

ELIMINATION OF SINGLE-USE PLASTIC

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INTRODUCTION

Plastic is a special type of polymer that is made up of a long chain containing a large number of molecular repeating units. The term polymer is derived from two Greek words: poly, which means many, and meros, which means parts or units. Polyethylene is a well-known plastic material consisting of a long chain of carbon atoms with two hydrogen atoms connected to each carbon atom.

Plastic is widely used in packaging items because of its availability in a variety of sizes and shapes. It is lightweight and flexible, and it can be manufactured in a wide range of colors and opacities. Due to these advantages and user-friendliness nature, the usage of plastic has increased twentyfold since the 1900s [1]. Additionally, plastic does not biodegrade naturally in the environment and has various harmful effects on human health. Single-use plastics are commonly known as disposable plastics which are widely used for packaging and are manufactured to be used only once before being discarded or recycled. Some of these Single-use plastics items are shopping bags, food packaging, bottles, straws, containers, and cups, etc.

Every year, approximately 150 million tons of disposable plastics are used globally, and this number is sharply increasing. Furthermore, according to the global industry report, the use of plastic materials is rapidly expanding in developing countries such as India. It is noteworthy to mention that In India, households and informal waste per year contribute approximately 8 million metric tonnes [2]. Researchers from all over the world have extensively studied the effect of single-use plastic on land, water, and air resources. If current trends continue, with 10% of plastic waste entering the ocean [3], it is predicted that plastics will outnumber fish in the ocean at the end of the year 2050 [4]. Therefore, Single-use plastics are now recognized as a global crisis [5].

HARMFUL EFFECTS OF PLASTIC

Plastic use has skyrocketed since its introduction in the 1950s, owing to the various benefits it offering [6]. Furthermore, there is evidence that plastic pollutants can be passed from the sea to the human food chain [7]. It has been documented that plastic waste tangles and ingestion decrease the life expectancy of animals by nearly 17% [2]. Moreover, the longevity and resistance to the decomposition of plastics [8] and their widespread use have resulted in an epidemic of mismanaged waste.

Some microplastics have been found to contain chemicals that are recognized as reproductive poisons, carcinogens, and mutagens [9]. These chemicals by the

process of ingestion might get bioaccumulated into the food chain and cause fatal consequences [10], [11], [12].



Furthermore, the side effects of the chemical cocktail of additives often combined with virgin polymer resins to improve its functionality can be harmful to both the environment and humans [6] Hence, Single-use plastics pose greater risks because they

degrade into tiny particles (microplastics) that penetrate our water and food chains.

In fact, the amount of plastics used in the Indian economy has recently surpassed the volume of steel. However, when it comes to recycling single-use plastics, India's situation differs significantly from that of the rest of the world. Furthermore, the lack of government penalties is a significant contributor to the widespread use of single-use plastic products. Overall, the disposal of plastic in India can be identified as a serious concern.

INDIAN SCENARIO

The government in India has adopted a range of policies and prohibitions regarding bans on single-use plastic bags however, it has been reported that the implementation of these laws has been somewhat disappointing in the various states, with most state legislations leaving only partial bans on single-use bags.

In India, a nationwide ban on the use of single-use plastic was imposed by plastic waste management in 2014. The notice emphasizes the prohibition on using non-compostable plastic bags with a thickness of less than 50 mm. Aside from the national notification for the ban, many state governments of Indian unions started the process of banning the use of plastic bags much earlier. In 1998, the Sikkim government took the initiative to replace plastic bags with paper covers.

MAJOR CHALLENGES TO THE ELIMINATION OF SINGLE-USE PLASTIC

- 1) Insufficient attempt to recognize consequences in order to increase public awareness.
- 2) There is a lack of media support to advertise and investigate the negative impact of plastics.
- 3) The insufficient invention of biodegradable materials to compensate for single-use plastics

- 4) Lack of understanding regarding the harmful effects of single-use plastics and their resulting toxicity on humans
- 5) Government regulations and laws are not being sufficiently enforced to encourage the use of biodegradable single-use products.

RESEARCH GAPS

According to the findings of the past research, the global movement to eliminate single-use plastic waste has gained popularity, with many countries around the world either banning them or imposing taxes [13]. While the growth rates for plastic manufacturing represent a blessing for the Indian economy, however at the root cause of this problem is non-scientific waste management practices [14]. It is reasonable to assume that plastic consumption in India is steadily increasing due to the high rate of urbanization [15].

