TOWARDS SUSTAINABLE SOLUTIONS: LEGAL CHALLENGES AND RESPONSES TO MICROPLASTIC POLLUTION

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Abstract

Micro plastic is defined as plastic particles smaller than 5 millimeters that has emerged as a critical threat to the environmental sustainability and public health. Their ubiquitous presence in ecosystems, water bodies, and even the human systems has given rise to global concern. This paper explores the multifaceted challenges posed by microplastics and evaluates the existing regulatory frameworks at both international and national levels. The paper examines India's substantial contribution to the global plastic waste and the urgent need for stringent policies. The International efforts, including resolutions passed by the United Nations Environment Assembly (UNEA) and the European Union's Nature Restoration Law, are analyzed to showcase global commitments toward mitigating plastic pollution. Domestically, India's Plastic Waste Management Rules and their amendments from 2016 to 2024 are scrutinized, with a particular focus on extended producer responsibility (EPR). The role of Sustainable Development Goals (SDGs) in guiding legal and regulatory actions is also discussed.

Keywords: *Microplastics, environmental regulations, public health, plastic pollution, National Green Tribunal (NGT), Sustainable Development Goals (SDGs), extended producer responsibility (EPR), Plastic Waste Management Rules, United Nations Environment Assembly (UNEA).*

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Introduction

> "*It is only the force of citizenry, it is only the force of the population, it is only the wisdom of the entire nation, which will determine what shall be the profile when it is we say no to plastics, we must say emphatically, 'no' to plastic*" - Justice UU Lalit[1]

Micro plastics – the small plastic particles under 5 millimeters in size – have become an urgent environmental and public health threat. The omnipresence of their material in various ecosystems, oceans, and even human bodies has garnered worldwide attention for the necessity of stricter regulations and creative solutions. In India, the subject has been pushed to center-stage by the National Green Tribunal (NGT) which is taking an active interest in addressing the environmental and health hazards of micro plastics. The NGT had earlier, in February 2024, pointed to the alarming health hazards of micro plastics, noting their capacity to enter human blood cells.[2] This led to a directive for strict compliance with environmental regulations and a study to determine the need for policy changes. In July 2024, as soon as there were reports of micro plastic contamination in Ashtamudi Lake, the tribunal directed the Kerala State Pollution Control Board and the Department of Environment to take action.[3] In March 2023, the NGT had directed multiple ministries of the government to assess a report by the Central Pollution Control Board (CPCB) on micro plastics and make any policy changes deemed necessary.[4]

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[1]District Legal Services Authority, Andhra Pradesh State Legal Services Authority & NALSA, Legal Services Programme organised at AU Convention Centre, Vishakhapatnam, June 3, 2022, available at: https://barnbench-nlul.refread.com/news/emphatically-say-no-to-plastic-supreme-court-judge-justice-uu-lalit (last visited Nov. 15, 2024).

[2]National Green Tribunal Principal Bench, New Delhi, News Item titled "All Indian salt Sugar brands contain microplastics reveals study" appearing in the Business Standard dated 13.08.2024, Original Application No.1094/2024, Coram: Hon'ble Justice Prakash Shrivastava (Chairperson) & Hon'ble Dr. A. Senthil Vel (Expert Member) (2024).

[3]National Green Tribunal Principal Bench, New Delhi, NGT asks Department of Environment, Pollution Control Board to report on microplastic contamination in Ashtamudi Lake, The Hindu, May 24, 2024, available at: https://www.thehindu.com/ (last visited Nov. 15, 2024).

[4]Tribunal on its own motion Suo Motu based on the news item titled "News reveals extent of microplastic pollution in Ashtamudi Lake" appearing in The Hindu dated 24.05.2024, Original Application No. 640/2024, Before the Hon'ble National Green Tribunal, Principal Bench, New Delhi.

In August 2024, the NGT issued another important intervention directing the Punjab Pollution Control Board to be added to discussions on solid waste management at the vegetable market in Ludhiana.[5] This showed how micro plastic pollution is linked with urban waste management systems. These events highlight the critical necessity of widespread action to address micro plastic pollution. India's role in the world's plastic waste problem is huge, accounting for 9.3 million tons of plastic waste generated a year almost 20% of the global total.[6] This stark reality demands that we devote a focused legal and regulatory solution to its mitigation.

