PLASTIC POLLUTION: A GLOBAL CRISIS AND INDIA'S LEGAL FRAMEWORK ON PLASTIC WASTE MANAGEMENT

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ABSTRACT

In today's world, plastic has become an irreplaceable product, and we can't imagine our daily life without plastic. Plastic has become a global crisis due to its use and non-biodegradability. Plastic was invented in the year 1907, and it achieved its full potential in the 1950s. Plastic is made from synthetic or semi-synthetic polymers, which don't biodegrade for hundreds or thousands of years. Approximately 8.3 billion metric tons (BMTs) of plastic were generated worldwide between 1950 and 2015, of which 6.3 BMTs, or 80%, were classified as plastic garbage (as per the data published by NITI Aayog & UNDP handbook, 2021). According to recent studies, the annual global emissions of plastic trash are estimated to be 52.1 [48.3–56.3] million metric tons (Mt), of which 57% and 43% are made up of open-burning and unburned garbage, respectively (as per Ed. Cook's research published in 2024). Plastic pollution is a threat to human health and the environment. Plastic Waste Management Laws in India are implemented, but plastic generation is increasing in India every year. Today, India is one of the leading countries in plastic pollution generation. This paper discusses plastic as a global issue, the existing legal framework in India to combat the problem of plastic pollution and the role of the Indian judiciary to combat plastic problems. The doctrinal research methodology is used for this. Based on research, suggestions have been drawn to improve the legal framework in India.

Keywords: Environmental Degradation, Legislation on Plastic, Plastic Waste Management

Introduction

Plastic is the most commonly used product in today's world; it has overtaken our lives. It feels like an irreplaceable commodity for daily life in packaging, storage, or carrying things, etc. Plastic originated from the term *'plastikos',* which means fit for moulding. Synthetic or semi-synthetic organic polymers make up plastics, which are inexpensive, robust, lightweight, and long-lasting.[1] This is the reason behind its widespread use as well as the main cause of the plastic pollution that we are facing today. Synthetic polymers began to replace natural materials in practically every field more than 50 years ago, and today, plastics are an essential part of our daily life.[2] Plastic generation broadly can be classified into two categories: pre-consumer or industrial waste, and post-consumer waste. The major part of wastage is generated by the post-consumer category. The pre-consumer plastic waste is produced by factories and industries like discarded byproducts while producing plastic, packaging, or printing materials. The post-consumer category pollution is the waste that the consumer generates after buying and using products, like residential or agricultural plastic. Technically, plastic has two types: Thermoplastic and Thermoset/thermosetting plastic. The plastic industry began with the production of the first synthetic plastic in 1907 and achieved its full potential in the 1950s.[3] The Second World War made it easier for the plastics sector to grow quickly since industrial might was just as important to victory as military prowess.[4] Approximately 8.3 billion metric tons (BMTs) of plastic were generated worldwide between 1950 and 2015; of this, 6.3 BMTs, or 80%, were classified as plastic garbage.[5]

Plastic pollution hinders the achievement of United Nations Sustainable Development Goals (UN SDGs) such as Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action), Goal 14 (Life Below Water), and Goal 15 (Life on Land). Plastic pollution is creating various negative implications for human health and the environment. The landfills or dumps of plastic waste can be seen on the outskirts of the cities or even in the middle of cities. This problem is not only with cities but has spread its roots to rural India also. Organic garbage is typically composted in rural settings, but plastics are a big problem since they clog drains and

[1]Walter Leal Filho & Ulla Saari et al., *An overview of the problems posed by plastic products and the role of extended producer responsibility in Europe,* 214 Journal of Cleaner Production, 550-558 (2019).
[2]Aamer Ali Shah & Fariha Hasan et. al, *Biological degradation of plastics: A comprehensive Review*, 26 Biotechnology Advances, 246–265 (2008).
[3]Abdul Rafey & Faisal Zia Siddiqui, *A Review of Plastic Waste Management in India Challenges and Opportunities,* 103 International Journal Of Environmental Analytical Chemistry, 3971-3978 (2021).
[4]Amanda Keetley, Plastic Game Changer: How to Reduce Plastic in your Organization to Make a Difference to Plastic Pollution, (2019) (ebook).
[5]NITI Aayog & UNDP, Sustainable Urban Plastic Waste Management Handbook, (2021) (ebook).

