UP ROADSHOW 2021

PATHWAYS FOR PREVENTING RIVERINE & MARINE LITTER:

ENABLING A CIRCULAR ECONOMY FRAMEWORK FOR THE STATE OF UTTAR PRADESH

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
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Uttar Pradesh Roadshow 2021
Pathways For Preventing Riverine & Marine Litter:
Enabling A Circular Economy Framework For The State Of Uttar Pradesh

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Foreword

MR MANOJ SINGH, IAS, ADDITIONAL CHIEF SECRETARY, DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVERNMENT OF UTTAR PRADESH

PLASTIC WASTE LEAKAGES into rivers and oceans are a global issue. Macroplastics and microplastics have become ubiquitous in landscapes as well as in marine and riverine ecosystems. As per global estimates, more than 10 million tonnes of plastic enter the oceans annually, and plastics make up 80% of all marine litter. This accumulation of plastics into the environment is growing rapidly due to increase in plastic consumption and unsustainable plastic waste management practices. According to a 2017 article published in the journal Environmental Science & Technology, of the world's ten rivers that carry 90% of the plastics the oceans receive, three are in India: the Indus, the Ganga and the Brahmaputra (MoEFCC, 2018). For a state like Uttar Pradesh where river Ganga majorly flows through and plastic waste generation is over 1.5 Lakh tonnes annually, collective and collaborative strategies are needed for tackling the issue of marine litter.

However, the international mobilisation for reducing plastic leakage into waterways and seas is also gaining attention. For instance, the United Nations Agenda 2030 for Sustainable Development intends to "prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution" by 2025 (UNGA 2015). The target 14.1 of the Sustainiable Develeopment Goal (SDG) 14 provides for prevention and significantly reduction of marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by 2025. In order to achieve this SDG 14, concerted action at different levels and by various stakeholders is required. The Hon'ble Prime Minister has urged all the stakeholders in the country including the start-ups to innovate and develop technologies to manage plastics. On the policy front, the Ministry of Environment, Forest and Climate Change (MoEF&CC) had notified the Plastic Waste Management (PWM) Rules in 2016. This was amended subsequently to bring a holistic approach for waste management, clearly delineating the responsibilities of different stakeholders especially the Producers, Brand Owners and Importers (PIBOs). The policy mandates to minimize generation of plastic waste, source segregation of various types of waste and aims to follow a waste to-wealth pathway via recovery, reuse and recycling. The Plastic Waste Management Rules 2016 has also been amended to fast-track the elimination of single-use plastics and promote alternatives. The PWM Rules have mandated the producers and brand owners to devise a plan in consultation with local bodies to introduce a collect-back system. This system known as the Extended Producer Responsibility (EPR) helps to integrate the environmental costs connected with products' life cycles. Recently, MoEF&CC had announced the PWM (Amendment) Rules, 2022, which notified the instructions on EPR for plastic packaging.

Various measures and initiatives have been undertaken by the Government of Uttar Pradesh for the management of plastic waste. The state has imposed a ban on the use, manufacture, sale, distribution, storage, transport, import, or export of all kinds of plastic carry bags, single-use plastic and thermacol disposables in all urban and industrial areas on 15th July 2018 as per the guidelines of the Plastic Waste Management Rules 2016 (amended 2018). The state has also constituted a "Special Task Force (STF)" to strengthen the effective execution of the PWM rules enabling multi-level governance to manage plastic waste till end-of-life. The state is also developing state guidelines and SOPs to monitor recyclers and issuance of certificates for plastic credits under EPR. The state has taken measures to screen the storm water drains which are primary source of plastic waste entering the riverine and marine ecosystems. State has also issued guidelines for cities to identify hotspots of littering and adopt appropriate mitigation mechanisms. In addition, state is also ensuring convergence with national missions such as the Swachh Bharat Mission and National Mission for Clean Ganga for enabling knowledge and developing infrastructure for managing marine litter.

Scientific knowledge, sharing of best practices, and partnerships to work together are essential to address the common and emerging challenges. The necessary legislative measures have been put in place in the country to tackle plastic waste, however, implementation mechanisms to manage litter must be based on circular economy approaches. With the objective that all the departments and private actors need to work cohesively to address the challenges of plastic waste management, the Indo-German technical cooperation project Circular Economy Solutions Preventing Marine Litter in Ecosystems (CES) is being jointly implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Ministry of Environment, Forests and Climate Change (MoEFCC) Government of India & Department of Environment, Forest & Climate Change, UP. The CES Project focus ranges from tracking and monitoring of marine/riverine litter in Uttar Pradesh to the demonstration of technological solutions on reduction, reuse and recycling of plastics for supporting the national framework of Extended Producer Responsibility (EPR) implementation in India. The recently concluded Noida Roadshow on "Creating awareness to prevent Marine/Riverine litter in Ecosystem" in December 2021 is marked as a flagship event by the Department of Environment, Forest & Climate Change, Uttar Pradesh Government and GIZ India under CES Project to promote multi stakeholder engagement on Plastic Waste Management in the state of UP. This event witnessed thematic discussions with key representatives in the government and industry sector on policies and technologies to address the issue of plastics management and provided a platform to start-ups to showcase innovative technologies and solutions to prevent plastic litter. Since plastics is an unavoidable commodity and forms a part of all part of the social strata, all departments and private actors need to work cohesively to address the challenges of plastic waste management.

From the consultations and thematic discussions held during the Roadshow, a charter was envisaged, aiming to look intothe overarching goal of closing the material cycles of marine litter via circular economy approaches and thereby supporting the state of Uttar Pradesh intackling plastic litter.

I would like to warmly congratulate the entire team of officials from the Department of Environment, Forest and Climate Change, Government of Uttar Pradesh and GIZ India for the remarkable efforts to initiate such a dialogue and come out with the 'Uttar Pradesh Charter on Plastic Waste Management' to facilitate and guide the state to take further the mission of Circularity in Plastic Waste Management.

Preface

MR ASHISH TIWARI, IFS, SECRETARY,
DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVERNMENT OF UTTAR PRADESH

PLASTICS CONSTITUTE A VERY important segment of the Indian economy and contribute significantly to the growth of various key sectors in the country such as Automotive, Agriculture, Construction, Electronics, Healthcare, Textiles and FMCG etc. Plastic is a highly desirable material and finds wide industrial applications due to its properties such as low cost, lightweight, durability and high strength. The same properties unfortunately also make its disposal a challenge. This has serious social, environmental, and economic implications besides sustainability. Most of the companies use Multi-Layered Plastics (MLP), Polypropylene (PP), Low Density Polyethylene (LDPE) and Polyethylene Terephthalate (PET).