This paper reviews international efforts, including resolutions passed by the UN Environment Assembly (UNEA). From UNEA-1 Resolution 1/6 addressing marine litter to UNEA-4 Resolution 4/6 calling for globally comprehensive networks, these efforts demonstrate the international community's recognition of the urgent action needed to combat plastic pollution. The E.U. has also been at the forefront, with the Nature Restoration Law (NRL) and the European Strategy for Plastics in a Circular Economy serving as pillars to help combat micro plastic pollution and become more sustainable.

In India, domestic legislation has been developed to address plastic pollution. In 2016, the Plastic Waste Management Rules proposed a big step in that direction — along with the concept of extended producer responsibility (EPR), making producers, brand owners and generators of plastic waste accountable for the entire lifecycle of the plastic they introduce into the environment (including its post-consumer end). This regulation has been gradually improved, through subsequent amendments in (up till) 2024, which included stricter rules for recycling, forbidding the use of single-use plastics, and extending authorship of hazardous waste regulations to non-ferrous materials such as aluminum and copper. The principle of Extended Producer Responsibility (or EPR) has been at the center of India's efforts to have producers liable for collection and recycling of waste generated from products. The focus of this approach is the reduction of environmental footprints while embedding sustainability in industrial ways. Furthermore, FSSAI has acted swiftly to address the issue by taking steps to ensure that the presence of micro plastics does not compromise food safety and applying a multi-sectoral approach to deal with this.

[5]National Green Tribunal Principal Bench, New Delhi, Kapil Dev v. State of Punjab & Ors., Original Application No. 199/2023, M.A. No. 63/2024, available at: https://greentribunal.gov.in/ (last visited Nov. 15, 2024).

[6]Down to Earth, With 20% of world's share, India is biggest generator of plastic waste (2024), available at: https://www.downtoearth.org.in/ (last visited Nov. 15, 2024).

In this paper, we examine frameworks, international initiatives and domestic regulations to provide a holistic view of micro plastics It considers landmark cases such as the *Tamil Nadu and Puducherry Paper Cup Manufacturers Association vs. the State of Tamil Nadu*[7] to relate to the judicial interventions on plastic pollution. The focus on the interaction between law mechanisms and public health aims at the cultural action of generating knowledge capable of providing an immediate application to the challenges posed by the micro plastic crisis.

International efforts to deal with Micro plastic

2.1. Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) were introduced at the United Nations in September 2015 as a blueprint for dealing with the most important global challenges of our time. These goals define a unified vision for a sustainable and equitable future. The SDGs are a global agenda to eradicate poverty, protect the planet, and ensure prosperity for all. With 17 ambitious goals and 169 measurable targets, this agenda details tangible measures to reach these aspirations by 2030.

These targets are especially important for micro plastics. Micro plastics are a global environmental and health threat, contaminating our water systems, food chains and even the air we breathe. These objectives can curb the production and release of micro plastics through sustainable consumption, destiny, and prevention in aquatic and terrestrial ecosystems. Aligning our efforts towards achieving the SDGs will allow us to mitigate the negative impact of micro plastics and ensure our future generations grow up in a healthier environment.

2.1.1. SDG 6- Clean Water and Sanitation

This may have been first eliminated but now it is emphasizing that it should be assured to everyone, since to get clean and safe water as well as a sustainable management of water and sanitation is vital for the wellbeing of our planet. The emerging problem of micro plastics is also a major threat to water systems, arising from their introduction to aquatic environments via wastewater effluent and agricultural practises. Micro plastics — generated by synthetic clothing fibers, personal care products and a host of other goods

[7]Tamil Nadu and Puducherry Paper Cup Manufacturers Association v. State of Tamil Nadu, Civil Appeal No. 8536 of 2022, 2023 LiveLaw (SC) 923.

— remain in the effluent stream even after advanced wastewater treatment processes, and represent a complex data management challenge for water management.