water bodies, causing waterlogging, mosquito breeding, and higher village health expenses.[6] In summary, plastic pollution poses a threat to human health, food security, biodiversity, and ecosystem services.[7] Plastic has many pollutants in it which has the potential to cause major harm to the environment. Environmental impacts of plastic pollution include- groundwater pollution, killing animals, damage to marine ecosystems, land pollution, air pollution, and disturbing the food chain.[8] Growth in Global Plastics Production 1950–2014[9]. "Since 1964, plastics production has increased twentyfold, reaching 311 million tons in 2014, and is expected to double again in 20 years and almost quadruple by 2050."[10] Plastic trash is a concerning environmental issue due to its nature, which makes it difficult or takes hundreds of years to degrade, as well as harmful and carcinogenic processing methods.[11]

Definition of Plastic, and Plastic Waste Management

Plastic was not defined in the Recycled Plastics Usage Rules, 1999, and the Plastics Manufacture, Sale and Usage Rules, 1999. Then **t**he Plastic Waste (Management and Handling) Rules, 2011, replaced the Recycled Plastics Usage Rules, 1999. For the first time, a comprehensive definition of Plastic Waste Management was provided under the Plastic Waste (Management & Handling) Rules, 2011. But there was no definition of Plastic under the Indian legal framework before the Plastic Waste Management Rules, 2016. These define "Plastic as a material that contains as an essential ingredient a high polymer such as polyethylene terephthalate, high-density polyethylene, Vinyl, low-density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, Polybutylene terephthalate."[12] "Plastic Waste" means any plastic discarded after use or after its intended use is over"[13] and Plastic Waste Management is defined as "waste management means the collection, storage, transportation reduction, reuse, recovery, recycling,

[6]Swati Bhatia & Susmita Sengupta, Reducing Plastics in Rural Areas: Scoping Paper, (Akshat Jain, ed., Centre for Science and Environment) (2023).
[7]Stephanie B. Borrelle & Chelsea M. Rochman et. al*, Why we need an international agreement on marine plastic pollution,* 114 Proceedings of the National Academy of Sciences of the United States of America, 9994-9997 (2017).
[8]Obebe S.B. & Adamu A.A., *Plastic Pollution: Causes, Effects and Preventions,* 4 International Journal of Engineering Applied Sciences and Technology, 85-95 (2020).
[9]World Economic Forum, The New Plastics Economy Rethinking the Future of Plastics (2016) (ebook).
[10]Ellen MacArthur Foundation, The New Plastics Economy: Rethinking the future of plastics & catalysing action, (June 28, 2024, 4:30 PM) https://emf.thirdlight.com/file/24/RrpCWLERyBWPZRrwS oRrB9KM2/The%20New%20Plastics%20Economy%3A%20Rethinking%20the20future%20of%20plastics%2 0%26% 20catalysing%20action.pdf.
[11]Z Murti & Dharmawan, Siswanto et. al, Review of the Circular Economy of Plastic Waste in Various Countries and Potential Applications in Indonesia, IOP Conference Series Earth Environmental Sciences (2022).
[12]Plastic Waste Management Rules, 2016, Rule 3(o).
[13]*Id.,* Rule 3(q).

composting or disposal of plastic waste in an environmentally safe manner."[14] Plastic Waste Management (Amendment) Rules, 2021 widened the scope of the definition clause by including the kinds of plastic in it, "Thermoset plastic means a plastic which becomes irreversibly rigid when heated and hence cannot be remoulded into desired shape"[15] "Thermoplastic" means a plastic which softens on heating and can be moulded into desired shape."[16] The amendment rules of 2021 also defined "Plastic waste processing" means "any process by which plastic waste is handled for the purpose of reuse, recycling, co-processing or transformation into new products"[17] and inserted the concept of Single-Use Plastic for the first time. "Single-use plastic commodity" mean "a plastic item intended to be used once for the same purpose before being disposed of or recycled."[18]

