

## Living in a Plastic World: An Indian Perspective

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### ABSTRACT

Over the past few decades, plastic has replaced paper, cloth, jute, metals, and wood as the primary material for useable goods. At first, it appeared to be beneficial, but over time, negative effects emerged in the form of worse environmental and health problems. The world's lakes, rivers, and oceans receive the equivalent of 2,000 garbage trucks' worth of plastic waste every day. Plastic pollution is a worldwide issue. Lakes, rivers, and seas are contaminated annually by the 19–23 million plastic waste particles that seep into aquatic environments. Millions of people's livelihoods, capacity to produce food, and social well-being can all be negatively impacted by plastic pollution, which can modify habitats and natural processes and lessen ecosystems' capacity to adapt to climate change.

Although the issues with waste management and plastic litter were not foreseen, the durability of plastics and its potential for a variety of uses, including broad use as disposable objects, were. As Yarsley and Couzens (1945) put it, the forecasts were about "how much brighter and cleaner a world [it would be] than that which preceded this plastic age." This essay summarizes what is now known about the advantages and drawbacks of using plastics and considers future potential, problems, and priorities.

The information is derived from a variety of sources, including papers submitted to this Theme Issue on Plastics, the Environment, and Human Health. The following viewpoints are discussed in this paper: People's awareness of the negative impacts of plastic use and the buildup of plastic trash in the environment, the effects of plastic debris on humans and wildlife, the laws now in place governing plastic use, and their awareness of these regulations. Alongside other environmental stressors like climate change, ecosystem degradation, and resource consumption, it is necessary to evaluate the dangers that plastics pose to the environment, society, economy, and human health.

**Key Words:** Plastic World, Plastic Pollution

*The buildup of plastic items and particles (such as bottles, bags, and microbeads) in the environment that negatively impacts people, wildlife, and their habitat is known as plastic pollution. Pollutant-producing plastics are divided into three size categories: micro-, meso-, and macro-debris. Manufacturers select plastic over other materials because it is affordable, long-lasting, and highly versatile for a variety of applications. However, most plastics disintegrate slowly because of their chemical makeup, which makes them resistant to many natural processes. When combined, these two elements enable significant amounts of plastic to enter the environment as improperly handled garbage that spreads across food webs and remains in the ecosystem.*

***Plastic Pollution Facts: Production and Consumption***

**Global plastic production has increased exponentially:** Ever since plastic was first invented in the 20th century, global plastic production has grown alarmingly. According to plastic pollution statistics from the United Nations Environment Programme (UNEP), the world has produced more than 9.2 billion tons of plastic since 1950, with half of that amount produced in the last 13 years alone. The trend for new plastic shows no sign of slowing down, as plastic production is expected to double by 2050.

**Single-use plastics dominate the market:** One of the most concerning plastic pollution facts is the prevalence of single-use plastics in modern society. These disposable items, such as plastic bags, bottles, and packaging, are used for a short period and discarded. It is estimated that around 36% of all plastic produced is for single-use purposes, contributing significantly to the global plastic waste problem.

**Plastics are not effectively recycled:** The OECD (Organisation for Economic Co-operation and Development) have stated that despite recycling efforts, only 9% of all plastic waste has been recycled globally. The remaining 79% has ended up in landfills or the natural environment, with the remaining amount of plastic (12%) being incinerated. This problem with recycling rates highlights the need for better plastic resource recovery and a shift towards more sustainable materials.

### Use of Plastic Bags & Plastic Bottles

It is estimated that carbon footprint of plastic (LDPE or PET, polyethylene) is nearly 6 kg CO<sub>2</sub> per kg of plastic. If we know the weight of our plastic bags, we can multiply it with the number of plastic bags we are using per year. Then we can easily calculate the carbon dioxide emitted by our own usage of plastic bags.

- The production of 1 kg of polyethylene (Pet or LDPE), involves the equivalent of 2 kg of oil for energy and raw material. Polyethylene (PE) is the maximum generally used plastic for plastic bags.
- Burning 1 kg of oil generates about 3 kg of carbon dioxide. In Other words, we can say per kg of plastic, about 6 kg carbon dioxide is generated during production and incineration.
- Depending on size and thickness a plastic bag has a weight in the range of about 8 g to 60 g. In the further calculations, it now depends on which weight for a plastic bag

we actually utilize. An ordinary plastic carrying bag in our household had a weight in about between 25 g and 40 g.