Important targets of SDG 6 include:

1. Guaranteeing universal access to clean, safe, and affordable drinking water.[8]
2. Enhancing water quality by curbing pollution and advancing treatment methods.[9]
3. Promoting water efficiency across all sectors and safeguarding sustainable freshwater supplies.[10]
4. Adopting integrated approaches to water resource management to ensure sustainable use.
5. Restoring and protecting water ecosystems, such as rivers, lakes, wetlands, forests, and aquifers, for ecological balance.[11]

2.1.2. SDG 11- Sustainable Cities and Communities

Urbanization must not take place at the expense of human safety and environmental thriving. This goal aims to make cities safe, resilient, and sustainable through the reduction of the impacts of disasters and urban pollution.

Important targets include:

1. By 2030, significantly lowering the number of deaths and economic losses caused by disasters, particularly water-related crises, with special attention to protecting vulnerable communities.[12]

[8]United Nations, Target 6.1: Achieve universal and equitable access to safe and affordable drinking water for all, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024)..

[9]United Nations, Target 6.3: Improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024)..

[10]United Nations, Target 6.4: Substantially increase water-use efficiency across all sectors, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[11]United Nations, Target 6.5: Implement integrated water resources management at all levels, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[12]United Nations, Target 11.5: Reduce the adverse per capita environmental impact of cities, including paying special attention to air quality and municipal and other waste management, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

2. Minimizing cities' environmental footprints by improving air quality and establishing effective waste management systems.[13]

2.1.3. SDG 12- Responsible Consumption and Production

This goal requires both reducing harm to human health and the environment through smarter resource use and waste management. Sustainable production systems and responsible consumption habits are the focus.

Important targets include:

1. Managing chemicals and waste in an environmentally sound manner throughout their life cycle to reduce adverse effects on health and ecosystems.[14]
2. Encouraging waste reduction through prevention strategies, recycling programs, and reusing resources.[15]
3. Reforming fossil fuel subsidies to eliminate market inefficiencies that lead to excessive consumption, while addressing the unique needs of developing nations and ensuring that vulnerable populations are not adversely affected.[16]

2.1.4. SDG 14- Life below Water

The health of oceans is critical for the planet's well-being. This goal aims to protect the marine environments from pollution and unsustainable practices to support biodiversity and coastal communities.

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[13]United Nations, Target 11.6: Significantly reduce the number of deaths and the number of people affected by disasters Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[14]United Nations, Target 12.4: Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[15]United Nations, Target 12.5: Substantially reduce waste generation through prevention, reduction, recycling, and reuse, Sustainable Development Goals , available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[16]United Nations, Target 12.c: Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

Important targets include:

1. By 2025, significantly reducing marine pollution, including debris and contaminants originating from land-based activities.[17]
2. Managing and conserving marine ecosystems to prevent damage, enhance resilience, and restore their productivity.[18]
3. Strengthening global collaboration by advancing scientific research, enhancing technological expertise, and sharing marine knowledge to aid developing nations, particularly small states and the least developed countries.[19]
4. Mahindra University, HyderabadThe UN Environment Assembly (UNEA) is the world's highest decision making body on environmental issues. It was set up in June 2014 meets every two years in the United Nations Environment Programme (UNEP) with headquarters in Nairobi, Kenya.[20] UNEA unites governments, civil society and the private sector to collaboratively tackle the world's most pressing environmental challenges. A major function of this body is to define the global environmental agenda, create sustainable development and environmental policies globally.[21]

The UNEA sessions address wide-ranging issues, such as climate change, biodiversity, pollution, and sustainable consumption and production. Resolutions and decisions of the Assembly set forth the guidelines for the environmental work of the United Nations and the specialized agencies. Such resolutions typically translate into policies and strategies, and actions that are recommended for Member States to implement.

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[17]United Nations, Target 14.1: Prevent and significantly reduce marine pollution of all kinds, Sustainable Development Goals , available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[18]United Nations, Target 14.2: Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[19]United Nations, Target 14.a: Increase scientific knowledge, develop research capacity and transfer marine technology, Sustainable Development Goals, available at: https://sdgs.un.org (last visited Nov. 15, 2024).

