CHALLENGES AND POLICY PATHWAYS TO TACKLE MICROPLASTICS IN INDIA

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ABSTRACT

Microplastics emerged as omnipresent and long-lasting environmental contaminants and place extremely dangerous effects on the ecological system, the well-being of people, as well as the opportunities of sustainable development. The science on the issue paints a clear picture of a widespread microplastic pollution in the aquatic ecosystem, terrestrial soil, atmospheric matrix, and the human food supply system; still, the legal and policy structure is inadequate and fragmented in the Indian context. This paper attempts a critical evaluation of regulatory challenges that faces microplastic pollution in India, focusing on gaps of statutory acknowledgements, regulations, and enforcement procedures of the scopes of the existing environmental laws. It also questions the socio-economic and general health consequences of uninhibited microplastic growth, especially the susceptible demographic groups and ecological components. Using the examples of global policy frameworks and changing the global environmental standards, the article offers specific policy interventions to India, such as reinforcement of the precautionary principle, introduction of extended producer responsibility, introduction of specific monitoring benchmarks, and encouragement of the innovational-based policy reactions. It argues that a comprehensive, evidence based and rights based legal paradigm cannot be ignored in order to deal successfully with the mounting crisis of microplastics in the country.

Keywords: Microplastics; Environmental Rule; Plastic Waste; Precautionary Principle; Public Health.

Introduction

The emergence of microplastics, which are views as plastic particulates smaller than five millimetres in diameter has quickly become one of the most complicated and least controlled types of environmental contamination in the twenty-first century. Their distribution through all parts of the marine environment, freshwater environments, as well as soils, atmospheric levels, and the human diet system substantially challenge the modern environmental governance systems. Microplastic pollution is a latent and heavily structural ecological and human population crisis in India, as a country that is facing the threat of capacity building around plastic consumption and inadequate facilities to handle its resulting waste materials. In contrast to macro-plastic waste, which is conspicuous, microplastics do not subject themselves to the traditional regulatory frameworks and remedial strategies, which makes their management a legal and institutional challenge.

The problem of microplastics has become a notorious yet unregulated type of environmental pollution, and it presents sophisticated problems to modern law frameworks. Scientifically microplastics are often described as plastic items that are less than 5 millimetres across, either as primary microplastics, which are deliberately produced at the scale of microplastics and used in cosmetics, abrasives, and industry, or secondary microplastics, which form as a result of degradation of larger plastic waste by physical, chemical and biological factors. The legal difference is important since primary microplastics would involve an issue of control and responsibility of their products, whereas the secondary microplastics would presuppose the problem of bad waste management and environmental policies.

Scientifically, microplastics are currently present in ecologies such as in the sea, fresh water, soil and air as well. They have been proved to exist in the oceans, rivers, soil, drinkable water, food products as well as in the human biological samples. Their persistence and bio accumulative properties coupled with their capacity to serve as vectors of toxic chemicals and pathogens augment environmental and human health hazards. Nonetheless, there is a scientific doubt about the long-term physiological impacts of microplastics on the human health, especially the endocrine disturbances, cellular toxicity, and inflammations. The uncertainty leads to a serious point of congruency between science and law, particularly when it comes to environmental jurisprudence wherein risk regulation frequently occurs before complete scientific confidence.

It is due to this uncertainty that microplastics have a legal relevance. A growing environmental legal field of operation is based on the recognition that the scientific understanding of aspects of the environment remains incomplete but requires prevention. On the international front, agencies including the United Nations Environment Programme and the World Health Organization have come out to note that microplastics is emerging as a new form of environmental and health risk aspect and that states should come up with precautionary and adaptive governance measures on the issue. Even without definite causal information, these scientific alerts enhance the normative rationale of regulatory intervention.

Therefore, scientific knowledge and conceptual clarity are the origin of the creation of a unified legal solution to microplastics. There should be no law without science but scientific evidence, despite its dynamic character, should guide the implementation of constitutional environmental principles like, the right to a healthy environment, intergenerational equity, and sustainable development. The acknowledgement of the microplastics as a legally enforceable pollution is the primordial area to establish proper regulatory, policy and judicial framework to deal with this elusive yet omnipresent environmental menace.