Plastic Pollution at the Global Level

Plastic is a global issue, and many countries and organizations are working to find sustainable alternatives to mitigate plastic pollution. The 2017 study, which was the first to concentrate on plastic pollution of drinking water worldwide, found that 83% of tap water samples collected worldwide contained plastic pollutants. The United States had the most contaminated tap water, followed by Lebanon and India, with a contamination rate of 94%.[19] "In 2018, the New York Times reported that microplastic particles of nine different materials were detected in humans, including the most common polypropylene (PP) and polyethylene terephthalate (PET)."[20] The worldwide plastic market is expected to reach a value of approximately US$580 billion in 2020, up from an estimated US$502 billion in 2016. This indicates that the demand for plastic is still growing.[21] "The United States is estimated to have produced 42.8 million metric tons of plastics and used 34.8 million metric tons in 2015, which was 13.3% and 10.8% of the global production and consumption, respectively making it the second-largest country in both plastic production and consumption just after China."[22] So this data shows that plastic pollution is increasing at a high rate with every passing year. However, many initiatives are being taken by

[14]Plastic Waste Management Rules, 2016*,* Rule 3(z).
[15]Plastic Waste Management (Amendment) Rules, 2021, Rule 3(vb).
[16] *Id.,* Rule 3(vc).
[17]*Id.,* Rule 3(qa).
[18]*Id.,* Rule 3(va).
[19]Plastic Fibers Found in Tap Water Around the World, Study Reveals, https://www.theguardian.Com/environm \ent/2017/sep/06/plastic-fibres-found-tap-water-around-world-study-reveals (last visited May 20, 2024).
[20]Siyu Li1a & Jinke Li et.al., *International legal system: Marine Pollution*, 174 SHS Web of Conferences (2023).
[21]United Nations Environment Programme, From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution, Nairobi, (2021) (ebook).
[22]Mengqing Kan & Chunyan Wang et. al., *Seven decades of plastic flows and stocks in the United States and pathways toward zero plastic pollution by 2050*, Journal of Industrial Ecology, (2023).

the developed and underdeveloped nations. For instance, Vietnam's National Action Plan on Marine Plastic Litter Management by 2030 seeks to reduce marine plastic litter by 75% by 2025, whilst Indonesia's National Action Plan on Marine Litter 2017-2025 suggests reducing marine plastic litter by 70% by the end of 2025.[23] Despite the many efforts to curb plastic pollution by different countries, such figures show that it's an alarming situation for the whole world if the issue of plastic is not taken seriously. The plastic that is generated in the whole world is approximately 81 percent is accounted as waste, and from this, only 9% is recycled,12% has been incinerated, and around 60% is discharged into landfills or the environment.[24]

Plastic Pollution and India

India is the fastest-growing economy, and it has the potential to become a world-class plastic waste supplier. All India Plastic Manufacturing Association Governing Council (AIPMA) Chairman *Arvind Mehta* said that "the Indian plastic industry is poised for rapid growth and the size of the plastic industry is projected to grow from Rs 3.50 lakh crore in 2022-23 to Rs 10 lakh crore in 2027-28."[25] The consumption of plastic is increasing because it is satisfying the needs of middle-class people at a shallow rate. It is cheaper than other materials like metal or glass. Due to the increase in its consumption rates, the production of plastic is also increasing day by day. The high rate of its consumption also leads to a rise in plastic wastage. The country with plastic waste mismanagement in 2016 was Indonesia with 4.28 million metric tons and then in second place was India, with 3.16 million metric tons.[26] The Central Pollution Control Board's Report (2019-20) of 35 States/UTs during the year 2019-20 is approximately 34,69,780 tons per annum of plastic waste generated in India annually.[27] This scenario of increase in plastic waste can be seen in other countries like China, the US, Japan, Indonesia, and India is also one among them. As per the latest data released by the Punjab Pollution Control Board, plastic pollution has increased two-fold in the State. In the year 2022 total of