[20]United Nations Environment Programme, About the United Nations Environment Assembly, available at: https://www.unep.org/environmentassembly/about-united-nations-environment-assembly (last visited Nov. 15, 2024).

[21]*ibid*

2.2.1. UNEA-1, Resolution 1/6

Resolution 1/6 regarding Marine Plastic Debris and Microplastics, adopted at the first United Nations Environment Assembly (UNEA), in June (2014), underscores the urgency as well as the complexity of marine plastic pollution.[22] The resolution calls on the Executive Director, in cooperation with relevant institutions and stakeholders, to carry out a thorough study of main sources of marine plastic and micro plastics, including prevention, best practice and measures for action needed urgently.[23] The study is also designed to highlight analysis gaps, particularly for and in relation to diversity environments and human health, and other priorities as deemed by the GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) assessment.

2.2.2. UNEA-2, Resolution 2/11

After the adoption of the Sustainable Development Goals (SDGs) in 2015, there came Resolution 2/11, which was more comprehensive in nature than its predecessor, at UNEA-2 and focused on marine plastic litter and microplastics. Adopted on 27 May 2016,[24] reaffirming the concerns in previous resolutions and recognizing the role of relevant UN agencies, such as the International Maritime Organization (IMO). The resolution aims to prevent and significantly reduce sea-based litter dumping, enhance provisions in existing measures to ensure that adequate port reception facilities are in place, facilitate the development of innovative new approaches to addressing marine litter, and calls for an assessment of the effectiveness of international, regional and sub regional governance approaches and regulatory frameworks in addressing marine plastic litter and microplastics.[25]

2.2.3. UNEA-3, Resolution 3/7

UNEA-3 adopted Resolution 3/7 on marine plastic debris and microplastics in January 2018. It establishes an Ad Hoc Open-ended Expert Group on Marine

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[22]United Nations Environment Assembly, Second session: International environmental policy and governance issues: Marine plastic debris and microplastics (UNEP/EA.2/5) (23–27 May 2016), available at: https://www.unep.org/ (last visited Nov. 15, 2024).

[23]*ibid*

[24]United Nations Environment Assembly, Third session: Nairobi (UNEP/EA.3/Res.7) (4–6 December 2017) available at : https://apps1.unep.org/resolutions/uploads/k1800210.english.pdf (last visited Nov. 15, 2024).

[25]*ibid*

Litter and Microplastics and requests the Executive Director to enhance UNEP's ability to address marine litter and microplastics.[26] Strengthening contributions to the Global Partnerships on Marine Litter, prioritizing activities according to the best available science, and supporting capacity-building in the formulation of regional and national action plans. The resolution also highlights the need to fill data gaps and improve availability of data on sources and extents of marine litter.

2.2.4. UNEA-4, Resolution 4/6

Resolution 4/6, adopted at UNEA-4 in March 2019, repeats earlier issues and resolutions and notes important legal and policy work undertaken at other UN bodies.[27] The resolution urges the identification of possibilities for addressing marine litter in a manner consistent with existing international agreements, specifically mentioning an action plan from the MEPC to address marine plastic litter from ships. This includes calls to enhance scientific and technological knowledge through activities including convening relevant science advisory initiatives, collating data on litter sources and hazards, and recommending indicators that can help harmonize monitoring and assessment methodology.

An International Negotiating Committee (INC) was established in March 2022 during the fifth session of the United Nations Environment Assembly (UNEA). Taking place in Paris, the summit's main focus is creating a legally binding treaty address plastic pollution, especially in oceans. In Jan 2022, POPRC recommended the addition of six more chemicals to the Stockholm Convention, which will increase the ambit of the Convention. Medium-chain chlorinated paraffins, metallic salts, long-chain perfluorocarboxylic acids (and related compounds), UV-328, etc.

The INC negotiations, driven by UNEA-5.2's resolution titled "Ending Plastic Pollution," have revealed significant findings regarding microplastics in successive sessions:

1. **INC-1 (Uruguay, 2022):** The first session underlined the pressing need for global collaborations to address microplastic pollution in

[26]United Nations Environment Assembly of the United Nations Environment Programme, Third session: Nairobi (UNEP/EA.3/Res.7), Dec. 4–6, 2017, available at: https://www.unep.org/ (last visited Nov. 15, 2024).