The microplastic pollution poses a multidimensional regulatory challenge to India in most cases because this issue currently lacks a specific legal framework that can be applied to this particular nature of pollution and its effects. Although India has already done commendable progress in the control of plastic waste, microplastics are still legal blinds, and they are solemnly fixed only through the law of the larger environment (laws) and the subordination to them. This regulatory loophole is a big concern regarding the prevention, monitoring, and enforcement.

Fundamental to the environmental governance of India is the Environment (Protection) Act, 1986 (EPA), which is a widely pivotal legislation which authorized the Central Government to undertake actions to reinforce and enhance environmental wellbeing. Nevertheless, microplastics is not a defined and accepted pollutant by the EPA. This non-recognition by statute creates normative uncertainty so that even the regulators are restricted in the way to establish specific standards of that which can be allowed, regulating procedures or liability insurance, aimed at microplastic pollution in particular.

The key regulatory tool of the plastic waste in India is the Plastic Waste Management Rules, 2016, (PWM Rules) which is periodically amended. These regulations are mostly about visibly

evident and macro-level plastic waste, which is filled with collecting, segregating, recycling and disposing it. In spite of the fact that the rules come with Extended Producer Responsibility (EPR), the structure has much more focus on post-consumer plastic products and packaging. The microplastics, especially those being created as a byproduct in plastics degradation or those ones that are purposefully made to be contained in cosmetics and detergents, are not within the instant scope of the PWM Rules. This is why producers and manufacturers are rarely responsible in the process of microplastic release on the source.

The judicial interventions have contributed significantly towards the development of environmental protection in India especially through the National Green Tribunal (NGT). Nonetheless, the microplastic pollution has not taken a centre-stage in the environmental litigation or adjudication. This is because the absence of specific legal regulations makes it hard to courts and tribunes, to provide specific directions or craft jurisprudence that addresses a micro-level risk that microplastic poses to people, as compared to air or water pollution, which is under an elaborate statutory set of rules and regulations.

Lastly, the Indian regulation model is still rather reactive but not precautionary. The time delay between the scientific finding and the adoption of its application in the legally binding rules can be seen as the product of institutional inertia and the lag of the policies. This reactive stance is counterproductive to the implementation of long-standing practices in environmental ethics, like the Precautionary Principle and Intergenerational Equity, in the particular case of microplastics, where scientific ambiguity remains, but the risks involved could severely affect many people. Overall, the regulatory and institutional risks in India occur due to legislative silence, diverse governance, limited enforcement ability, gaps of data, and delay of the response to the policy. The aim of filling in these gaps is inseparable to establishing a cohesive and future-adaptable system of law that would be able to face the diffuse and ongoing menace of microplastics.

The problem of microplastic pollution is a multi-dimensional, multi-level issue that goes beyond traditional environmental sinisterity, out to the danger of the populace at large and serious socio-economic ramifications. With the Indian context, such implications are acute especially with the high population density, reliance on natural resources, and global loopholes in managing waste and environment surveillance. In terms of the environment, microplastics have been observed in the ecosystems of the Indian seawater, rivers, soils, and even in the

atmosphere of the Indian deposits. These particles take decades to break, but they end up in fragments, which are easily consumed by sea creatures and land animals as nano-sized plastics. Aquatic organisms often confuse microplastics with food, causing biomagnification and bioaccumulation of the organisms within trophic levels. This interferes with biodiversity, disturbs the functioning of the ecosystem, and poses threats to the ecological resistance. The long coastline as well as Ganga and Brahmaputra River systems and agricultural soils in India tend to be more sinks of microplastics causing worries due to irreversible destruction of the environment and decades-long pollutants of the natural commons. Municipalities living on the coast and urban fishing communities are affected by falling fish stocks and pollution of water products, which directly affect the livelihood and food security. Another area that is also becoming compromised is agriculture since microplastics in the soil compromise the soil fertility, water retention and microbial activities, hence posing a threat to crop productivity. The polluted beaches and poor natural landscapes result in reputation and economic losses to the tourism-dependent regions. They are exacerbated by raising the risk of exposure of informal waste workers who are already socially marginalised without protective solutions or regulation. Furthermore, the microplastic pollution compounds environmental injustice, and often negatively affects vulnerable and low-income groups.

