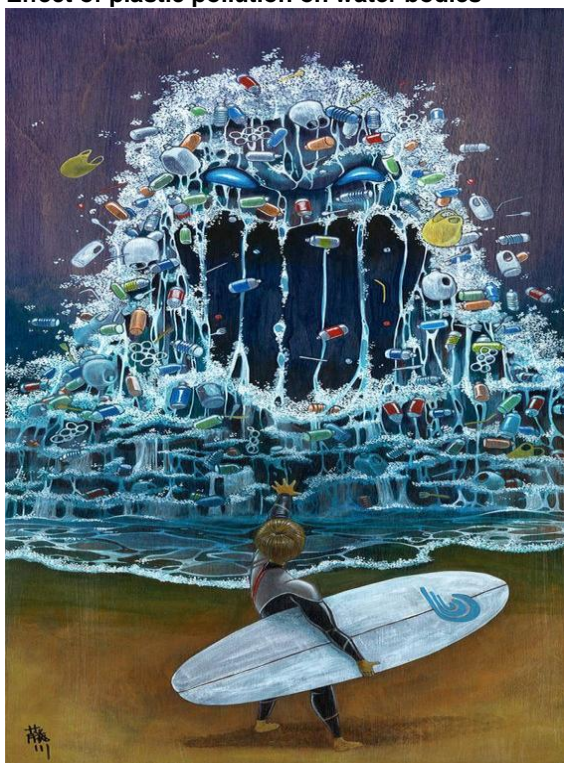


0.85 mmt/yr and tenth is Bangladesh with 0.79 mmt/yr.

In regard to plastic pollution, India ranks twelfth among all the nations of the world. With about 0.60 mmt/yr, India adds up to about 1.9% to the global plastic pollution level. The continuous increase in production and use of plastic adds further to the problem in the country. The increasing population also adds to the high demand of plastic products throughout the country.

With the demands met of more than 130 million people in the country, the use of plastic products too is increasing in leaps and bounds. This increase furthermore leads to high scale piling up of plastic in the both the lithosphere and the hydrosphere causing pollution and thus imposing a threat to its various creatures.

#### **Effect of plastic pollution on water bodies**



**Fig 3: Plastic Pollution in water bodies**

In 2012, it was estimated that out of the total plastic waste, approximately 165 million tons of plastic pollution is in the world's oceans. The Ocean Conservancy reported that China, Indonesia, Philippines, Thailand, and Vietnam dump more plastic in the sea than all other countries combined. Plastic when dumped in the sea and the oceans can hamper life in water too. This plastic is harmful for the marine creatures as it contains carcinogen making it toxic for life forms living in it. It also leads to deterioration of water quality rendering it unfit for drinking. Animals in water may also get trapped in the plastic wastes or swallow it thereby leading to suffocation or even death of those creatures. Plastic pollution also leads to water pollution. By 2050, if not controlled we may have more plastic in the oceans and water bodies than living species says a headline with estimates from the Ellen MacArthur Foundation.

#### **Effect of plastic pollution on soil**

**Fig 4: Plastic Pollution on soil**



The amount of plastic which is dumped on land is greater and more concentrated than that in the water. Plastic pollution on land poses a threat to the plants and animals – including humans who are based on the land. Chlorinated plastic releases harmful toxins into the surrounding soil which ultimately reaches underground water and can cause serious harm to the species that drinks it. Not only this, excess amount of plastic accumulation can lead to reduction in the fertility of the soil and degradation of its quality too. Plastic pollution also leads to degradation of the nearby environment of the places as more and more places get converted into dumping zones.

#### **Effect of Plastic pollution on air**



**Fig 5: Burning of Plastic Waste**

In 2019 a report named "Plastic and Climate" was published. According to the report, in 2019, plastic will contribute to greenhouse gases in the equivalent of 850 million tons of carbon dioxide (CO<sub>2</sub>) to the atmosphere. If continued in the current trend, annual emissions will grow to 1.34 billion tons by 2030. By 2050 plastic could emit 56 billion tons of Greenhouse gas emissions.

Plastic not only emits greenhouse gases but its burning also leads to the emission of highly toxic gases like dioxins, furans and mercury into the atmosphere. This plastic burning also gives rise to air pollution in the long run. Other serious threat like ozone layer depletion is also imposed to the environment as a result of this burning This will also result to an increase in the level of Global Warming,

melting of ice bergs and glaciers and rise in the sea level as a whole.

#### **Effect of plastic pollution on human health**

Plastic and its pollution does not only harm water bodies, soil or air but imposes serious threat to the life of human beings as well. It becomes the cause of various types of diseases in humans including cancer, hormonal imbalance and diseases related to the endocrine system. Women can also face problems related to reproduction. Inhalation of poisonous gases of plastic can also lead to asthma, nerve damage, cardio vascular diseases, diseases related to the respiratory system and also several life threatening diseases. It can lead to various vision related issues and irritation in the eye.