[27]United Nations Environment Programme, UN Environment Assembly 4 Resolutions, available at : https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-4 (last visited Nov. 15, 2024).

marine systems. It exposed how microplastics have infiltrated aquatic food chains, deriving from synthetic fibers and broken-down plastics, threatening biodiversity and human health.

2. **INC-2 (Paris, 2023):** Discussions at this session revolved around possible regulatory frameworks, such as restrictions on microplastic emissions from primary sources (like textiles, cosmetics and industrial processes).[28] Delegates also mentioned the need to make use of advances in wastewater treatment technologies, in order to remove microplastics efficiently.
3. **INC-3 (Kenya, 2023):** This session explored a lifecycle approach tackling microplastic pollution throughout production and disposal. Major takeaways were recommendations to limit microplastic leakage during manufacturing and transportation, as well as to encourage biodegradable alternatives where possible.[29]
4. **INC-4 (Canada, April 2024):** Session 4 was focused on regional cooperation, and case studies where successful in reducing microplastic pollution. Discussions also addressed approaches to monitor microplastic contamination in drinking water and the feasibility of integrating microplastic data generation into national legislation that already address environmental pollution.[30]
5. **INC-5 (Republic of Korea, November 2024):** Even though INC-5 is still to happen, it is anticipated that it will close over the entire

[28]United Nations Environment Programme, Intergovernmental Negotiating Committees & Resolutions (n.d.), Intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, Second session: Paris (UNEP/PP/INC.2/5), May 29–June 2, 2023., available at: https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-4 (last visited Nov. 15, 2024).

[29]United Nations Environment Programme, Intergovernmental Negotiating Committees & Resolutions (n.d.), UNEA-5 theme: Strengthening actions for nature to achieve the Sustainable Development Goals (UNEP/EA.5/1/Rev.2), available at: https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-4 (last visited Nov. 15, 2024).

[30]United Nations Environment Programme, Intergovernmental Negotiating Committees & Resolutions (n.d.), Fourth session: Ottawa (UNEP/PP/INC.4/5), Apr. 23–29, 2024, available at: https://www.unep.org/resources/resolutions-treaties-and-decisions/UN-Environment-Assembly-4 (last visited Nov. 15, 2024)

set of guidelines to curb microplastic pollution globally.[31] Therefore, it looks to prioritize enforceable measures including stricter product labeling, industry-specific emission targets, and international cooperation on research and innovation to eliminate microplastics.

European Union on micro plastic

3.1. The EU Environmental Council adopted the Nature Restoration Law (NRL)

The EU Nature Restoration Law (NRL), the first of its kind aimed at restoring and protecting biodiversity and healthy ecosystems was endorsed by the EU Environmental Council on 17 June 2024.[32] The legislation includes all ecosystems, from land, coast, freshwater, forested, agricultural and urban areas. The scope covers major ecosystems such as wetlands, grasslands, forests, rivers, lakes and marine ecosystems (including seagrass beds and coral reefs).

As a first step at least, 20% of degraded terrestrial, marine and freshwater ecosystems within the EU to be restored by 2030, one key component of the NRL by 2030 at least is the focus on providing stronger protection for EU's most valuable ecosystems. One specific goal under the law is to restore 25,000 kilometers of European rivers to a natural, free-flowing state. The EU Joint Research Centre has just published a report to guide this process and sets out key criteria determining the free-flow state. It includes the following: Reconnecting rivers (River segmentation, longitudinal, lateral and vertical connectivity); maintaining sediment and migration pathways; requisite length for restoring rivers.

3.2. The European Strategy for Plastics in a Circular Economy

The Dry Dock belongs to a 2018 initiative by the European Union involving the European Strategy for Plastics in a Circular Economy under the 2015 Circular Economy Action Plan. It focuses on plastics: changing the way we design, use, and manage them for better sustainability. Aware of the dislike of the environmental and health risks posed by microplastics, the EU's Group of Chief Scientific Advisors (GCSA) has made two recommendations.[33] The

[31]United Nations Environment Programme, INC-5: Busan, Republic of Korea, available at: https://www.unep.org/inc-plastic-pollution/session-5 (last visited Nov. 15, 2024).