Plastic commodities have boosted the culture of use and throw. Its growing consumption and mismanagement in disposal are root causes for plastic litter in riverine/marine ecosystems, resulting in further negative socio-economic impacts. Promoting integrated sustainable waste management is the key to prevent riverine/marine litter.

A fundamental change is necessary on the way plastic products including packaging are designed, used, and disposed. One key solution is managing plastic waste in an efficient, responsible manner by fostering circularity in use of plastics. Circular economy measures/models retain the added value of goods as long as possible, reducing waste and keeping the value of plastics in the economy, without leakage into the natural environment. Implementing Extended Producer Responsibility (EPR) mechanisms as well as Deposit-Refund Systems (DRS) can play an important role in this regard. Such actions contribute to the global Sustainable Development Goals (SDGs) including SDG 12 ensuring sustainable consumption and production patterns, and SDG 14 reducing marine pollution.

In line with the clarion call given by the Prime Minister Shri. Narendra Modi to phase out single-use plastics by 2022, the Ministry of Environment, Forest and Climate Change, Government of India has notified the Plastic Waste Management Amendment Rules which prohibits identified single-use plastic items with low utility and high littering potential. The Government of Uttar Pradesh has already started complying with the local regulations and National commitments. Regular enforcement drives are carried out for compliance of the prohibition on carry bags, single-use plastics and thermocol cutlery. Around 1045 MT of prohibited items have been confiscated and a fine of over Rs. 14.5 Crores has been imposed on defaulters till January 2022. Plastic waste used for road construction amounts to 100 tonnes, which was used in Lucknow, Kanpur, Meerut and Jhansi. Capacity for Plastic Waste to Oil of 6 tonne/day is installed in Jhansi and the Urban Development Department has already sanctioned budgets and design of Material Recovery Facilities (MRFs) to be set up in each urban local body of the state. Further, manufacturers and

corporates are making efforts ranging from undertaking buyback schemes for collection of plastic wastes to increasing the recycled content in their plastics packaging.

The Uttar Pradesh Government together with GIZ India is undertaking various initiatives towards addressing the challenge of plastic waste with focus on a paradigm shift from the linear 'take-make-waste' model to 'plastics circular economy' regime. Tackling the issue, a joint project has been initiated by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) in partnership with the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India and the Department of Environment, Forest and Climate Change (DoEFCC), Government of Uttar Pradesh, and implemented by GIZ India. DoEFCC and GIZ is working closely in four cities - Varanasi, Prayagraj, Mirzapur and Kanpur for developing a circular economy approach across the entire life cycle of plastics. Role of Multilateral agencies like GIZ in tackling the issue of litter is crucial in the state of Uttar Pradesh.

The recently concluded 'Noida Roadshow on Creating awareness to prevent Marine/Riverine Litter in Ecosystem' has generated awareness about plastic waste management, through engagement of government representatives and other major stakeholders that are closely working in this space. I am happy that the "Uttar Pradesh Charter on Plastic Waste Management" which has evolved from the roadshow will play a crucial role for plastic waste management systems in the state. The implementation of the actions suggested in the roadshow will address the social and environmental challenges due to mismanagement of plastic wastes and associated economic costs while also reducing plastic consumption in the state. The roadshow has paved the way forward for a strong emphasis on a transition to a circular plastics economy in India that requires extensive (financial and regulatory) linkages between key stakeholders supported by innovative technological and financial solutions with an inclusive approach of incorporating the informal sector. This will enable focused discussions on plastics use and recycling and generate interest among the business community for bringing about multitude of business models, contributing towards a circular plastics economy in the state.

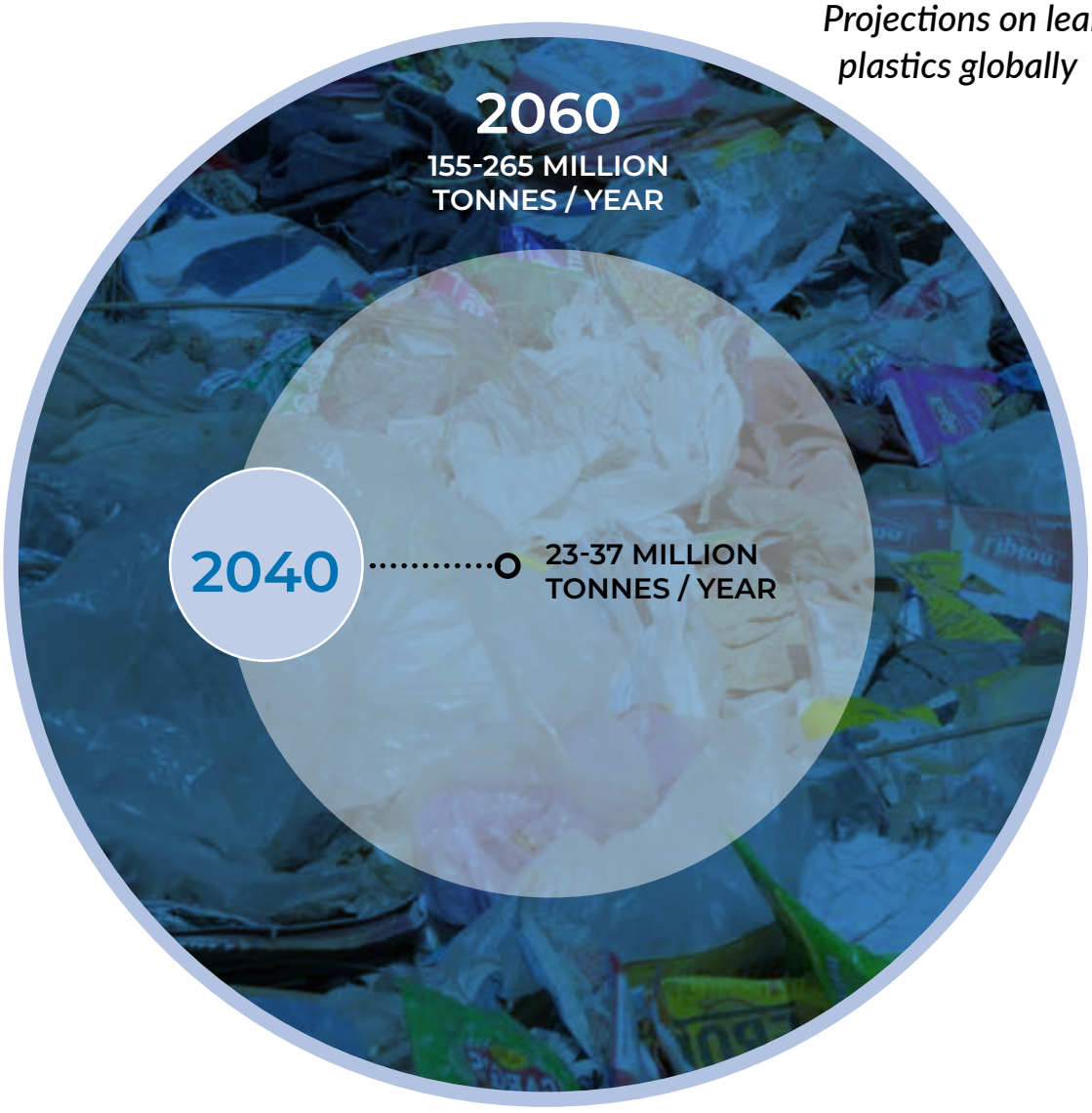
My appreciation goes to the GIZ India team and support offered by the officials from the Department of Environment, Forest & Climate Change, Government of Uttar Pradesh who have contributed greatly to this book. At a time when our state is undergoing rapid transformation in the space of plastic waste management, I wish that 'circular economy' and 'resource efficiency' becomes pillars of our sustainable development process.