The reaction to microplastic pollution around the world has been uneven with disparities in scientific ability, regulatory ideologies, as well as environmental priorities. However, it is possible to find useful pointers towards developing a good legal structure responding to this diffuse and emerging pollutant through the experiences of international and comparative policy development. The European Union (EU) has been very precautionary and proactive in the regulation of microplastics. The EU has now taken the whole step to limit the deliberate additives of microplastics in consumer goods like cosmetics, detergents, fertilisers, and industrial abrasives through the chemical regulation under the process of REACH. This is an important strategy since it does not solely consider microplastics as waste but as dangerous materials, the lifecycle of which should be controlled on the very level of production. The precautionary principle is a guiding principle of policy of the EU which permits regulatory intervention in a situation where there is a lack of scientific certainty, the precautionary principle is of particular relevance to microplastics since debates on the long-term health effects of microplastics persist. This type of ex ante regulatory regime is very different to the essentially waste-focused and post-consumption regulatory environment in India.

On the same note, the policy-analytical approach by the Organisation to Economic Co-operation and Development (OECD) has incorporated life cycle management of plastics, extended producer responsibility (EPR), and economic tools to internalise the environmental costs. OECD research predicts the relevance of the upstream interventions, namely product redesign and material innovation, in place of the end-of-pipe solutions. This economic form of governing can provide India a framework on how to incorporate environmental protection with regard to industrial policy and not to view regulation as something which limits economic growth.

The comparative study of these global solutions shows that three trends are prominent in the policymaking: first, the transition towards life-cycle regulation over waste management; second, the growing importance of precautionary and preventive regulation; and three, the inception of a transition to microplastics, as a cross-boundary and systemic environmental hazard. In the case of India, to correspond domestic law to these trends, it is important to go beyond prohibitions of conspicuous plastics and develop the overall regulation of the sources of microplastic material, adapt international best practices, and play an active role in global treaty-making. This convergence would not only reinforce domestically the environmental protection but it would also increase the credibility and leadership of India within the international environmental management.

Considering the microplastic pollution in India, an integrated approach to addressing the problem would require a future-directed, precautions-focused, and integrated legal approach to environmental protection, population health, and sustainable development. Because microplastics are not a regulated substance based on their inherent characteristics, (that is, like waste), the response by the policy-makers should not follow the accepted paradigms of waste management, but is designed on the basis of the life-cycle perspective of the issue.

To start with, microplastics ought to be formally listed as a category of environmental pollutant in the Environment (Protection) Act, 1986 in India. The existing lack of a statutory definition of it brings a regulatory gray area and undermines enforcement. Clear identity would allow the Central Government to promulgate specific rules to prescribe standards, prohibitions, and compliance measures specific to microplastic pollution. This recognition is in line with the broad understanding of the right to a clean and a healthy environment provided by the Supreme Court in the context of the Article 21 of the Constitution.

Second, the precautionary principle should become operational in the control of microplastic. The uncertainty of scientific opinion on long-term health effects should not hinder regulation. India can also follow the example of precautionary bans or limits on deliberately added microplastics in cosmetics, personal-care products and industrial abrasives through international leading practices. The regulatory thresholds and safe limits must be reviewed periodically based on the new scientific findings.

Third, the institutional and substantive expansion of the producer responsibility should be extended through the extended producer responsibility (EPR). The existing EPR systems as provided in rules on Plastic Waste management mostly emphasize on post-consumer plastic garbage. These need to be reestablished to include the aspect of responsibility in terms of microplastic production throughout the full product life cycle, which consists of textile fibres, tyre–wear particles, and industrial pellets. The manufacturers should be required to finance research, surveillance facilities and cleanup, and thus internalise the expenses of the environment in terms of the polluter-pays principle.

Fourth, India should have a microplastic national monitoring and data framework. Currently, standardized methods of sampling, testing, and reporting are missing, and they compromise evidence-based policymaking. The more coordinating nodal agency in partnership with the Central Pollution Control Board, research institutions and state authorities must be entrusted with the responsibility of coming up with standardized methodologies, maintaining national databases as well as publishing periodic risk assessment. Disclosure that is legally enforced and accessible to the public would increase the level of transparency and accountability.