[32]Council of the European Union, Nature restoration law: Council gives final green light available at: https://www.consilium.europa.eu/ (last visited Nov. 15, 2024).

[33]European Commission, Plastics in a circular economyavailable at : https://research-and-innovation.ec.europa.eu/ (last visited Nov. 15, 2024).

need for coordinated action to address micro plastic pollution. The second lays out criteria for assessing biodegradable plastics to see where they might have an environmental edge over regular plastics. In food packaging, for example, the strategy tackles the pivotal role plastics play in their use. Multi-layer plastics play a role in food safety and reducing waste by extending the shelf-life of many products. But their unrecyclability, accompanied by a shortage of alternatives, offers a major hurdle. Banning these plastics without replacements would result in increased food waste, less safety, and a greater environmental toll from food production.[34] This too would drive up costs and upset economies of scale, raising costs for consumers.

India on Micro Plastic

4.1. The Plastic Waste Management Rules, 2016

Plastic Waste Management Rules have been issued in India for a much more stringent governance and for improved management of plastic waste. An important provision includes the increase in the minimum thickness of plastic carry bags and plastic sheets to 50 microns from 40 microns, to facilitate collection and recycling of plastic waste. These rules also apply to rural parts of the country for the first time, as plastic waste had made its way to these regions too. In rural areas, these rules are to be enforced by Gram Panchayats. The rules also hold producers, brand owners, and waste generators accountable. Under Extended Producer Responsibility (EPR), producers must implement a system to collect the plastic waste. They have to submit an action plan for waste management to State Pollution Control Boards (SPCBs), otherwise registration will not be renewed for them.[35] And producers need to keep records of which vendors they have provided raw materials to, in order to curb unregulated production.

Waste generators (including people, offices and industries) are required to segregate plastic waste at source and pay user fees. No longer can public events organizers wash their hands of the waste created at their events. Non-compliant plastic bags are not allowed to be used by retailers and street

[34]Matthews C, Moran F & Jaiswal AK, A review on European Union's strategy for plastics in a circular economy and its impact on food safety (2021) Journal of Cleaner Production 283, Article 124581

[35]Taxmann, Plastic and E-Waste Management – An analysis of regulations, responsibilities, and compliance in India, July 29, 2023, available at: https://www.taxmann.com/ (last visited Nov. 15, 2024)

vendors, who are fined if caught breaking the law. The rules also require the elimination of non-recyclable multi-layered plastics within two years and instruct the Central Pollution Control Board (CPCB) to create guidelines for thermoset plastics that cannot be recycled. Earned income from vendors and shopkeepers registration will help fund waste management and Plastic waste reduction initiatives.

4.2. The Plastic Waste Management Amendment Rules, 2021

Making this announcement, the Ministry of Environment, Forest and Climate Change stated that the Plastic Waste Management Amendment Rules were introduced to "minimize the ecological damage" from plastic litter.[36] The regulation outlaws single-use containers and tableware with little functionality and high littering potential, like plastic ear buds, balloon sticks, candy sticks, polystyrene decorations, cutlery, and various types of packaging films and banners as of July 1, 2022. Plastic carry bags have to be of minimum thickness of 75 microns with effect from 30th September 2021 or and 120 microns with effect from 31st December 2022. Additionally, plastic carry bags have to reuse and should not be thrown away after use.[37] The rules also impose Extended Producer Responsibility (EPR) on producers, importers and brand owners (PIBOs), so that they collect and channel plastic packaging waste to be treated "environmentally safe management". Finally, the EPR guidelines have been required by law to ensure compliance. These actions are indicative of a holistic approach towards minimizing plastic waste and its effects on terrestrial and aquatic ecosystems, while promoting sustainable usage patterns.