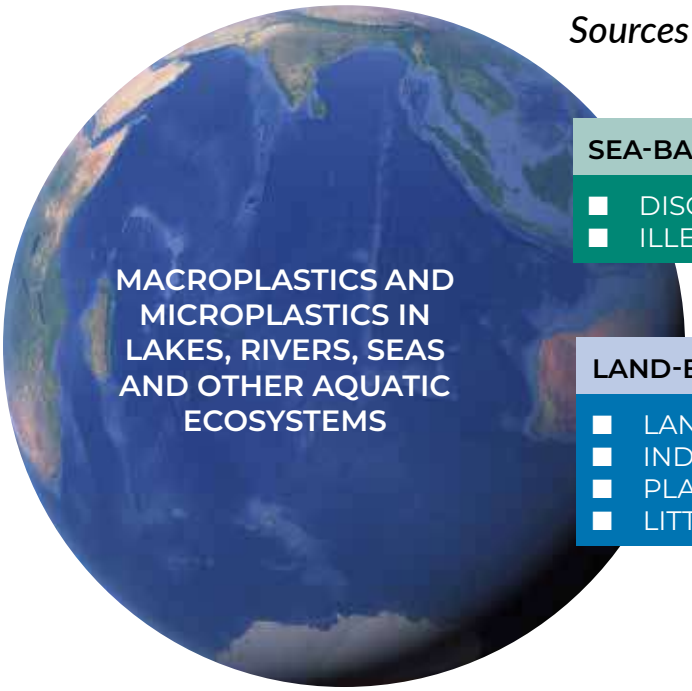
01 INTRODUCTION

GLOBAL SCENARIO ON PLASTIC POLLUTION AND MARINE LITTER

PLASTIC AND PLASTIC WASTE PRODUCTION has risen exponentially in the last few decades. Floating plastic debris has become a common sight in major water bodies including the oceans. The unmanaged plastics often find its place at the bottom of the ocean floor and even at the top of mountains. It has been affecting the flora and fauna, deeply disturbing the balance of natural ecosystems. The macro-plastics eventually get fragmented into microplastics which has become a major global problem and a growing environmental threat. Micro- and nano-plastic particles have already been identified in tap water, salt, vegetables, several food items and have deeply impacted the food chain.

Projections on leakage of plastics globally





Sources of litter in aquatic ecosystems

SEA-BASED ACTIVITIES

- DISCARDED FISHING NETS AND GEARS
- ILLEGAL DUMPING AT SEA

LAND-BASED ACTIVITIES

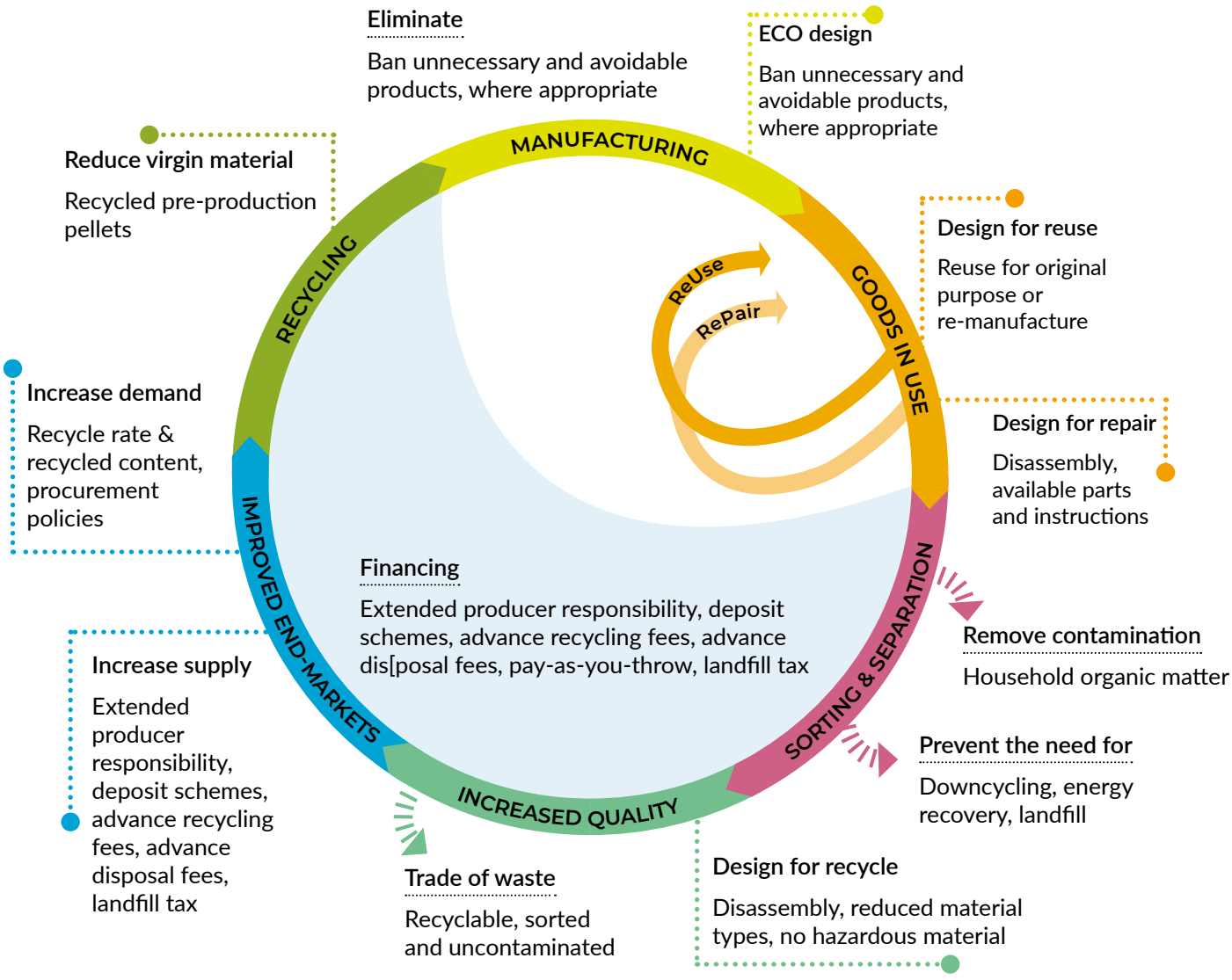
- LANDFILLS, OPEN DUMPSITES
- INDUSTRIAL OUTFALLS
- PLASTIC WASTE IN STORM WATER DRAINS
- LITTERING OF BEACHES, COASTAL AREAS

