# Pathway to a Plastic-Free and Sustainable India

***The editorial is based on "Familiar Impasse: On the Global Response to Eliminating Plastic Pollution," published in The Hindu on 19/08/2025. It addresses global resistance to a universal plastic pollution treaty and highlights India's significant plastic waste challenge and the need for a more effective as well as coordinated approach to reduce plastic production and improve recycling.***

**For Prelims: Project REPLAN, Plastic Waste Management Rules, India Plastics Pact, Swachh Bharat Mission**

**For Mains:** Plastic Waste Management in India: Related Challenges and Way Forward

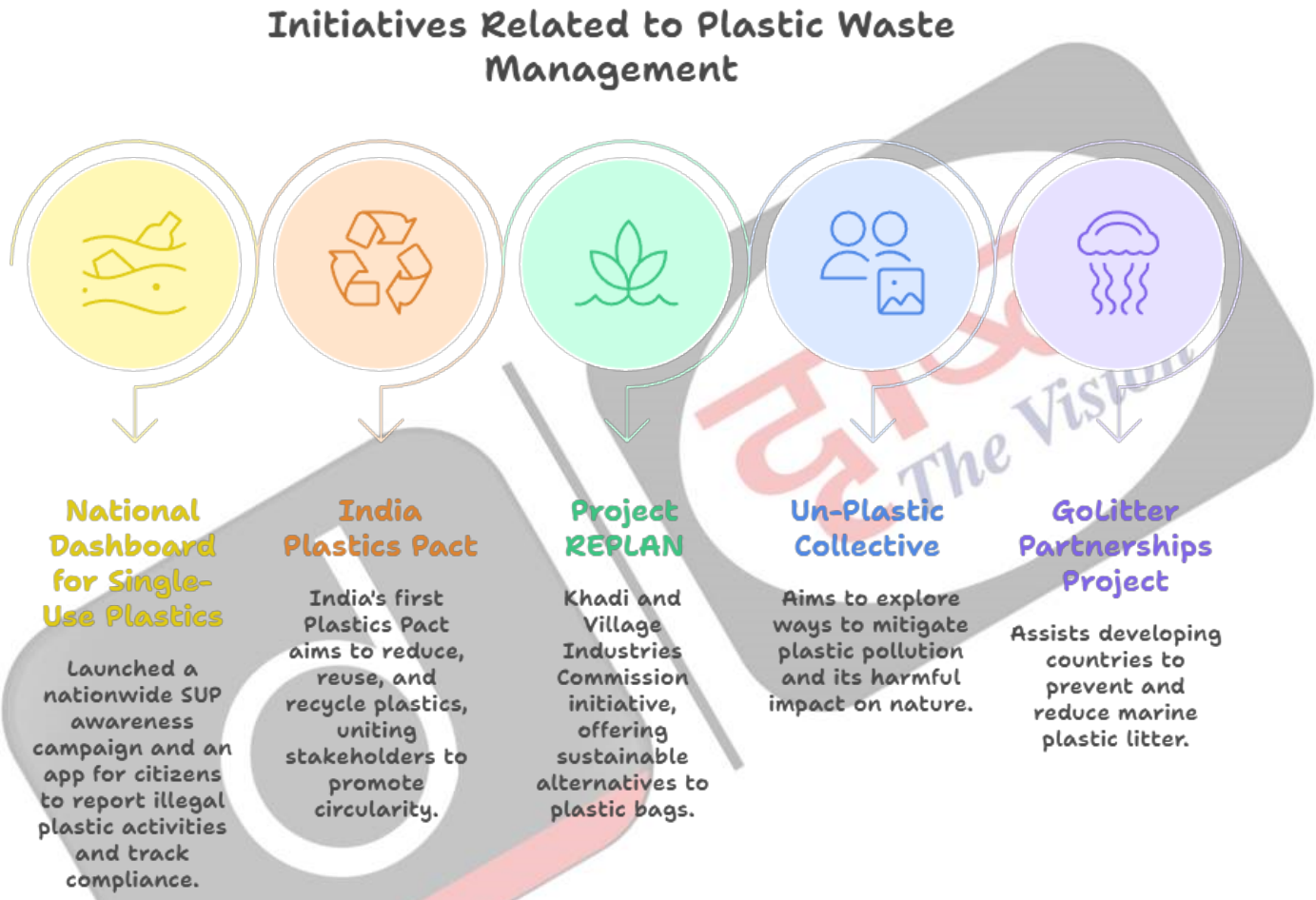
India is facing a significant **plastic waste challenge**, **generating 3.4 million tonnes annually,** with only 30% being recycled. As plastic consumption continues to rise, reducing plastic production at the source becomes essential. While **global discussions on a universal treaty to eliminate plastic pollution** are ongoing, India's role in shaping effective solutions remains crucial. The challenge lies in **reconciling national priorities with the need for stronger international cooperation and agreements**.