[23]Chen Quansheng, Philosophy of Environmental Law, (Legal Publishing House Beijing, China) (2013).
[24]Maria Tsakona & Ieva Rucevska, Plastic Waste Background Report, https://gridarendalwebsitelive.s3.amazonaws.com/production/documents/:sdocument/554/original/UNEP-CHW-PWPWG.1-INF4.English.pdf?1594295332 (last visited May 08, 2024).
[25]Indian plastic market expected to reach Rs 10 lakh crore by fiscal 2027-28: AIPMA, The Economics Times, (Aug. 20, 2023) https://economictimes.indiatimes.com/industry/indl-goods/svs/paper-/-wood-/-glass/-plastic/-marbles/indian-plastic-market-expected-to-reach-rs-10-lakh-crore-by-fiscal-2027-28-aipma/articles how/102874 79.cms?from=mdr.
[26]Kara Lavender Law & Natalie Starr, The United States' contribution of plastic waste to land and ocean, https: //www.ncbi.nlm.nih.gov/pmc/articles/PMC7608798/ (last visited 25 May, 2024).
[27]NITI Aayog & UNDP, NITI Aayog-UNDP Handbook on Sustainable Urban Plastic Waste Management (2022) (ebook).

1,28,744.64 tons per annum was generated, and that is an increase of over 138%, as compared to 54,066.1 tons per annum generated in 2017.[28] The total plastic waste generation is approx. 220 million tons in 2024 worldwide, and in the year 2025, plastic waste generated by different countries is presented here under.[29]

Countries	Plastic Waste (Kilotons per year in 2025)
China	56949
USA	32352
India	11073
Brazil	6821
Japan	5469
Russian Fed.	4823
Germany	4510

(Table No. 1 Plastic waste produced by different countries)

India is ranked 5th in plastic waste generation among the most plastic-polluted nations in the world in 2019, and now on 4th in the latest reports. Global plastic output hit 436 million metric tons in 2023, and trade in plastics exceeded $1.1 trillion, making up 5% of all goods traded worldwide; but 75% of the plastic that has ever been made has ended up as waste, and a large portion of it seeps into ecosystems and the ocean.[30] Public health, food systems, ecosystems, and long-term development are all at risk due to this developing imbalance, particularly in small island and coastal nations.

Legislative Framework at the International Level for Plastic Waste Management

For the first time in the 1960s, reports started coming in on the adverse impacts of marine plastic debris. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, also known as the London Dumping Convention, was the first

[28] Vinod Kumar, Despite Ban, Plastic Waste Increase Twofold in Punjab from 2017 to 2022, Times of India, (Sept 08, 2022 http://timesofindiaindiatimes.com/articeshow/103488449.cms?utmsource=contentofinterest&utmmedIum=text&utmcampaign=cppst.

[29] Plastic Overshoot Day-Report 2024, Earth Action, 2024, https://plasticovershoot.earth/wp-content/uploads/2024/ 04/EA_POD_report_2024_summary.pdf (last visited Dec. 12, 2025).

[30]UN Trade & Development, Global Trade Update (August 2025): Mobilising trade to curb plastic pollution (UNCTAD/DITC/INF/2025/6), https://unctad.org/system/files/official-document/ditcinf2025d6en.pdf (last visited January 06, 2025).

convention to protect the marine environment. The London Dumping Convention came into force in 1975.[31] The International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL), is a significant international marine agreement that attempts to reduce ship-related pollution. It addresses trash disposal, chemicals, and oil contamination, among other types of maritime pollution. In particular, MARPOL Annexe V deals with preventing pollution from ship waste, including plastic waste.[32] Marine plastic trash was originally recognized as a potential global influence on the marine environment in the 1980s, some 30 years after industrial manufacturing began.[33] The most comprehensive international mechanism against pollution from marine plastics was the United Nations Convention on the Law of the Sea (UNCLOS), which was adopted in 1982, and the United Nations General Assembly in 2015 decided to develop it as an internationally binding instrument.[34] It is the legislative framework that regulates all marine activities as well as those that have the potential to pollute the sea, and it sets broad guidelines and norms for global sea governance. The United Nations Environment Assembly (UNEA) in 2005 held a discussion under an ad hoc open-ended expert group (AHEG) on "Analyse the effectiveness of existing and potential response options and activities on marine litter and microplastics at all levels to determine the contribution in solving the global problem."[35] "The Global Partnership on Marine Litter (GPML) was launched at the United Nations Conference on Sustainable Development (Rio+20) in June 2012."[36] To address the issue, "four United Nations Environment Assembly resolutions on marine litter and microplastics: (i) UNEP/EA.1/Res.6: Marine plastic debris and microplastics (2014), (ii) UNEP/EA.2/Res.11: Marine plastic litter and microplastics (2016), (iii) UNEP/EA.3/Res.7: Marine litter and microplastics (2017), (iv) UNEP/EA.4/Res.6: Marine plastic litter and microplastics (2019)."[37] Amendments to Annexes II, VIII, and IX of the Basel Convention were adopted at the fourteenth meeting of the Conference of the Parties to the Basel Convention (COP-14, April 29–May 10, 2019) with the goals of improving the control of transboundary