### Few attractive facts around plastics

- The world-wide manufacturer of plastic is at present at 35 kilogram per year per individual. On average, it is increasing by 3% per year.
- Maximum plastic is utilized for packaging (35%), followed by the construction sector and vehicle construction.
- Nearly 40% of the produced plastic is being disposed within 1 year (primarily packaging material).
- 12 years is the average lifetime of plastic. The major reason is the relatively long life span in the construction sector.
- About 2.5kg CO<sub>2</sub> per kg of plastic save on average through recycling. Thus recycled plastic generates about 3.5 kg CO<sub>2</sub> compared to 6 kg of CO<sub>2</sub> for new plastic (production and incineration).
- World-wide about 6% of the oil consumption is used for the production of plastic (with increasing tendency)

### *Environmental Consequences of Plastic*

**Plastic pollution affects every ecosystem on Earth:** Plastic pollution is not limited to a single habitat or location. The most isolated places on earth, including the deepest oceanic regions and the Arctic and Antarctic regions, have been shown to contain plastic debris. Additionally, the widespread nature of plastic pollution is demonstrated by the discovery of microplastics—tiny plastic particles less than 5 mm—in the soil, water, and air.

**Microplastics are a growing concern:** The prevalence of microplastics in the environment is one of the most alarming plastic pollution facts. These tiny particles form when larger plastic items break down into smaller pieces of plastic or are intentionally produced for use in cosmetics and cleaning agents. Animals can ingest Microplastics and can accumulate in the food chain, posing a significant threat to ecosystems and human health. A 2017 study found that 83% of tap water samples taken around the world contained plastic pollutants. The increase in plastic and microplastic pollution in soils can cause adverse impacts on plants and microorganisms in the soil, which can in turn affect soil fertility. Microplastics affect soil ecosystems that are important for plant growth. Plants are important for the environment and ecosystems so the plastics are damaging to plants and organisms living in these ecosystems.

Microplastics alter soil biophysical properties which affect the quality of the soil. This affects soil biological activity, biodiversity and plant health. Microplastics in the soil alter a plant's growth. It decreases seedling germination, affects the number of leaves, stem diameter and chlorophyll content in these plants.

Microplastics in the soil are a risk not only to soil biodiversity but also food safety and human health. Soil biodiversity is important for plant growth in agricultural industries. Agricultural activities such as plastic mulching and application of municipal waste contribute to the microplastic pollution in the soil. Human-modified soils are commonly used to improve crop productivity but the effects are more damaging than helpful.

Plastics also release toxic chemicals into the environment and cause physical, chemical harm and biological damage to organisms. Ingestion of plastic does not only lead to death in animals through intestinal blockage but it can also travel up the food chain which affects humans.

**Plastic pollution contributes to climate change:** The production, use, and disposal of plastic all contribute to greenhouse gas emissions, exacerbating the issue of climate change. Plastic production uses fossil fuels, and the mining and manufacturer of these materials and the conversion of them into plastics is a cause of climate change. It is estimated that plastic pollution accounts for approximately 3.4% of global greenhouse gas emissions. Furthermore, as plastics break down in the environment, they release additional greenhouse gases, adding to the overall impact of climate change and air pollution.

#### **Effect on flooding**

Plastic waste can clog storm drains and such clogging can increase flood damage, particularly in urban areas. A buildup of plastic garbage at trash cans raises the water level upstream and may enhance the risk of urban flooding. In India flood risk increases substantially because of plastic waste clogging the already overburdened sewer system.

#### ***Plastic Pollution Effects on Wildlife***

**Marine life is severely impacted by plastic pollution:** As stated by National Geographic an estimated 8 million metric tons of plastic is released into the oceans from coastal nations each year.

One of the most well-known plastic pollution facts is the devastating impact on marine life. An estimated 100,000 marine mammals, sea turtles, and one million seabirds die each year due to plastic ingestion and entanglement. In addition, countless fish and other marine organisms are affected by plastic pollution, threatening the overall health of marine ecosystems. The scale of the problem in the marine environment is almost unfathomable but the Great Pacific Garbage Patch. This plastic garbage patch is located between Hawaii and California and is bound together by the currents and gyre that are located in the area. The GPGP covers an estimated 620 thousand square miles gives an indication of the scale of the problem that humans have created.