On March 2, 2022, the United Nations Environment Assembly (UNEA) voted to formulate an international legally-binding instrument by 2024 to end plastic pollution. The developed UNEA resolution to manage plastic pollution aims to have an intergovernmental negotiating committee (INC) which is expected to submit its draft agreement by 2024. This resolution agreed at the UNEA categorically looks into global rules and regulations, financing and enforcement mechanisms aimed at managing plastics across the lifecycle. The resolution recognises the role of the private sector as well as other key stakeholders (including the workers from the informal and cooperative settings) in the implementation of the treaty and promoting actions at local, regional and global levels. It has been recognized that a single policy measure or one specific targeted intervention is not effective to monitor and manage marine pollution. A mix of actions and partnerships are required.

> *40% plastic waste is lost from the value chain and approximately 60% ends up in riverine and marine ecosystem. The hotspots of littering needs to be identified and appropriate mitigation mechanisms must be adopted on ground. The motto of the campaign on tackling litter should be "Reduce, Reuse, Recycle and Recover". Alternatives to the banned single-use plastic items must be promoted. Actions to tackle littering is based on individual and collective actions by the society.*
>
> — *MR. MANOJ SINGH, ADDITIONAL CHIEF SECRETARY, DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVERNMENT OF UTTAR PRADESH*

Globally, the "Whole life cycle approach for plastics" addresses all the potential risks of plastic pollution while looking into possible interventions that could be undertaken by stakeholders in the value chain. Essentially, it is about introducing strategies to stop plastic pollution at stages of production and consumption, wherever it is deemed most efficient and appropriate rather than developing high-cost infrastructure to clean up the problem afterwards. The lifecycle approach ranges from banning certain unnecessary and highly littering potential materials (like certain types of single-use plastics), developing design standards and certifications (to the product designed so that it can be safely reused or recycled), as well as promoting the right financing mechanism (like EPR, deposit return systems for PET bottles, landfill taxes etc.) to have a more circular system.

National policies and frameworks towards circularity[1]