[31]The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/LC1972.pdf (last visited May 26, 2024).
[32]The International Convention for the Prevention of Pollution from Ships, 1973, https://www.imo.org/en/about/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx (last visited on 26 May, 2024).
[33]A.T. Pruter, *Sources, Quantities and Distribution of Persistent Plastics in the Marine Environment*, 18 Marine Pollution Bulletin, 305-310 (1987).
[34]G.A. Res. 69/292.
[35]UNEP/AHEG/4/1.
[36]United Nations Environment Programme, From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution, Nairobi, (2021) (ebook).
[37]United Nations Environment Assembly of the United Nations Environment Programme, Compilation of UN EA resolutions on marine litter and microplastics, https://wedocs.unep.Org/bitstreamm/handle/20.500.11822/32238/UNEAML_en.pdf?sequence=1&isAllowed=y (last visited on 30 May, 2024).

movements of plastic waste and elucidating the scope of the Convention as it relates to such waste.[38] A landmark resolution to create an international, legally binding instrument against plastic pollution, notably in the marine environment, was adopted in March 2022 during the UN Environment Assembly's restarted fifth session (UNEA-5.2).[39] India worked cooperatively with every member state to reach an agreement on the resolution that would spearhead international action against plastic pollution.[40]

Legislative Framework in India for Plastic Waste Management

- The Environment (Protection) Act, 1986
- Recycled Plastics Usage Rules, 1999,
- The Plastics Manufacture, Sale and Usage Rules, 1999
- Recycled Plastics Manufacture and Usage (Amendments) Rules, 2003
- The Plastic Waste (Management and Handling) Rules, 2011
- The Plastic Waste Management Rules, 2016
- Plastic Waste Management (Amendment) Rules, 2018
- Plastic Waste Management (Amendment) Rules, 2021
- Plastic Waste Management (Second Amendment) Rules, 2021
- Plastic Waste Management (Amendment) Rules, 2022
- Plastic Waste Management (Second Amendment) Rules, 2022
- Single-Use Plastic Ban effective from July 01, 2022
- Plastic Waste Management (Amendment) Rules, 2023
- Plastic Waste Management (Second Amendment) Rules, 2023
- Plastic Waste Management (Amendment) Rules, 2024
- Plastic Waste Management (Amendment) Rules, 2025

In the year 1860, the Indian Penal Code was passed, Chapter XIV deals with "solid waste management of offences affecting the public health, safety, convenience, decency, and morals."[41] Now it's under the chapter XV of the Bharatiya Nyaya Sanhita, 2023. Since waste

[38]The Basel Convention, 1989 https://www.basel.int/Implementation/MarinePlasticLitterandMicroplastics/Overview/tabid/6068/Default.aspx#::text=During%20the%20Basel%20Co nference%20of,management%20is%20safer%20for%20human (last visited on 26 May, 2024).
[39]UNEP/EA.5/Res.14, End Plastic Pollution: Towards an International Legally Binding Instrument, (Mar. 07, 2022).
[40]Ministry of Environment, Forest and Climate Change, Ban on identified Single Use Plastic Items from 1st July 2022, /https://pib.gov.in/PressReleasePage.aspx?PRID=1837518 (last visited May 10, 2024).
[41]The Indian Penal Code, 1860.

is a cause of various diseases and poses a danger to the health of humans, it has been regarded as a 'public nuisance' and punished accordingly. However, there is no specific section in the Sanhita on Solid Waste. Earlier, the Criminal Procedure Code of 1973 and now the Bharatiya Nagarik Suraksha Sanhita, 2023 deal with "removal of nuisance' and "empowers the Sub-Divisional Magistrate or any executive Magistrate, on receiving information, to order the removal of the public nuisance and desist from carrying on any trade or business that is causing a public nuisance."[42]