4.3. The Plastic Waste Management (Amendment) Rules, 2022

Extended Producer Responsibility (EPR) for plastic packaging was recently defined in detail with the issuance of the Plastic Waste Management (Amendment) Rules, 2022. The regulations are built on specified targets for recycled plastic packaging waste, reusable rigid plastic packaging and recycled plastic content in new products. In line with the 'polluter pays' principle, the rules hold entities liable for environmental compensation if they are unable to meet

[36]Central Pollution Control Board, Plastic Waste Management Amendment Rules, 2021, Aug. 12, 2021, available at: https://cpcb.nic.in/uploads/plasticwaste/Notification-12-08-2021.pdf (last visited Nov. 15, 2024)

[37]Ministry of Environment, Forest, and Climate Change, Government notifies the Plastic Waste Management Amendment Rules, 2021, Press Information Bureau (2021), available at: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1745433 (last visited Nov. 15, 2024)

EPR targets. This concept states that the offenders have an equal society's (public) responsibility to pay for the adverse effects on the environment, regardless of guilty intention, intending thereby to curb / reduce pollution also to ameliorate environment health. They also create a strong foundation for improving the circular economy around the management of waste from plastic packaging.

4.4. The Plastic Waste Management (Amendment) Rules 2024

Biodegradable plastics are materials that bio-degrade without leaving microplastics, as per the Plastic Waste Management (Amendment) Rules. But the rules are vague on what the chemical tests should entail to confirm microplastic absence, and the level of reduction necessary to consider it eliminated. The amendment allows the manufacture of carry bags and products made from compostable or biodegradable plastics, provided they conform to labeling standards prescribed by the Food Safety and Standards Authority of India (FSSAI). They are required to get the manufacturers registered/ certified by the Central Pollution Control Board (CPCB) before the sale of these products[38] where manufacturers are also required to process pre-consumer plastic waste and report to the relevant pollution control authorities.

4.5. Extended Producer Responsibility (EPR)

The Hazardous and Other Wastes (Management and Transboundary Movement) Second Amendment Rules, 2024 will come into effect on 1 April 2025 and will ensure Extended Producer Responsibility for producers of non-ferrous scraps such as aluminium, copper and mercury.[39] These amendments shall strengthen environmental protection while maintaining the responsibility of a business sector that includes hazardous wastes, in compliance with the 2016 rules. EPR aims to ensure that producers are responsible for the safe collection, recycling, and disposal of hazardous waste. Such methods are in accordance with sustainable waste management practices aimed at minimizing environmental impacts and promoting the responsible utilization of resources. By focusing on the entire lifespan that hazardous materials have, the rules aim

[38]Jain, A., Plastic Waste Management (Amendment) Rules, 2022 (2022), available at: https://environment.delhi.gov.in/sites/default/files/inline-files/pwm_epr_1.pdf (last visited Nov. 15, 2024)

[39]Food and Agriculture Organization of the United Nations, Plastic Waste Management (Amendment) Rules, 2024 (2024), available at: https://www.fao.org/faolex/results/details/en/c/LEX-FAOC227249 (last visited Nov. 15, 2024)

to limit the harmful effects such waste can have on ecosystems and human health. The amendments also highlight heavy penalties for compliance failures. Those who violate these new guidelines could see a up to five year sentence or a fine of one lakh rupees or both.[40] In case of continuing violations, an additional penalty of up to five thousand rupees is imposed for every day during which such contravention is continued or persisted in.[41] These measures emphasize the necessity of compliance with environmental laws and encourage responsible conduct from all parties involved.

4.6. The Food Safety and Standards Authority of India (FSSAI)

One critical issue that the FSSAI has taken a major step to combat is the contamination of food articles with micro plastics. This project, called Micro- and nano-plastics as emerging food contaminants: establishing validated methodologies and knowledge on their occurrence in diverse food matrices, started in March 2024. Its purpose is to create accurate techniques for detecting microplastics in a variety of food products and to evaluate their distribution and exposure levels in India. All Indian salt and sugar brands tested were found to contain microplastics and the concentrations showed wide variations across brands, found a recent study, including one by Toxics Link. For instance, the amount of iodine varies depending on the type of salt in use, and iodized salt has the highest concentration of those iodine pieces, standing at 89.15 pieces per kilogram whereas organic rock salt has the lowest at 6.70 pieces per kilogram.[42] The project will work with top research institutions to develop standardized protocols for analysis and create critical data on consumer exposure.