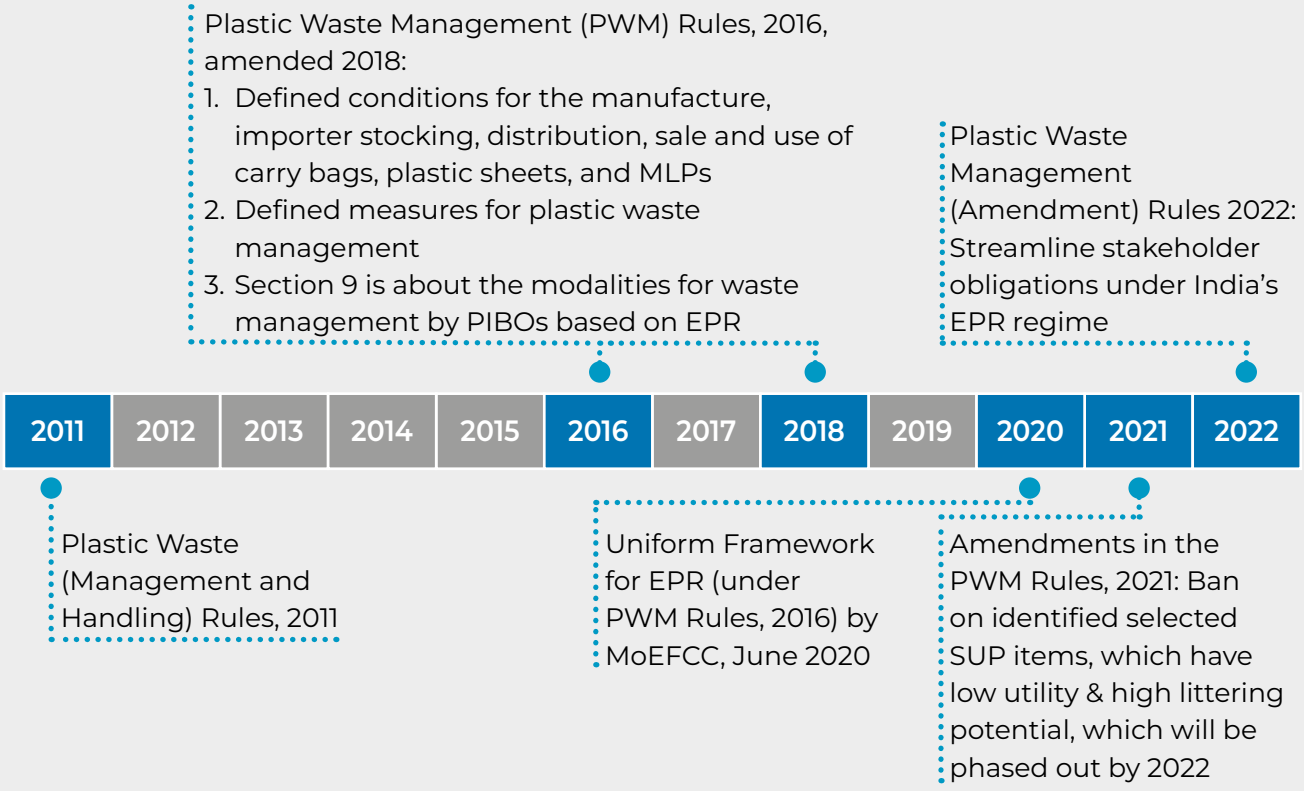
INDIAN GOVERNMENT APPROACH TO TACKLE MARINE LITTER

INDIA IS ONE OF THE biggest plastics producing countries in the world with an estimated market size of US$25 billion[2]. In recent years, India has been witnessing higher rates of plastic waste generation, owing to the fact that a huge quantum of plastics (nearly 50%) is dumped after its first use. As per the OECD Global Plastics Outlook Database[3], India contributes 5% to the global generation of plastic waste and has a relatively low per capita plastic waste generation -14 kg per inhabitant. Though the relative numbers are small, it is imperative that a rapidly growing and transforming economy like India needs critical engagement for tackling this global problem.

POLICY AND REGULATORY LANDSCAPE

Single-use plastic (SUP) items form a significant portion of the littered waste that finds its way into oceans and seas. The 'Report on Single-Use Plastics', worked on by an expert committee constituted by the Department of Chemicals and Petrochemicals (DCPC)[4], Ministry

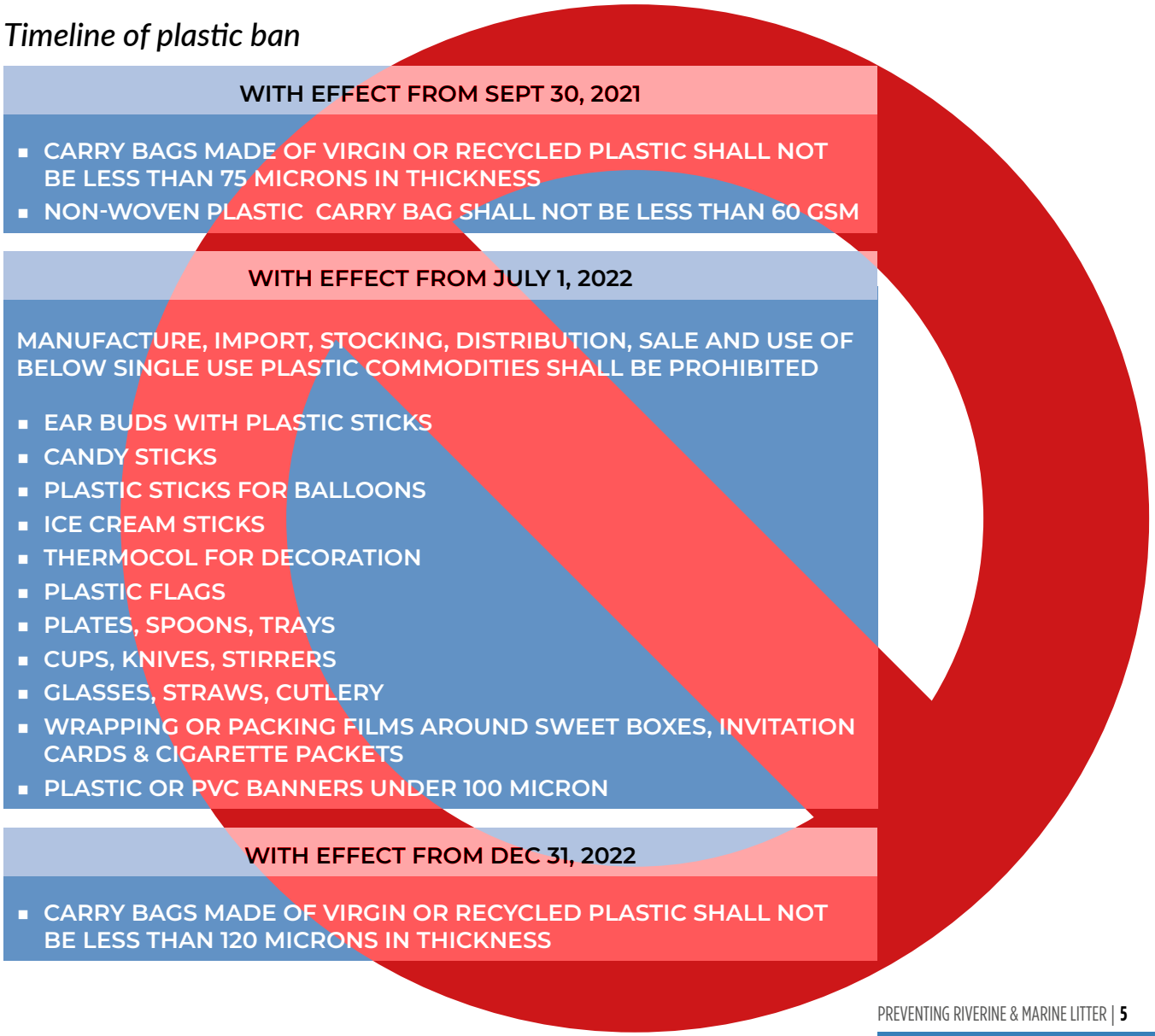
Timeline of plastic waste management policy frameworks in India



of Chemicals and Fertilizers, Government of India has categorised plastic products based on their environmental impact and utility — those found to have the lowest utility and highest environmental impact are recommended for a phase-out. The study also pointed out that end-of-life management solutions like 'Alternate Use' and 'Energy Recovery' are yet in the nascent stage in India. The current system of recycling of plastics is predominantly unorganised and the work practices (including safety, health and environment norms) in this sector (handling, segregation and processing) are found to be poor.

In 2021, the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India introduced an amendment in the Plastic Waste Management Rules, 2016. The amendment defined a SUP item as “a plastic commodity intended to be used once for the same purpose before being disposed or recycled”.