#### **Government role in the mitigation of this serious issue**

1. An all time ban has been imposed on plastic carry bags by the central government with effect from 2<sup>nd</sup> October 2019.
2. Various governmental departments have been requested by the Ministry of Drinking Water and Sanitation, Government of India, to avoid the use of plastic bottles for providing drinking water during governmental meetings, etc., and instead make arrangements to provide drinking water that do not generate plastic waste.
3. Sikkim has restricted use of plastic water bottles (both in government functions and meetings) and also on Styrofoam products.
4. The state of Bihar has banned usage of water in plastic bottles in governmental meetings.
5. Plastic for all purpose has been banned in the city of Bangalore in 2016. Only few special purposes like milk delivery etc. have been exempted from the ban.
6. In the state of Maharashtra, Plastic and Thermocol Products have been banned from 23 June 2018, subjecting plastic users to fines and potential imprisonment for repeat offenders.

In India, plastic debris clogs up landfills, blocks drains and thus pollutes waterways too. Plastic on roadside and beaches and public places is continuously increasing every day and has become an eyesore. Bottled water and its waste not only leads to an increase in this type of pollution but also leads to a depletion in the clear water reservoir of the country. Single use plastic, which cannot be recycled has to be incinerated which generates harmful fumes.

Plastic acts as a serious negative externality in the following ways:

1. Hampers health: The use of plastic in a heavy amount leads to various diseases in human beings. Not only this, the health of various animals in the sea is also hampered by this plastic, which on reaching human body furthermore adds to the problem.
2. Destroys environment: Plastic destroys the environment around it as it can easily resist the various natural processes which help in its degradation. In such cases, the durability of plastic, which was its asset at the time of packaging becomes a liability and thus in every way harms the environment.

3. Dumping zones: The reckless dumping of plastic has led to the creation of various dumping zones outside almost every big city. This acts as a negative externality and hampers the aesthetic beauty of those places. It also leads to blockage of the quality lands used as dumping yards.

Plastic though is a durable product yet it is not one that promotes sustainable development. Sustainable development is that "development which meets the needs of the current generation without compromising the ability of the future generation to meet their own needs"<sup>1</sup>. The damages done by plastic are not reversible or sustainable in the long run. These damages hamper the quality of life on earth and once done they continue to do it in the years to come too.

#### **Role of other organisations in reducing pollution**

1. Construction of roads: Padma Shri Rajagopalan Vasudevan, a professor of Thiagarajar College of Engineering, Madurai laid out the process of building roads by recycling plastic wastes for which his college got patent in 2006. Roads using his concept have been made in other states like Himachal Pradesh too. People can contact him and learn the concept to develop roads of plastic waste.
2. The "Re-Tile" concept: Initiated by the Bengaluru based NGO Swachha, a single retile costs between Rs. 70-90 and up to 10,000 tiles can be manufactured every day with around 3-4 tonnes of plastic. It takes 15 disposable food containers or 150 polythene bags or disposable spoons or 10-15 cosmetic bottles to make one re-tile.
3. Plastic as fee: The Akshar school, founded by Mazin Mukhtar and Parmita Sarma in June 2016 in the pristine woods of Pamohi, in Guwahati, Assam has the kind of fee structure where children deposit at least 10-20 plastic items a week, with a pledge to not burn plastic. Promotion of the interests of the environment is done through this concept.
4. Plastic Parks: In India, the Ministry of Chemicals and Fertilizers has formulated schemes for the creation of six plastic parks viz. two in Madhya Pradesh and one each in Assam, Orissa, Jharkhand and Tamil Nadu. These plastic parks use waste from nearby plastic producing industries as raw materials.

#### **Conclusion**

The findings of this research paper from various sources, to a great extent indicates that plastic acts as an externality due to the pollution it causes in the day to day lives of humans. The slow degradation and the improper care while disposing plastic, mostly done in water bodies and dumping zones lead to adverse effects on environment and human habitation.

In the present times, we are so much dependent on plastic that we cannot fully stop the use of plastic. Also, efforts of a single person cannot be useful in the fulfillment of the desired goal. We must join our hands together if we want to defeat this evil called "Plastic Pollution." If not so, we ourselves would

be imposing a serious, irreversible threat to our Mother Nature.

#### **Suggestions**

Use less of plastic products and start replacing them with more and more environment friendly substitutes. Carry paper and jute bags while going out to buy something so that you don't have a bring a carry bag home every time you buy something. A universal solution to every problem that exists, "plant more and more trees." Avoid using plastic containers and water bottles made of single use plastic items.

The government can also to a great deal help in the reduction of plastic ways by recycling it as much as possible. It can also help by making the policies rigid and enforcing them in a strict manner. These policies should be put into force not only in files ad written documents but also in practical use.

Go green to the most possible extent. Start with small steps a day. A completely plastic free world would be an unreal concept, but let us come together and join hands so that we can make the world if not a "NO PLASTIC" but at least a "LOW PLASTIC" one.

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*Images- Pinterest*

*Data*

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