The issue of elimination of single-use plastic cannot be resolved without technological improvements and proper coordination between the policymakers and the scientific community. Single-use plastic can be eliminated only if we work together to develop innovative solutions through technology, policy, and public awareness. Therefore, more ground-breaking research should be conducted to tackle plastic pollution.

SOLUTIONS FOR PLASTIC POLLUTION

Plastic pollution is a complicated and widespread issue with no clear solutions. Overcoming the problem of single-use plastic pollution has been one of the most serious ecological crises in recent years. Moreover, Global policymakers have introduced several regulatory measures aimed at reducing the usage of single-use plastics. In the Indian context, despite the fact that the government has been more proactive in implementing guidelines and its laws, implementation is still in its early stages. The government thus requires the establishment of a strategic regulatory committee to track the issue by undertaking strong steps in providing financial support and recommendation. Last but not the least, In order to minimize dependency on plastic single-use bags, alternative sources of the bags need to be made available.

REFERENCES

1. Thompson, R. C., Swan, S. H., Moore, C. J., & Saal, F. S. (2009). Our plastic age, 1973–1976. <https://doi.org/10.1098/rstb.2009.0054>
2. Vimal, K. E. K., Mathiyazhagan, K., Agarwal, V., Luthra, S., & Sivakumar, K. (2020). Analysis of barriers that impede the elimination of single-use plastic in developing economy context. *Journal of Cleaner Production*, 272.
3. Schmaltz, E., Melvin, E. C., Diana, Z., Gunady, E. F., Rittschof, D., Somarelli, J. A., ... Dunphy-daly, M. M. (2020). Plastic pollution solutions : emerging technologies to prevent and collect marine plastic pollution. *Environment International*, 144(May).
4. World Economic Forum. (2016). World Economic Forum. *World Economic Forum*, (January).
5. Leissner, S., & Ryan-fogarty, Y. (2019). Resources , Conservation & Recycling Challenges and opportunities for reduction of single use plastics in healthcare : A case study of single use infant formula bottles in two Irish maternity hospitals. *Resources, Conservation & Recycling*, 151(July).
6. Andrady, A. L., Neal, M. A., Andrady, A. L., & Neal, M. A. (2009).

Applications and societal benefits of plastics Applications and societal benefits of plastics. *Springer open - Marine Anthropogenic Litter*, (June).
<https://doi.org/10.1098/rstb.2008.0304>

7. Worm, B., Lotze, H. K., Jubinville, I., Wilcox, C., & Jambeck, J. (2017). Plastic as a Persistent Marine Pollutant. *Annual Review of Environment and Resources*.
8. Andrady, A. L. (2015). *Marine Anthropogenic Litter*.
9. Wright, S. L., & Kelly, F. J. (2017). Plastic and human health: a micro issue? *Environ. Sci. Technol.* (May).
10. Carbery, M., Connor, W. O., & Thavamani, P. (2018). Trophic transfer of microplastics and mixed contaminants in the marine food web and implications for human health. *Environment International*, (March).
<https://doi.org/10.1016/j.envint.2018.03.007>
11. Farrell, P., & Nelson, K. (2013). Trophic level transfer of microplastic: *Mytilus edulis* (L.) to *Carcinus maenas* (L.). *Environmental Pollution*, 177, 1–3.
<https://doi.org/10.1016/j.envpol.2013.01.046>
12. Lusher, A. L., Hernandez-milian, G., Berrow, S., Rogan, E., & Connor, I. O. (2017). Incidence of marine debris in cetaceans stranded and bycaught in Ireland: Recent findings and a review of historical knowledge *. *Environmental Pollution*, 1–10. <https://doi.org/10.1016/j.envpol.2017.09.070>
13. Pettipas, S., Bernier, M., & Walker, T. R. (2016). A Canadian policy framework to mitigate plastic marine pollution. *Marine Policy*, 68, 117–122.
<https://doi.org/10.1016/j.marpol.2016.02.025>
14. Xanthos, D., & Walker, T. R. (2017). International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review. *Marine Pollution Bulletin*.
<https://doi.org/10.1016/j.marpolbul.2017.02.048>
15. Bhattacharya, R. R. N. S., Chandrasekhar, K., Deepthi, M. V, Roy, P., & Khan, A. (2018). Plastic Waste Management in India.