**Plastic pollution threatens terrestrial wildlife:** While the impact from ocean plastic pollution on marine animals is widely recognized, the effects of plastic pollution on land-based wildlife are often overlooked. Animals on land can also ingest or become entangled in plastic waste, leading to injury and death. Plastic debris can remain in the body of the animal has been found in the stomach of animals. Furthermore, plastic pollution can disrupt ecosystems by altering habitats and introducing toxic chemicals into the environment.

**Plastic pollution poses a risk to endangered species:** With hundreds of species known to be affected by plastic pollution, the problem poses a significant threat to biodiversity. Many of these species are already threatened by habitat loss, climate change, and other factors, making the additional stress from plastic pollution a critical concern for their survival.

#### *Human health Implications of Plastic*

**Plastic pollution can adversely affect human health:** As plastic pollution infiltrates ecosystems, it can also, directly and indirectly, impact human health. Microplastics and toxic chemicals associated with plastic waste can enter the food chain, leading to potential ingestion by humans. The long-term effects of exposure to these substances are not yet fully understood. However, there is growing concern about possible links to various health issues, including hormone disruption, cancer, and developmental problems in children.

#### **Objectives of the study**

The objectives of the study are:

1. Assessing the knowledge of plastic pollution among the people.
2. Analyzing the life-style of people which is responsible to enhance footprints on planet.
3. Assessing the level of values among people for a plastic free environment in emerging life style.

#### **Hypothesis**

1. Low level of knowledge is accelerating the people towards harmful activities which are affecting environment adversely.
2. People are very little aware with the harm of plastic use due to lack of interest to develop a plastic free environment.
3. Lack of knowledge among people about the negative consequences of plastic on health and environment is directing them towards using of plastic.

#### **Research Methodology**

- ❖ **Research design-** Descriptive Research
- ❖ **Universe and sample-** The people of sector 18, Indira Nagar (urban area), Lucknow, U.P., India will be the universe and 100 people (age limit of 25-35 years) will be purposively selected as sample.
- ❖ **Source of data collection-** Primary, secondary and tertiary.
- ❖ **Tools of data collection-** Interview Schedule and Observation Guide
- ❖ **Techniques of data collection** – Observation and Interview.
- ❖ **Classification and Analysis of Data** – Through editing, coding and tabulation.