Timeline of plastic ban

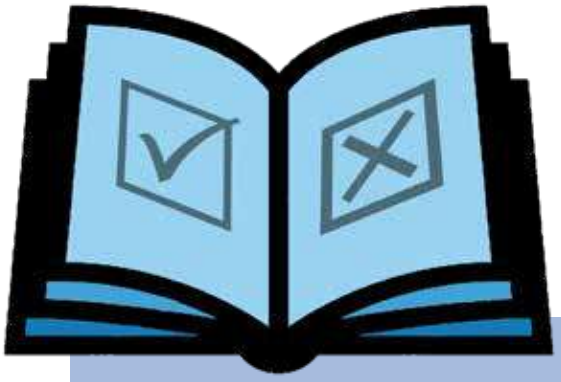


On the regulatory front, the Plastic Waste Management Rules 2016 govern the management of plastic waste in India. They apply to waste generators, local bodies, gram panchayats, manufacturers, importers and producers and define responsibilities when it comes to plastic waste management. The rules also identify Extended Producer Responsibility (EPR) as a mechanism through which Producers, Importers and Brand Owners (PIBOs) can contribute to the waste collection system through their own distribution channel or the local body concerned. The Plastic Waste Management (Amendment) Rules 2022 which legally enforces the EPR is a step in the right direction for bringing accountability to plastics introduced in the market.

FORWARD LOOKING INTERVENTIONS BY INDIA FOR MANAGING PLASTIC POLLUTION

Plastic waste management demands a systemic approach in addition to the regulatory mechanisms. There is a need to identify tangible solutions for implementation of closed loop measures like alternatives, certifications, eco-design and digitalization etc. Furthermore, citizens engagement on the reduction of SUPs, shift to existing alternatives and sustainable lifestyles to reduce consumption needs to be designed. The strengthening of aspects related to circular economy approaches such as recycling, reusability and rethinking packaging or alternatives to plastics as well as the implementation of instruments such as EPR plays an essential role in this transition. The action plan with indicative guidelines for plastics prepared by MoEFCC is illustrated in below figure.

Guidelines for plastic waste management by MoEFCC, Govt. of India



- POLICY AND REGULATORY FRAMEWORK
- INSTITUTIONAL MECHANISM
- MANAGEMENT OF LITTERED SINGLE-USE PLASTIC ITEMS
- ENFORCEMENT OF BAN ON THE USE OF IDENTIFIED SINGLE-USE PLASTIC ITEMS
- PLASTIC WASTE MANAGEMENT SYSTEMS AND END OF LIFE DISPOSAL FACILITIES
- DEVELOPMENT & PROMOTION OF ALTERNATIVES, AND PROMOTING INNOVATION
- DATA COLLECTION AND MONITORING MECHANISM
- AWARENESS GENERATION AND CAPACITY BUILDING
- ELIMINATING SINGLE-USE PLASTIC ITEMS IN PUBLIC/GOVT. INSTITUTIONS

Though plastic is an indispensable part of the human life, its end-of-life management needs to be better scientific and sustainable. The role of multilateral and bilateral institutions like GIZ is crucial in for supporting the states in ensuring enabling partnerships. Industry associations need to motivate its members for sustainable approaches for plastic waste management.

— **C.P. GOYAL,** *DIRECTOR GENERAL OF FOREST & SPECIAL SECRETARY, MOEF&CC*

A multipronged approach is essential to manage plastic pollution. The right kind of policy and scientific methodology needs to be adopted on ground to tackle the effects of marine and riverine pollution. The Plastic Waste Management (Amendment) Rules, 2021 clearly prohibits identified single-use plastic items that have high potential for littering. This is the first step in realising the commitments of the country in tackling plastic pollution. EPR framework in the country and appropriate ecosystem enabled by digital platforms to monitor the EPR targets will facilitate effective enforcement and bring accountability to the system.

— **DR. PRASHANT GARGAVA**, *MEMBER SECRETARY, CENTRAL POLLUTION CONTROL BOARD (CPCB)*

For effective plastic waste management, it is important to address (1) The Policy and Governance Perspective. for transforming plastics economy, (2) plastic waste management with the approach of circularity and strategies to use EPR as a policy and financial instrument to manage plastics pollution and finally (3) multiple level governance and stakeholder management for managing plastic waste

— **ASHISH TIWARI,** *SECRETARY, DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVERNMENT OF UTTAR PRADESH*

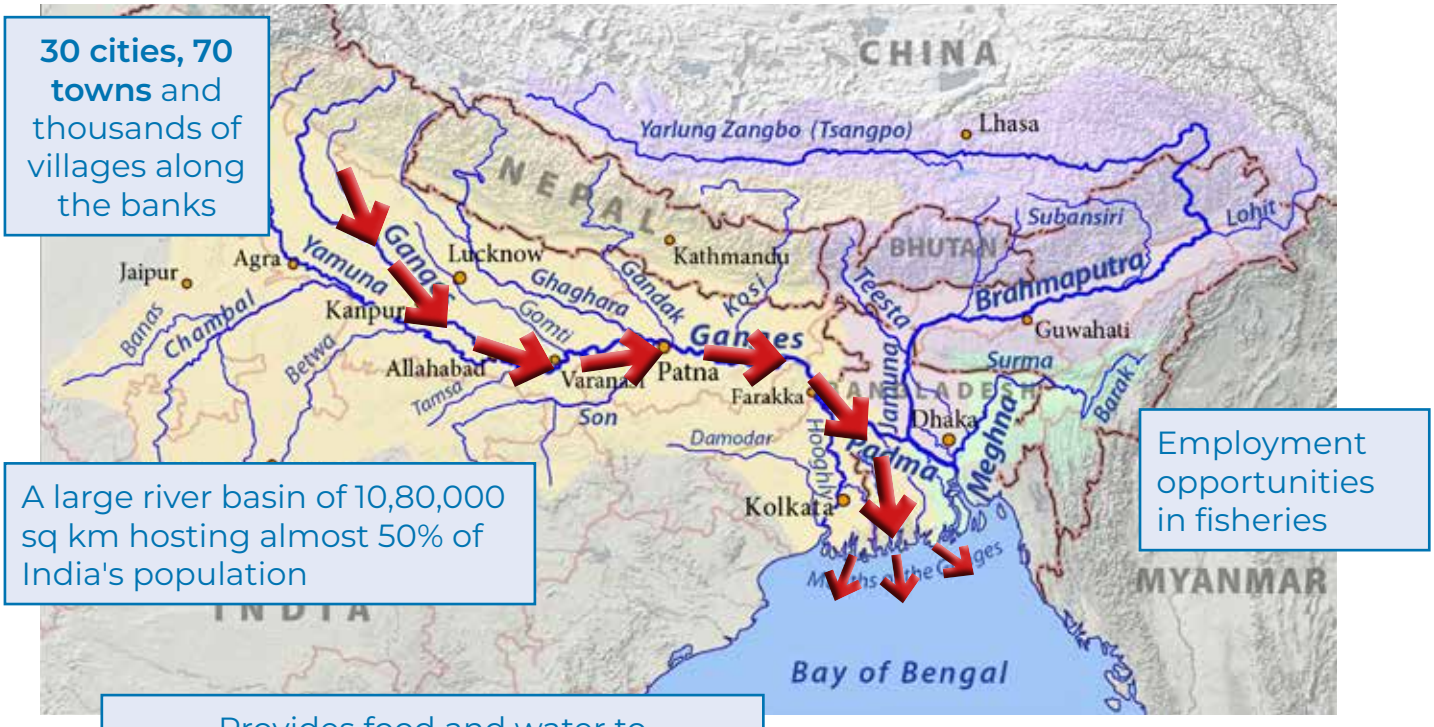
GANGETIC PLAIN AND GROWING IMPACTS OF LITTERING