## What is the Current Scenario and Institutional Mechanism for Plastic Waste Management in India?

- **Current Scenario:** India is **among the top producers of plastic waste globally**, generating approximately **9 million tons annually,** accounting for nearly one-fifth of the global total.
    - This figure is significantly **higher than Nigeria** (3.5 mt), **Indonesia (**3.4 mt), and **China** (2.8 mt).
        - The quantity of plastic waste produced worldwide is projected to increase almost three times from 353 million tonnes in 2019 to **1,014 million tonnes by 2060,** with India expected to contribute a significant share to this rise.
    - Also, according to the FICCI, **India may lose USD 133 billion in material value** from plastic packaging waste by 2030.
- **Related Institutional Mechanism:**
    - **Solid Waste Management Rules, 2016:** Focused on waste segregation at source, manufacturer responsibility, and user fees for waste collection, ensuring scientific waste management practices.
    - **Plastic Waste Management Rules, 2016:** Introduced **Extended Producer Responsibility (EPR)** for plastic producers, raising plastic carry bag thickness to 50 microns.
        - It **mandated segregation and proper disposal** of plastic waste, including in rural areas, in its implementation.
    - **Plastic Waste Management Amendment Rules, 2018:** Phased out non-recyclable

Multi-Layered Plastics (MLP) and introduced a registration system for producers under **CPCB**, enhancing accountability in plastic waste management.

- **Plastic Waste Management Amendment Rules, 2021:** Banned Single-use Plastics (SUPs) by 2022 and **increased plastic bag thickness to 120 microns**.
    - Strengthened EPR rules for packaging waste, promoting recycling and design for reuse.
- **Plastic Waste Management Amendment Rules, 2022:** Establish mandatory recycling and reuse targets, accompanied by environmental compensation for non-compliance, and promote a circular economy approach for plastic recovery and reuse.
- **Plastic Waste Management Amendment Rules, 2024:** Defined registration, reporting, and certification requirements for manufacturers.
    - Introduced **certification for biodegradable plastics** and mandates reporting of pre-consumer plastic waste.




## What are the Key Challenges Hindering Effective Plastic Waste Management in India?

- **Lack of Adequate Infrastructure for Waste Collection and Recycling:** Under the **Swachh Bharat Mission – Urban 2.0**, **Urban Local Bodies (ULBs)** are mandated to ensure 100% waste segregation and provide access to **Material Recovery Facilities (MRFs)**. However, India's waste management systems are still not equipped to handle the growing volume of plastic waste.
    - Around **77% of the waste generated in cities is dumped into open landfills** without treatment, and **only 60% of plastic waste is recycled**, often inefficiently, through the informal sector.
        - For example, the **Ghazipur landfill in Delhi continues to expand**, posing severe environmental and health risks.
    - Moreover, **India burns roughly 5.8 million tonnes (mt) of plastic each year**, and releases another 3.5 mt of plastic into the environment (land, air, water) as debris.