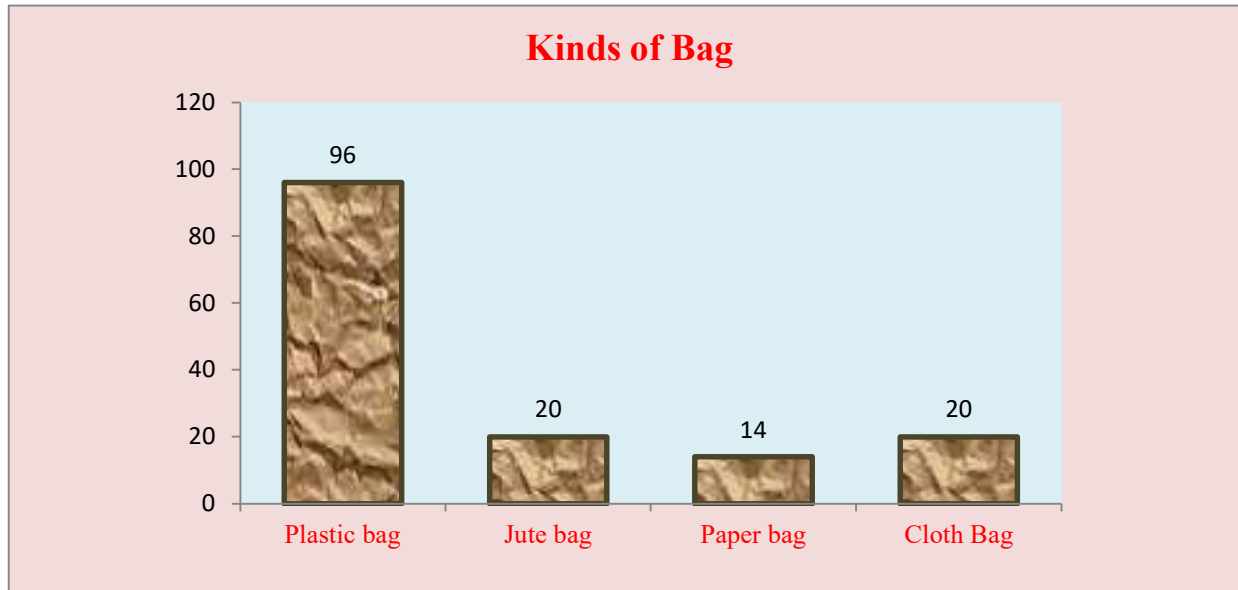
#### **Result and Discussion**

##### **Plastic & Climate Change**

Plastic is made from fossil fuels- four percent of the world's annual petroleum production is converted directly into making plastics and another four percent gets burned to fuel the process. Resultant plastic use releases at least 100 million tons and may be as much as 500 million tons of carbon dioxide into the atmosphere each year. How distressing fact is this? So this is the call of the hour to cut the plastic use from our daily life, either it are easily available or having low cost. But future is so valuable for us that cannot be compared with the low cost.

Instead of this they are also responsible for drainage problems in rivers, drains, reservoirs, and death of lots of animals with hazardous impact on human health.

The responses of respondents regarding the use of bags for marketing. The majority of respondents 96 percent responded that they use plastic bags followed by 20 percent respondents responded that they use jute bags, 14 percent responded that they use paper bags and 20 percent responded that they use cloth bags for marketing.



Thus, it may be concluded according to the analysis that majority of the

respondents i.e. 96 percent use plastic bags.

Plastic products are responsible for increase in climate change. The analysis incorporates the knowledge level regarding its negative role in climate change. The majority of respondents 67 percent responded that plastic products are responsible for increase in climate change. 11 percent respondents responded that plastic products are not responsible for increase in climate change and 22 percent respondents responded that they do not know about it.



Thus, it may be concluded according to the analysis that Majority of the respondents i.e. 67 percent. were agree with that the plastic products are responsible for increase in climate change

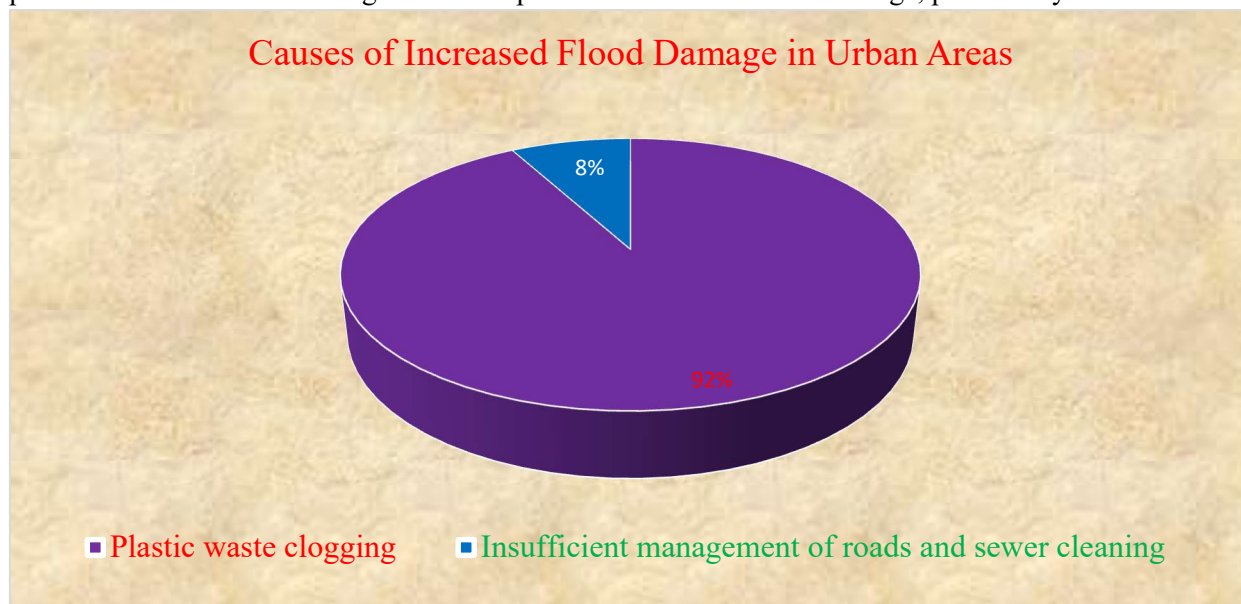
The analysis incorporates the responses that by which way plastic products are harmful to environment. 44 percent respondent responded that plastic product causes soil pollution. 35 percent responded that it increases soil infertility. 53 responded that it cannot be destroyed, 21 responded that it causes air pollution and 61 percent responded that it causes