On 20th November 1998, the Recycled Plastics Usage Rules were published in the official gazette within a given period of 60 days to raise objections. The Environment (Protection) Act, 1986, in the exercise of powers conferred "under section 3(2) (viii) and section 25, Recycled Plastics Usage Rules, 1998, was passed to lay down a prohibition on the use of recycled carry bags and containers for storage and food packing."[43] **"**The minimum thickness of carry bags made out of virgin plastic shall not be less than 20 microns."[44] Then, after the consideration of all the objections on 2nd October, 1999; The Plastics Manufacture, Sale and Usage Rules, 1999 were notified. On 1st July 2002**,** the draft of an amendment to the Recycled Plastics Manufacture and Usage Rules, 1999, was published to raise objections. The Recycled Plastics Manufacture and Usage (Amendment) Rules, 2003 were passed on 17th June 2003, after considering all the objections. The Rules of 2003 substituted many provisions into the definition clause, and restrictions were imposed on the manufacturers with respect to the size of carry bags, and to strictly comply with section 8 of the Act. After this, the rules of 1999, which were amended in 2003, were replaced with the Plastic Waste (Management and Handling) Rules 2011. "The new Rules imposed a ban on the use of plastic materials in sachets for storing, packing, or selling gutkha, tobacco, and pan masala, no foodstuff will be allowed to be packed in recycled plastics or compostable plastics, recycled carry bags to have specific BIS standards, color to the prescription by the Bureau of Indian Standards (BIS), uniform thickness shall not be less than 40 microns in carry bags, etc."[45] The rules of 2011 define the waste pickers for the first time "Waste pickers" mean individuals or groups of individuals engaged in the collection of plastic waste."[46] The role and responsibilities of implementing

[42]The Criminal Procedure Code, 1973, s.133.
[43]Recycled Plastics Usage Rules, 1998, Rule 2.
[44]*Id.,* Rule 4.
[45]Press Information Bureau Government of India, https://pib.gov.in/newsite/PrintRelease.aspx?relid=69649 (last visited May 15, 2024).
[46]The Plastic Waste (Management and Handling) Rules 2011, Rule 3(q).

authorities, like municipalities, were defined,[47] and provisions regarding the marking and labelling of plastic products were laid down.[48] These regulations were the first to place more emphasis on managing plastic waste than on recycling and producing plastics. Then, in 2016, plastic waste management regulations were updated, and the Plastic Waste Management Rules, 2016 were passed in order to better implement these regulations and to emphasize plastic waste minimization, source segregation, recycling, and the involvement of waste pickers, recyclers, and waste processors in the collection of plastic waste.[49] Along with the responsibility of Urban Local Bodies,[50] the Gram Panchayats were also made accountable.[51] The rules of 2016 mandated the extended producer responsibility of producers, brand owners, and importers to establish a system for collecting back the plastic waste generated by their products.[52] "Plastic Waste Management (Amendment) Rules, 2018, laid down that the manufacture and use of multi-layered plastic which is non-recyclable or non-energy recoverable or with no alternate use of plastic if any should be phased out in two years' time"[53] and after the publication of these rules period of six months was given to producers of multi-layered plastics to register themselves with State Pollution Control Board or the Pollution Control Committees.[54] Plastic Waste Management (Amendment) Rules, 2021, were issued to make effective implementation of the Plastic Waste Management Rules, 2016. The amendment rules of 2021 inserted new definitions under rule 3; for the first time, single-use plastic has been defined as "Single-use plastic commodity, which means a plastic item intended to be used once for the same purpose before being disposed of or recycled."[55] The terms of the broad classification of plastics, "Thermoset plastic" and "Thermoplastic" have been included under the definition clause of the rules. Due to the high littering capacity of carry bags, the thickness of the plastic carry bags was increased from "fifty microns in thickness", to "seventy-five microns in thickness with effect from the 30th September 2021 and one hundred and twenty microns in thickness with effect from the 31st December 2022."[56] The rules of 2016 introduced the concept of EPR, and the rules of 2021 emphasised bringing the legal force into it. Plastic Waste Management

[47] *Id.,* Rule 6.
[48] *Id.,* Rule 8.
[49] Official Gazette of Govt. of India, Ministry of Environment, Forest and Climate Change, https://thc.nic.in/Central%20Governmental%20Rules/Plastic%20Waste%20Management%20Rules,%202016.pdf (last visited May 16, 2024).
[50] The Plastic Waste Management Rules, 2016, Rule 6.
[51] *Id.*, Rule 7**.**
[52] *Id.,* Rule 9.
[53] Plastic Waste Management (Amendment) Rules, 2018, Rule 9(3).
[54] *Id.*, Rule 9(5).
[55] *Id*., Rule 3(va).
[56] Plastic Waste Management (Amendment) Rules, 2021, Rule 4.