- **Fragmented Extended Producer Responsibility (EPR) System:** The EPR system in India, although a step forward, is largely inefficient due to weak compliance monitoring and reliance on self-reporting.
    - Producers are supposed to collect and recycle an equivalent amount of plastic waste they produce, but a **lack of third-party auditing and data transparency** has led to subpar outcomes.
        - As per the **report by the Centre for Science and Environment (CSE)**, data shows significant issues with the EPR system, highlighting that over 40,000 registrations exist, but major polluters, such as **producers (responsible for 65% of plastic), are underrepresented**.
    - Also, a CPCB report stated that **plastic recyclers in India generated about 7 lakh fake certificates,** which is 38 times higher than their actual recycling capacity, exposing major loopholes in the enforcement of EPR.
- **Weak Execution of Plastic Waste Management Policies** India's plastic waste management faces significant challenges due to fragmented governance across various levels, **ranging from local municipal bodies to state and national agencies**.
    - Although India has enacted **Plastic Waste Management (PWM) Rules (2016)** and subsequent amendments, enforcement remains weak.
        - Despite bans on Single-use Plastics such as bags, straws, and cutlery, a FICCI report states that packaging consumption of **Single Use Plastic (SUP) in India accounts for 43%, compared to the global average of 35%**.
    - **Informal workers**, who are responsible for managing about 60% of the country's plastic recycling, **are often excluded from formal waste management systems**, further undermining the efficiency and coherence of governance.
    - While cities like **Pune in Maharashtra and Ambikapur in Chhattisgarh have made strides in managing plastic waste**, coordination at the national level remains inadequate, leaving local bodies without the necessary support to implement strategies effectively.
- **E-commerce and Packaging Proliferation:** The rapid growth of **e-commerce** in India has significantly contributed to the proliferation of plastic packaging, **particularly single-use plastics** such as bubble wraps, plastic bags, and shrink wraps.
    - With increasing online shopping, **the demand for convenient and cost-effective packaging materials has risen**, leading to a surge in plastic waste.
    - In 2023, India's e-commerce sector generated about **1.2 million tonnes (MT)** of plastic waste.
        - This **not only strains the existing waste management systems but also hampers recycling efforts** due to the mix of materials used in e-commerce packaging.
- **Lack of Sufficient Alternatives and Innovation in Plastic Substitutes:** India's transition away from Single Use Plastics is hindered by the limited availability and scalability of effective alternatives.
    - Despite **biodegradable alternatives like palm leaf and bagasse (sugarcane residue) products**, people often choose readily available plastic cutlery, prioritizing convenience over environmental sustainability.
        - This **preference for easy-to-use plastic items** highlights the challenge of shifting consumer behavior toward more sustainable choices.
    - Also, for example, **bioplastics can be 2 to 5 times more expensive than traditional plastics**, making it difficult for companies to adopt them at scale without increasing consumer prices.
- **Gaps in Public Awareness and Resistance to Change:** A major challenge hindering India's plastic waste management efforts is the insufficient public awareness.
    - **Although initiatives like the Swachh Bharat Mission exist,** they sometimes fall short in deeply engaging communities and fostering lasting changes in behavior regarding plastic use and waste management.
    - A 2025 study found that **only 42% of participants were aware of single-use plastics**.
        - Moreover, a 2023 report by NITI Aayog indicates that **only 17% of Indian households practice full waste segregation**.

## What Strategies can be Adopted to Strengthen Plastic Waste Management in India?

- **Decentralized Waste Management:** A shift in focus is needed towards developing **decentralized, localized waste management systems** rather than depending entirely on large-scale centralized facilities.
    - One potential solution is the **establishment of community or ward-level Material Recovery Facilities (MRFs)**, which could be equipped with advanced sorting technologies, such as **AI-powered machines**.
        - These facilities would streamline the separation of plastics and other waste materials, reducing transportation expenses while ensuring faster processing and improved recycling efficiency.
- **Promoting Micro-Level Waste Segregation:** A key strategy for improving local waste management is fostering **waste segregation at the micro level within communities.**
    - This entails motivating households and small businesses to sort their waste at the source, focusing on categories like plastics, food waste, and non-recyclables.
        - Countries like **Germany, Sweden, and Singapore have implemented robust waste segregation** and recycling systems, supported by strong policy frameworks and public participation.
    - To encourage participation, **local waste collection systems could offer incentives or public recognition** (such as the **Indore Model**) to those who consistently adhere to proper segregation practices, thereby cultivating a community-led approach to managing plastic waste.
- **Strengthened Extended Producer Responsibility:** EPR must move beyond tokenistic compliance towards a digitally traceable, accountable framework.
    - **Integrating blockchain-led plastic tracking systems** and **geo-tagged collection networks** can bring transparency across the value chain.
    - Industries should be **mandated to submit annual plastic neutrality certificates**, verified through third-party audits.
    - By **integrating informal waste workers into formal EPR compliance**, social inclusivity is ensured. This will **create a robust polluter-pays ecosystem** aligned with sustainable business practices.
- **Regulated Market for Plastic Alternatives:** A regulated market for plastic alternatives is crucial to **encourage the development and adoption of sustainable materials.**
    - Governments **can implement policies and standards** that promote the use of biodegradable, recyclable, or reusable materials while ensuring they meet safety and environmental guidelines.
        - In the **European Union**, the SUPs Directive has set regulations that ban certain plastic products while encouraging the development and use of sustainable alternatives.
        - Moreover, **Vadodara's (Gujarat) cotton bag vending machines** are a positive step towards promoting eco-friendly alternatives to plastic, supporting the shift to sustainable materials.
    - **Linking farmers with agro-waste-to-packaging industries** can create rural employment while addressing plastic substitution. This ensures a gradual but resilient transition away from single-use plastics.
    - Such **regulatory frameworks would create a level playing field for businesses** to innovate and transition from conventional plastics to more eco-friendly alternatives.
- **Formalizing and Integrating the Informal Waste Sector:** India’s recycling economy relies on **1.5 to 4 million informal waste workers,** but their potential is hindered by unsafe working conditions, lack of recognition, and unstable supply chains.
    - Municipal segregation can improve their income and working conditions.
        - For example, **Pune’s SWaCH cooperative** boosted waste pickers' incomes by up to 40% by partnering with the municipality and gaining access to cleaner, sorted plastic waste.
    - **Recognizing waste pickers as "environmental service providers"** and offering micro-loans, PPE kits, and training could enhance efficiency and create green livelihoods.
- **Strengthening Plastic Waste Regulations for Small and Medium Enterprises**