health problems in living beings.

The analysis of the responses of respondents regarding the reasons that what causes force them to use plastic bags. The majority of respondents 61 responded that it is easily available in the market. 21 percent respondents find it easy in use, 8 percent respondents responded that its low-cost forces them to use it and 20 percent responded that all of the above given reasons force them to use the plastic bags.

Thus, it may be concluded according to the analysis that Majority of the respondents i.e. 96 percent use plastic bags while majority of respondents 67 percent know that plastic products are responsible for increase in climate change. So, the analysis of the responses proves the hypothesis that our youth is very little aware with the phenomenon of climate change. If some of them are aware, they don't have interest to follow the norms of sustainable environment.

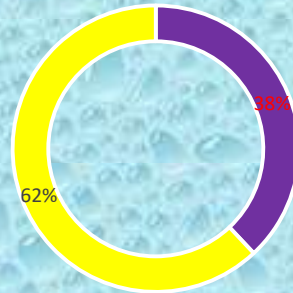
92 percent respondents responded that Plastic waste clogging is responsible to increase the flood damage due to sewer line blockages, rest 8 percent were in favour of insufficient management of roads and sewer cleaning in premonsoon period. Such kind of mismanagement is responsible to increase flood damage, particularly in urban areas.



Surprisingly in this digital era 52 percent respondents were aware about the Plastic debris can remain in the body of the animal has been found in the stomach of animals enough to take their lives and rest 48 percent were not aware with this. 38 percent respondents were aware with the harm of microplastics but still they were using the plastic due to unavoidable situations that every where most of the things are made of plastic. A comprehensive effort from the grassroot level of cutting the manufacturing of plastics things. Rest 62 percent were not knowing about the microplastic and its harm.



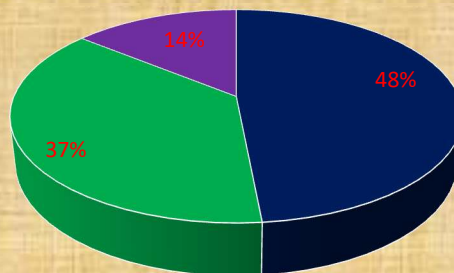
### Awareness and Usage of Plastics Among Respondents



- Respondents aware of microplastics' harm but still using plastic
- Respondents unaware of microplastics and their harm

The analysis shows the awareness of respondents regarding the adequacy of existing environmental laws in our country. The majority 48 percent respondents responded that there are insufficient environmental laws in our country, 37 percent respondents responded that existing environmental laws are adequate in our country, 14 percent respondents responded that they don't know about the adequacy of existing and needed environmental laws.

### Awareness of Respondents About Adequacy of Environmental Laws



- Respondents who believe environmental laws are insufficient
- Respondents who believe environmental laws are adequate
- Respondents who don't know about the adequacy of environmental laws

The analysis shows the responses of respondents regarding the responsible reasons for inadequacy of environmental laws. 22 that neutral attitude of government is responsible for inadequacy of environmental laws, 32 percent respondents responded that lack of proper implementation of existing few environmental laws, 11 percent respondents responded that unawareness of people regarding exist few environmental laws in present and 63 percent respondents responded that all of the above reasons are responsible for inadequacy of environmental laws.

Thus, it may be concluded according to the analysis of that Majority of the respondents think that all the reasons like neutral attitude of government towards environment, lack of proper implementation of existing few environmental laws and unawareness of people regarding existing few environmental laws in present are some main reasons which are responsible for inadequacy of environmental laws to prevent pollution and climate change.