Fifth, it is essential to strengthen institutions and control judicially. The National Green Tribunal (NGT) can take a catalytic property and address microplastic pollution as an environment degradation subcategory and instruct regulatory agencies to frame focused action plans. The jurisdiction of central, state and municipal authorities should be well coordinated to prevent fragmentation in regulation especially in coastal and riverine areas.

Conclusion

Microplastics represent a rather silent yet pervasive cause of environmental degradation- it infiltrates different matrices, it possesses a persistent nature, and is deeply connected with the modern production and consumption processes. The issue is also compounded by a system of

poor regulatory laws within the Indian context, epistemic uncertainties in scientific knowledge, poor monitoring apparatuses, and institutional enforcement failures. The existing environmental laws and regulations concerning plastic waste, despite their progressive orientations of thoughts, are not well suited to address the peculiarities of microplastic pollutions that are beyond conventional definitions of the terms of waste and point-source contamination.

India needs policy channels that are multi-dimensional: the reach of Extended Producer Responsibility needs to include microplastic emissions, the establishment of national standards of detection and monitoring, support the development of materials with less harmful characteristics and more engagement of the population in the processes of environmental decision-making. It will also need harmonising domestic legislation with the emerging trends towards international best practices in solutions to the transboundary nature of microplastic pollution.

Finally, the reduction of the microplastic pollution is not just an environmental resource obligation but a constitutional, population and intergenerational responsibility. A unified and far-sighted legal reaction which is implemented to date will define how India will be able to maintain ecological wholeness and human life in an age of unseen pollutants.

References

1. Ministry of Environment, Forest and Climate Change, *Draft Regulations on Extended Producer Responsibility for Plastic Packaging* (2022).

2. Central Pollution Control Board, *Status Report on Microplastics in Indian Rivers* (2022).

3. NITI Aayog, *Strategy for Resource Efficiency in India* (2019).

4. United Nations Environment Programme, *Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations* (2018).

5. United Nations Environment Assembly, Resolution 5/14, *End Plastic Pollution: Towards an International Legally Binding Instrument* (2022).

6. World Health Organization, *Dietary and Inhalation Exposure to Nano- and Microplastic Particles and Potential Implications for Human Health* (2022).

7. GESAMP, *Sources, Fate and Effects of Microplastics in the Marine Environment* (2015, updated 2016).

8. Organisation for Economic Co-operation and Development (OECD), *Policy Scenarios for Eliminating Plastic Pollution by 2040* (2022).

9. European Parliament and Council Regulation (EU) No 1907/2006 (REACH Regulation).

10. European Chemicals Agency (ECHA), *Restriction of Intentionally Added Microplastics under REACH* (2023).

11. Shweta Narayan & Ananth Padmanabhan, Plastic Waste Governance in India: Between Law and Implementation, 13 NUJS L. Rev. 45 (2020).

12. Lavanya Rajamani, The Principle of Common but Differentiated Responsibility and Indian Environmental Jurisprudence, 35 Econ. & Pol. Wkly. 2349 (2000).

13. P. Leelakrishnan, *Environmental Law in India* (5th ed., 2019).

14. Philippe Sands et al., *Principles of International Environmental Law* (4th ed., 2018).

15. Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration), 1972.

16. Rio Declaration on Environment and Development, 1992.

17. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989 (as amended).

18. Almitra H. Patel v. Union of India, (2000) 2 SCC 679 (India).

19. Indian Council for Enviro-Legal Action v. Union of India, (1996) 3 SCC 212 (India).

20. Subhash Kumar v. State of Bihar, (1991) 1 SCC 598 (India).

21. A.P. Pollution Control Board v. Prof. M.V. Nayudu, (1999) 2 SCC 718 (India).

22. United Nations Development Programme, *Plastic Waste Management in India – Current Status and Way Forward* (2020).

23. Jambeck et al., Plastic Waste Inputs from Land into the Ocean, 347 Science 768 (2015).

24. Rochman et al., Anthropogenic Debris in Seafood: Plastic Pollution and its Implications for Human Consumers, 20 Sci. Rep. 1 (2015).

25. Central Pollution Control Board, *Annual Report on Implementation of Plastic Waste Management Rules* (Latest Edition).