**(SMEs):** There should be a focused effort to help SMEs transition from plastic use to sustainable alternatives.
    - Government programs **can offer subsidies, training, and technology support to these businesses**, ensuring they adopt eco-friendly practices without compromising their operations.
    - Streamlining the process for SMEs to adopt compliance with plastic waste regulations would facilitate their participation in national plastic reduction goals.
- **Enhanced Enforcement of Plastic Bans through Technology:** Implementing a technology-driven approach can significantly strengthen the enforcement of plastic bans.
    - By **utilizing data analytics and AI-powered surveillance**, authorities can monitor plastic usage and sales in real-time.
    - Developing **mobile applications would enable citizens to report illegal plastic activities**, while a centralized digital platform could automate penalties and facilitate communication between regulators and the public.
        - For instance, **in China, cities have deployed facial recognition technology** in public trash bins to encourage proper waste disposal.
    - This integrated system would enhance monitoring capabilities and ensure prompt action against violators.
        - E-commerce platforms can also be incentivised to **adopt sustainable packaging solutions**, promoting the use of biodegradable or recyclable materials.
- **Public-Private Partnerships (PPPs) for Technology Adoption:** To enhance recycling infrastructure, the government should foster PPPs aimed at developing advanced sorting technologies and waste-to-energy systems.
    - These partnerships can also support the use of plastic waste as a resource for innovative solutions, such as **creating high-quality 3D printing filaments from recycled plastic**.
    - Additionally, the **government can encourage investments in plastic-to-fuel technologies**, turning waste plastics into valuable energy resources.
    - By offering incentives and subsidies to clean-tech **startups** in the waste management sector, the government can accelerate the growth of sustainable solutions.
- **National Plastic Waste Awareness and Education Campaigns:** There is a need for **large-scale educational campaigns** aimed at both urban and rural communities to highlight the environmental consequences of plastic pollution and the importance of waste segregation.
    - These **initiatives should focus on shifting behaviors, promoting sustainable consumption**, and encouraging responsible waste disposal.
    - For instance, in a Kashmiri village, the **“Give Plastic-Take Gold” initiative** motivated residents to trade plastic waste for gold coins, **resulting in a nearly plastic-free environment**.
        - Such innovative **initiatives can be scaled up to promote awareness and drive behavioral change** towards better plastic waste management.
    - Additionally, integrating waste management education into **school curricula can help instill sustainable habits from a young age**.

## Conclusion

India’s plastic waste challenge requires a forward-looking approach driven by innovative solutions and sustainability. To achieve the targets of **SDG 12 (Responsible Consumption and Production**), India must focus on creating a **circular economy** that emphasizes reducing plastic production at the source, improving recycling, and fostering sustainable alternatives. The future of plastic waste management hinges on **collaboration, stronger enforcement, and a commitment to sustainable practices** that support both environmental and economic growth.

***Drishti Mains Question***

Analyze the major challenges in plastic waste management in India and propose effective strategies to improve recycling, reduce plastic production, and promote sustainability.

## UPSC Civil Services Examination Previous Year Question (PYQ)

## ***Prelims***

**Q. In India, 'extend producer responsibility' was introduced as an important feature in which of the following? (2019)**

(a) The Bio-medical Waste (Management and Handling) Rules, 1998

(b) The Recycled Plastic (Manufacturing and Usage) Rules, 1999

(c) The e-Waste (Management and Handling) Rules, 2011

(d) The Food Safety and Standard Regulations, 2011

**Ans: (c)**

**Q. How is the National Green Tribunal (NGT) different from the Central Pollution Control Board (CPCB)? (2018)**

1. The NGT has been established by an Act whereas the CPCB has been created by an executive order of the Government.
2. The NGT provides environmental justice and helps reduce the burden of litigation in the higher courts whereas the CPCB promotes cleanliness of streams and wells, and aims to improve the quality of air in the country.

**Which of the statements given above is/are correct?**

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

**Ans: (b)**

**Q. Why is there a great concern about the 'microbeads' that are released into the environment? (2019)**

(a) They are considered harmful to marine ecosystems.

(b) They are considered to cause skin cancer in children.

(c) They are small enough to be absorbed by crop plants in irrigated fields.

(d) They are often found to be used as food adulterants.

**Ans: (a)**

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## ***Mains***

**Q.** What are the impediments in disposing of the huge quantities of discarded solid waste which are continuously being generated? How do we safely remove the toxic wastes that have been accumulating in our habitable environment? **(2018)**