These goals should help in formulating the standardized methods of testing, inter-laboratory comparisons, and consequent regulatory interventions towards food safety in the FSSAI. Through this initiative, India is taking a step not only to protect public health in India, but also contributing to the global effort to understand and mitigate microplastic contamination in food.

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[40]Hazardous and Other Wastes (Management and Transboundary Movement) Second Amendment Rules, 2024, Chapter VIII: Extended producer responsibility for scrap of non-ferrous metals (2024)

[41]*ibid*

[42]Press Trust of India, FSSAI begins project on microplastic contamination (2024), available at: https://fssai.gov.in/upload/media/TheHindu_19082024.pdf (last visited Nov. 15, 2024

4.7. Tamil Nadu and Puducherry Paper Cup Manufacturers Association vs. the State of Tamil Nadu

Tamil Nadu and Puducherry Paper Cup Manufacturers Association vs. The State of Tamil Nadu,[43] the Tamil Nadu government in India announced a ban on the manufacture, sale, and use of "use and throwaway plastics" effective as of January 1, 2019. The ban imposed under the Environment Protection Act included many plastic products, but no mention of non-woven bags was made on the day the ban was announced, and only a clarification was issued later. The appellants disputed the ban, contending that paper cups were recyclable, and that the ban would hurt the livelihoods of many workers. They argued that the government did not adhere to the proper consultative process mandated by environmental legislation.

The Supreme Court ruled that the government has the authority to impose such a ban as it is in the public interest to prevent pollution. The Court cited previous judgements such as Liberty Oil Mills[44] and Dharampal Satyapal Ltd. v. CCE[45] which recognized that in exigent circumstances, pre-decisional hear-ings are not obliged.

Conclusion

Microplastic pollution is an urgent environmental and public health concern that requires strong legal and regulatory approaches. This paper highlights both global and local efforts to mitigate the crisis as being a combination of international resolutions, Sustainable Development Goals (SDGs) and legislative measures taken by India. Although these frameworks have provided a good starting point, enforcement remains weak and public information scarce. Microplastic pollution is complex and requires a holistic and coordinated strategy. Amending existing legislation to reflect emerging threats like the infiltration of microplastics into food and water systems will be equally important. By working together, industries, policymakers, and researchers can promote the use of good biodegradable, cheap alternatives to plastic, reducing reliance on environmentally unfriendly materials. The integration of microplastic management in SDG implementation is important and synergy across environmental and public health goals is critical to strengthening efforts.

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[43]Tamil Nadu and Puducherry Paper Cup Manufacturers Association v. State of Tamil Nadu, Civil Appeal No. 8536 of 2022, 2023 LiveLaw (SC) 923

[44]Liberty Oil Mills v. Union of India, (1984) 3 SCC 465

[45]Dharampal Satyapal Ltd. v. CCE, (2015) 8 SCC 519

A comprehensive strategy is needed to combat the ubiquitous plight of microplastic pollution. Improving monitoring systems are fundamental which will keep track on microplastic pollution on ecosystems and food webs respectively creating a data-driven policy process. Educating the society on the adverse consequences of microplastics and discouraging indiscriminate use of plastics and waste generation like single use of plastics through public awareness campaigns should be given the priority. It needs to be incentivized, too: Governments can financially and technologically support industries that are developing sustainable, biodegradable alternatives to traditional plastics. Collaboration is essential, both domestically and internationally, to facilitate the sharing of best practices, technologies, and regulatory best practices. It is legally necessary for strict adherence to the existing guidelines surrounding waste management, specifically the Plastic Waste Management Rules, and for the ambit of Extended Producer Responsibility (EPR) to be broadened to include microplastics. Stricter penalties for non-compliance, coupled with a more comprehensive integration of microplastic management into environmental and public health regulations, can significantly mitigate the impact of this pressing issue.