(Second Amendment) Rules, 2021, substituted under rule 4 of the 2016 rules that "carry bags made of recycled plastic or products made of recycled plastic shall not be used for storing, carrying, dispensing or packaging ready-to-eat or drinking foodstuff."[57] Plastic Waste Management (Amendment) Rules, 2022, introduced the concept of Imposition of Environmental Compensation. "Environmental Compensation shall be levied based upon the polluter pays principle, on person(s) not adhering to the provisions of these rules, for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution."[58] The EPR was extended for plastic packaging. "The Producers, Importers and Brand Owners shall fulfil the Extended Producers' Responsibility on plastic packaging waste as per regulations issued under these rules from time to time."[59] Plastic Waste Management (Second Amendment) Rules, 2022, introduced the definition of biodegradable plastics as an exemption from single-use plastics. "Biodegradable plastics mean plastics, other than compostable plastics, which undergo degradation by biological processes under ambient environment (terrestrial or in water) conditions, without leaving any microplastics, or visible, or distinguishable or toxic residue, which has adverse environmental impacts, adhering to laid down standards of Bureau of Indian Standards and certified by the Central Pollution Control Board."[60] Plastic Waste Management (Amendment) Rules, 2023, clarified the provisions regarding the registration of producers, brand owners, manufacturers, and importers. After that Second Amendment rules of 2023 defined the "categories of plastic packaging into five different categories."[61] "The local bodies are made accountable for submitting the report on plastic waste on 30th June 2024 to the CPCB."[62] In the year 2024, the rules were amended again under the Plastic Waste Management (Amendment) Rules, 2024. Before this, the manufacturer's raw materials could only be obtained by the producer who possessed a registration from the State Pollution Control Boards or Pollution Control Committee. But, now, raw materials are only available to producers who have registered under these guidelines.[63] The Environment Ministry has implemented regulations that make it more difficult for producers of disposable items to mark them as "biodegradable, introducing a

[57]Plastic Waste Management (Second Amendment) Rules, 2021, Rule 2.
[58]Plastic Waste Management (Amendment) Rules, 2022, Rule 18.
[59]*Id.,* Rule 9(1).
[60]Plastic Waste Management (Second Amendment) Rules, 2022, Rule 3(ac).
[61]*Id.,* Rule 2(iv).
[62]*Id.,* Rule 4.
[63]Plastic Waste Management (Amendment) Rules, 2024, Rule 4.

stipulation that they must not leave any microplastics behind."[64] The producers of disposable products cannot sell it under the name of bio-degradable products. So it can be observed that the Ministry is amending the laws again and again to make them more effective. Beginning on July 1st, 2025, manufacturers, importers, and brand owners must supply precise product information on plastic packaging via a QR code or barcode that is printed on the plastic package.[65]

Single-Use Plastics and Ban on Single-Use Plastic Products

Single-use plastics include items like water bottles, straws, bags, and cutlery that are used just once before being thrown away.[66] Single-use plastic products are defined by the UN Environment Programme (UNEP) as "an umbrella term for different types of products that are typically used once before being thrown away or recycled, which include food packaging, bottles, straws, containers, cups, cutlery, and shopping bags."[67] According to a United Nations Environment Programme estimate, up to 5 trillion single-use plastic bags are used worldwide each year, with less than 10% recycled.[68] Recognizing the pressing need for the international community to concentrate on this crucial issue, India proposed a resolution on tackling single-use plastic product pollution at the 4th United Nations Environment Assembly in 2019.[69] India took a significant step by adopting this resolution at the 4th UNEA. Prime Minister Narendra Modi declared on June 5, 2018, World Environment Day, that India would wipe out single-use plastics by 2022.[70] On August 12, 2021, India implemented regulations to phase out specific single-use plastic items that have low utility and high potential for littering. These items include lightweight plastic bags, buds with plastic sticks, balloon sticks, plastic flags, candy sticks, ice cream sticks, and polystyrene, as well as plastic plates, glasses, cutlery (plastic forks, spoons,