In August 2021, the Indian federal government amended the Plastic Waste Management Rules, 2016, prohibiting identified single use plastic items in India, which have low utility and high littering potential. Recently in February 2022, the Ministry of Environment, Forest, and Climate Change (MoEFCC) also released guidelines on the Extended Producer Responsibility (EPR) for plastic packaging vide the Plastic Waste Management (Amendment) Rules, 2022. As per the new guidelines, plastic packaging waste shall now be collected and managed in an environmentally sustainable way through the Extended Producer Responsibility (EPR) of the producer, importer, and brand owner.

Single use plastic is a form of disposable plastic used in products like water bottles, straw, cups etc., which can only be used once and then has to be discarded. Businesses are inclined towards producing single use plastics due to their cost-effectiveness. Recently, there have been apprehensions among consumers regarding plastic reuse due to Covid-19 related safety measures. Trade bodies like the All-India Plastic Manufacturers Association (AIPMA) had recommended that the government extend the deadline for phasing out single use plastic products by a period of one year to 2023 because of challenges caused by the pandemic.

It must be noted that India's per capita consumption of plastic is at 11 kilograms (kg) per year, as against the global average of 28 kg per year. As per data by MoEFCC, in India, over 3.4 million tons of plastic waste was generated in 2019-20 and 3.06 million tons in 2018-19. The situation worsens when a significant amount of such unrecyclable waste ends up in rivers, oceans, and landfills.

The biggest challenge around the elimination of single use plastic in India is the absence of a well-established system for effective segregation, collection, and recycling. Moreover, India still doesn't have a waste recycling policy in place due to environmental issues raised by various State Pollution Control Boards (SPCBs).

### **Plastic Waste Management (Amendment) Rules, 2022**

The 2022 rules enlist the following provisions:

#### Classification of plastics

- Category 1: Rigid plastic packaging will be included under this category.
- Category 2: Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets and covers made of plastic sheet, carry bags, plastic sachet or pouches will be included under this category.
- Category 3: Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic) will be included under this category.
- Category 4: Plastic sheet or like used for packaging as well as carry bags made of compostable plastics fall under this category.

#### Plastic packaging

The latest guidelines have mandated the reuse of rigid plastic packaging material in order to reduce the use of fresh plastic material for packaging. The enforceable prescription of minimum level of recycling of plastic packaging waste collected under EPR, along with use of recycled plastic content will further reduce plastic consumption and support recycling of plastic packaging waste. Parties responsible for breaching the above guidelines shall be penalized under the Environment Protection Act, 1986, which stipulates a jail term of up to five years, or a fine of up to INR 100,000, or both. Furthermore, there are municipal laws on plastic waste, which also outline their own penalties.

Businesses in India will need to comply with new plastic waste management rules that ban single use plastic from July 1, 2022. Noncompliance will trigger penal consequences. The products affected include ear buds with plastic sticks, plastic sticks for balloons, plastic flags etc. Plastic packaging waste shall now be collected and managed in an environmentally sustainable way through the Extended Producer Responsibility (EPR) of the producer, importer, and brand owner. The single use plastic ban will be closely monitored by the Central and State Pollution Control Boards and directives have been issued at the national, state, and local government levels to not supply raw materials to industries that operate in banned items.



### ***Plastic Waste Progress and Challenges***

While progress is being made in the fight against plastic pollution, challenges remain. Plastic pollution statistics show that despite efforts to reduce plastic waste, global production and consumption continue to rise. Additionally, the issue of plastic pollution is complex and multifaceted, requiring collaboration and coordination among various stakeholders to develop and implement effective solutions.

### ***Plastic Waste Solutions and initiatives***

Despite the overwhelming plastic pollution facts, there is hope for the future. Governments, businesses, and individuals worldwide are taking action to reduce plastic waste and promote sustainable alternatives. Some of these initiatives include:

- Implementing plastic bag bans, plastic straw bans, or fees for usage
- Encouraging the use of reusable products such as bags, bottles, and containers
- Investing in research and development of biodegradable and sustainable materials to reduce plastic use.
- Supporting recycling and resource recovery infrastructure improvements

### ***Steps to Combat Plastic Pollution***

Individuals play a crucial role in combating plastic pollution. People can contribute to the global effort to reduce plastic waste by making small changes in their daily lives. Some actions that individuals can take include:

- Reducing the use of single-use plastics by opting for reusable alternatives such as reusable water bottles
- Reducing plastic consumption – especially the use of plastic bottles and plastic packaging.
- Properly disposing of plastic waste and participating in recycling programs to reuse materials
- Be selective in purchase of wood products like paper
- Buy natural products like wood cotton and wool only and purchase only containers of glass, aluminum, tin and cardboard. Avoid purchasing non-recyclable plastic.
- Get the fullest possible use of non-renewable and minimally recyclable products. Write on both sides of the paper and use that scrap wood. Simply because our society gives the illusion of free-flowing resources, does not be utilized to the maximum extent possible. Resources are too often taken for granted and misused.
- Be prudent about the products and packaging materials you purchase, as not all wastes can be recycled. Everyone must be accountable for their waste, so plan accordingly. Think about where it will go and how it will be disposed of when you purchase something. If there is no place to recycle it, do not buy it.
- Purchase products made from recycled material whenever possible.
- Plant native trees and see that they grow. Protest the cutting of any healthy tree in your community. Trees are often sacrificed in the name of development of new curb or underground pipe line. Even dead trees are needed by the wildlife.
- Supporting businesses and products that prioritize sustainability
- Advocating for policies and initiatives that address plastic pollution
- Educating others about the issue and raising awareness
- Join with the others in the cause of global ecology and supporting national environmental organizations. There is strength and power in numbers.

These plastic pollution facts highlight the severity of the plastic pollution crisis and the urgent need for action. As the global community becomes increasingly aware of the problem, it is essential to continue working towards sustainable solutions and promoting responsible consumption of plastic products. By joining together in the fight against plastic pollution, it is possible to protect the environment, safeguard human health, and preserve the planet for future generations.

### **Plastic Collective Helps to reduce Footprints**

The Plastic Collective helps reduce the plastic problem whilst also supporting communities around the world in several ways such as through education and training. The Plastic Collective also supplies resource recovery and plastic recycling machinery. This helps support communities to recover and recycle plastic and turn discarded plastic materials into valuable local products which can provide valuable income to the community.

The Plastic Collective also supports businesses to reduce their plastic footprint through the use of a plastic offsetting scheme. The Plastic Collective will evaluate a business's plastic use and create a comprehensive strategy to reduce its plastic use to work towards becoming plastic neutral. Anything is not impossible, everything is possible. A true and honest effort of all is needed.

### Conclusion

In conclusion, plastics have a lot to offer the future, but it is clear that the way we currently produce, use, and dispose of them is unsustainable and poses risks to human health and wildlife. Many environmental risks are well understood, and understanding about their implications on human health is also expanding, but there are still a lot of unknowns and worries. Although there are remedies, they require coordinated efforts to accomplish. Individuals can play a part by using and consuming plastic products responsibly, especially when it comes to recycling them. Industries must embrace green chemistry for production, focusing on recyclability through product design, and governments and policymakers must set goals and norms.

These measures are long overdue and urgently needed; plastic production is still increasing at a rate of about 9% annually, despite the fact that the accumulation of plastic waste poses a variety of environmental risks and that worries about its effects on human health are growing (Plastics Europe 2008). As a result, the amount of plastics created in the present century's ten years will be close to the total produced in the previous century. A sustainable lifestyle pattern based on our consumerism ideology toward the choices we make is necessary if we wish to see a world free of plastic. It is recyclable or not, harmful to environment, impact on human health etc. All questions must be addressed by our self-analysis.

Today's environmentalists have broad commitments, wider information base, easy access to the media, and also good financial strength, in some instances. They might be quite effective in bringing valuable information on concerned issues to the notice of the public and the government. As far as the issue of environmental sustainability is concerned, the Indian environmentalists might be successful in mobilizing the interest of the nation towards the issue of environmental sustainability. Our individual acts can either deteriorate or recover our environmental quality. While a majority of persons desire for a cleaner and plastic free environment, not several of them crave to make the major changes in their way of life that would add to a cleaner environment. This imposes that individuals should not only be conscious of various environmental issues and the outlays of their actions on the environment, but also make a firm resolve to develop **sustainable environment supportive lifestyle**. It will not be enough to talk about it, but act on it. Only by action, before it is too late, can the earth be replenished and maintained as a viable support system for all inhabitants.

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