IN INDIA, the river Ganges occupies a unique position in the cultural, religious, socio-economic and ecological ethos of the country. The water from the river is treated with huge reverence. The river is a major life-support system for the people of India. It has total length of 2,525 km and has been a major source of agricultural and industrial prosperity of the country[5, 6].

ISSUES OF RIVERINE LITTERING IN GANGETIC PLAIN

As per the UNEP counterMEASURE project report[7], the major hotspots that triggers plastic leakage into the River Ganga are: (i) Hotspots of plastics waste generation in slum areas and industrial areas; (ii) Leakage spots from major wards; (iii) Plastic accumulation hotspots from drainage systems; (iv) Leakages from Ghats during peak seasons and (v) Other plastic application hotspots. The study was carried out for three cities - Haridwar, Agra and Prayagraj in the Ganga basin. A major component of all plastic waste observed is low value plastics

Ganges-Brahmaputra-Meghna (GBM) river system[8]



> *Ganges being one of the ten major plastic contributing riverine bodies in the world is quite alarming and needs urgent action. Inter-generational equity is key for sustainable development. A safe and clean environment is the right of future generations. A mindset shift towards environmental accountability by all stakeholders is essential. 'One to all approach' is needed so that all members in plastic value chain act responsibly. Currently, environmental compensation and expenses are treated as a liability by the industry which needs a paradigm shift. We must attribute value to nature and give godly regard to protect and preserve nature from plastic pollution.*
>
> — ***HON'BLE JUSTICE SUDHIR AGARWAL**, MEMBER (JUDICIAL), NGT, NEW DELHI*

especially films (on a mass basis) and the recovery value is less for such materials. Informal recyclers often scavenge for high-value plastics and items like cigarettes, food wrappers, tobacco sachets don't find its place in the plastic waste resource recovery process. Fishing activities also significantly contribute towards plastic waste in the Ganges. Accidental loss, or purposeful disposal of plastic-based fishing gear are increasing in the river stretch as seen from the abundance of fishing gear debris on the riverbanks.

An assessment of lower stretches of the river Ganga has identified the presence of micro and macro plastics, yet the concetration is lower as compared to other rivers in the world. Seasonal variations also affect the concentrations of the plastics in Ganges, as pre-monsoon season contributes to higher concentrations as compared to the post-monsoon period[9]. Thus, it is estimated that the plastic debris is hugely associated with anthropogenic activity and requires major intervention by all concerned stakeholders[10] across the plastic value chain in the Gangetic region.

GANGETIC CATCHMENT AREA IS THE 2ND LARGEST IN PLASTIC DISCHARGE GLOBALLY WITH AN ANNUAL DISCHARGE OF 0.12 MILLION TONNES ANNUALLY AFTER THE YANGTZE RIVER IN CHINA CONTRIBUTING 0.33 MILLION TONNES OF PLASTIC EVERY YEAR18

> *Measurable yardsticks are needed on understanding the gravity of plastic pollution and to monitor effectively how much waste ends up in a riverine ecosystem. "What can be measured, can be remediated". The rivers especially Ganges must be looked at the 'Aviralta' and the waste management needs to be appropriately planned and designed.*
>
> — ***MR. D.P. MATHURIA**, ED(T) NATIONAL MISSION FOR CLEAN GANGA (NMCG)*

UTTAR PRADESH STATE ACTION TOWARDS PLASTIC LITTER

STATUS OF BAN REGULATORY PERSPECTIVES IN THE STATE

SO FAR,
1192 TONNES
OF BANNED PLASTIC ITEMS HAVE BEEN SEIZED & A PENALTY OF
₹14 CRORES
IMPOSED ON VIOLATORS.

IN ORDER TO REDUCE the waste burden caused by single-use plastic, the state of Uttar Pradesh has imposed a ban on the use, manufacture, sale, distribution, storage, transport, import, or export of all kinds of plastic carry bags, single-use plastic and thermacol disposables in all urban and industrial areas on 15 July 2018 as per the guidelines of the Plastic Waste Management Rules 2016 (amended 2018). The ban and subsequent regulations are a series of processes:

- 15 July 2018: Ban on the use, manufacture, sale, distribution, storage, transport, import, or export of plastic carry bag thickness 50 Microns or less in all urban and industrial areas.
- 15 August 2018: Ban on the use, manufacture, sale, distribution, storage, transport, import, or export of all kinds of single-use plastic & thermacol disposables in all urban and industrial areas.
- 2 October 2018: Ban on the use, manufacture, sale, distribution, storage, transport, import, or export of all kinds of plastic carry bags in all urban and industrial areas.