[64]Jacob Koshy, No microplastics: new rules queer the pitch for 'biodegradable' plastics, (March 22, 2024 03:06 AM) https://www.thehindu.com/sci-tech/energy-and-environment/no-microplastics-new-rules-queer-the-pitch-for-biodegradable-plastics/article67977130.ece

[65] The Plastic Waste Management Rules, 2016, Rule 11(1(1A).

[66]Uzair Khan, *Plastic Pollution: Understanding the Global Threat and Countermeasures,* 1 Journal of Biosensors and Bioelectronics Research 1-2 (2023).

[67]Ministry of External Affairs, Joint Commitment to Eliminate Single Use Plastic Products Pollution, https://www.mea.gov.in/bilateraldocuments.htm?dtl/36801/Joint_Commitmentto_Eliminate_Single_Use_Plastic_Proucts_Pollution 7 (last visited May 04, 2024).

[68]Uzair Khan, *Plastic Pollution: Understanding the Global Threat and Countermeasures,* 1 Journal of Biosensors and Bioelectronics Research 1-2 (2023).

[69]Ministry of Environment, Forest and Climate Change, Ban on identified Single Use Plastic Items from 1st July 2022, /https://pib.gov.in/PressReleasePage.aspx?PRID=1837518 (last visited May 10, 2024).

[70]Siddharth Ghanshyam Singh, Minakshi Solanki How bad is India's single-use plastic crisis, Down to Earth, (May 05, 2024, 5:10 PM) https://www.downtoearth.org.in/news/waste/how-bad-is-india-s-single-use-plastic-crisis94667#: ~:text =It%20came%20in to%20force%20on,circulation% 20and%20continue %20to%20be .

knives, trays), plastic stirrers, etc.[71] "Three years later, on August 12, 2021, a ban on identified single-use plastic items was notified by the Ministry of Environment, Forest and Climate Change (MOEFCC) vide the Plastic Waste Management Amendment Rules, 2021; and it came into force on July 1, 2022."[72] According to a Federation of Indian Chambers of Commerce and sector report, the plastic processing sector is predicted to increase from 13.4 MT in 2015 to 22 MT annually by 2020, with nearly half of this being single-use plastic.[73]

Conclusion

India faces an immense issue in managing its plastic waste. Even with a variety of rules and policies in place, there are still differences in how well they are applied and upheld. The increasing amount of plastic waste is a threat to public health, environmental sustainability, and economic growth. India needs to improve public awareness and its regulatory framework, and support creative solutions like circular economy models, which prioritise reducing, reusing, and recycling plastic materials to align with the SDGs. The leading position of India in this crisis highlights the urgent need for stronger policies and better infrastructure. There is a lack of accountability and transparency in plastic waste generation data; the central and state pollution control data figures do not reconcile with each other. At the village level, there is no maintenance of data for plastic waste generation. In different states, many times guidelines are issued to ban plastic bags but after a few weeks of the guidelines plastic bags can be seen everywhere. We can witness the weakness of the single-use plastic ban, many local industries and informal sectors are using banned products. Although India has introduced plastic waste management laws and various amendments from time to time, their implementation remains weak. India lacks the infrastructure that is required for the proper implementation which leads to a lack of resources for the waste management agencies.

[71]Ministry of External Affairs, Joint Commitment to Eliminate Single Use Plastic Products Pollution, https://www.mea.gov.in/bilateraldocuments.htm?dtl/36801/Joint_Commitmentto_Eliminate_Single_Use_Plastic_Proucts_Pollution7 (last visited May 04, 2024).

[72]*Ibid.*

[73]Indulekha Aravind, Just how bad is India's plastic problem, The Economics Times, (June 09, 2019) https://economictimes.Indiatimes.com/news/politics-and-nation/how-india-is-drowning-in-plastic/articleshow/69706090.cms?utm_source=contentofinterest &utm_medium=text&utmcampaign=cppst.