Features of the state level plastic ban

PLASTIC BAN
COMPLETE BAN ON THE USE, MANUFACTURE, SALE, DISTRIBUTION, STORAGE, TRANSPORT, IMPORT, OR EXPORT OF ALL KINDS OF PLASTIC CARRY BAGS, SINGLE-USE PLASTIC AND THERMACOL IN ALL URBAN & INDUSTRIAL AREAS
SPECIAL POWERS
SPECIAL POWERS TO 12 DIFFERENT RANK OFFICERS APART FROM THE LOCAL AUTHORITY TO TAKE ACTION IN THEIR JURISDICTION
SPECIFIC FINE
A SPECIFIC AMOUNT OF FINE UP TO INR 1 LAKH COMPOUNDING TO THE OFFENSE
IMPRISONMENT
PROVISION OF IMPRISONMENT UP TO 1 YEAR IN THE REPETITIVE OFFENCE
SCIENTIFIC DISPOSAL
MATERIAL SEIZED UNDER THE PROVISION OF THE ACT SHALL BE DISPOSED OF IN AN ENVIRONMENT FRIENDLY MANNER

Initiatives for plastic waste management in the state

State generates approx. 1.61 lakh MT of plastic waste annually, with a reported a recycling capacity of 693 TPD.

- There are 99 plastic manufacturing units, 16 recycling units, 63 multi-layer packaging manufacturing units, 4 compostable plastic units.
- Approx. 43.66 km road constructed using 100 MT plastic waste in Lucknow, Kanpur, Meerut, Jhansi, Varanasi, Ghaziabad, Firozabad, Gajraula and Khekda.
- Approx. 200 MT plastic waste is used as RDF in cement kilns.
- State has disbursed funds to all urban local bodies to develop infrastructure for Material Recovery Facility equipped with supporting machineries like fatka machine, shredder, bailer, and racks, uniform for the workers, protective gears, washing stations, packaging arrangement, sewing machine etc.
- The state has currently two functional plastics to fuel plant of 1800 TPA in Mathura and 730 TPA in Prayagraj, and planning to set up a facility of capacity 360 TPA on a pilot basis in Varanasi.
- An Memorandum of Understanding is signed between the Department of Urban Development, Uttar Pradesh and Solar Energy Corporation of India Ltd. (SECI) to set up waste to energy plants in Kanpur and Prayagraj Municipal Corporation.
- Uttar Pradesh Pollution Control Board has received 77 EPR plans and issued show cause notices to 393 unregistered units and imposed environmental compensation against defaulters.
- 9.7 Lakh MT plastic waste has been collected and disposed of by brand owners and producers under the EPR scheme
- The paper mills in the state have also tied up with cement units for co-processing of their wastes. 48 Paper Units in Muzffarnagar, Meerut, Ghaziabad, Noida and Bijnore have entered into an agreement with M/s Ultratech Cement for co-processing of Plastic Waste. Total Plastic Waste sent for co-processing in from July 2020 to January 2022 is 23849.57 Tons.
- Uttar Pradesh Pollution Control Board monitors the enforcement of Environmental Laws including PWM rules. A dedicated Online Portal (www.upecp.in) exists in this regard.

The state also engages in

- Framing of bye-laws for plastic waste management for all ULBs.
- Monitoring of Recyclers, Producers, Importers, Manufacturers, and Brand-Owners by random inspection.
- Inviting private stakeholders under EPR to manage plastic waste generated.

NOTABLE PRIVATE SECTOR ENGAGEMENTS IN THE STATE

ITC is working as a technical partner on 'Community Led Solid Waste Management approach' for providing support on development and design of standardized training content and toolkit and technical inputs.

UNDP India in partnership with Coca Cola India foundation (CCIF), has proposed a project on Plastic Waste Management & Livelihood to be implemented in close partnership with the Urban Local Bodies.

In January 2021, **Plastic Fischer** has installed the first TrashBoom in Varanasi to restore the purity of the Ganges.

Dabur, in its pursuit to be a 'plastic neutral company' is working closely in the state of UP for waste collection and recycling/reuse. In the years 2018-19, Dabur had collected a total of 14,00,000 kg of different types of plastic waste (Recyclable and Non-Recyclable) directly from the end-users with the help of around 2,330 local ragpickers in Kanpur, Lucknow, Gorakhpur, Mathura, Agra, Moradabad, Ghaziabad, Sahibabad, Meerut, Noida & Greater Noida.

Bubble barrrier in Agra - The system of bubble barrier has been successfully tested in the Yamuna River. It has received strong support from the Agra Municipal Corporation and supports the city's plan to become 'the plastic-free Agra'. The collected waste is co-processed within the **Ambuja** and **ACC** cement plants in the city.

Plastic to Fuel (PTF) Plant in Prayagraj - **Hari Bhari Allahabad Waste Management Pvt. Ltd** has established a 2 TPD Plastic to fuel plant in March 2021. The facility uses pyrolysis technology to convert plastic into 50% furnace oil, 15 % Powdered Carbon, 30% Syn Gas and 5 % distilled water.

> *To manage plastic pollution in the riverine and marine ecosystems, the movement in the country should become 'Jan Andolan' – A people's movement, where collective action and systemic approach while pave the way for a safe and sustainable future*
>
> – ***ASHISH CHATURVEDI,*** *DIRECTOR, CLIMATE CHANGE AND CIRCULAR ECONOMY, GIZ INDIA*

FUTURE STRATEGIES OF THE STATE

A Special Task Force was constituted in the State under the chairmanship of the Chief Secretary, Uttar Pradesh, with the alignment of 15 important departments of the state government to prepare and develop a comprehensive action plan, as well as monitor and implement the SUP ban in the State. The activities planned by the task force are:

- Prepare a comprehensive action plan for implementation of PWMR 2016 and phasing out of single-use plastics with identified activities and timelines and synergies efforts and resource of various departments/agencies as state, district and city level.
- Assess plastic waste generation in the state with regards to collection, recycling and end of life disposal and identify gaps in plastic waste management (Reduce, Reuse and recycle)-policy, implementation enforcement, infrastructure etc.
- Strengthen policy, regulatory, institutional mechanisms/structures for the implementation of PWMR 2016 and phasing out of single-use plastics, design appropriate management strategies for allocation of financial resources including leveraging of funds from the Swachh Bharat Mission.
- Appropriate measures for effective enforcement of (i) PWMR 2016 as amended and (ii) State specific bans imposed on identified single-use plastic items
- Development of policies for supporting the adoption of alternatives to identified single-use plastic items prohibited under PWMR 2016 as amended.
- Effective measures to strengthen ULBs/GPs for segregation, collection, storage, transportation, processing, disposal of plastic waste.
- Take measures for effective monitoring of implementation of PWM Rule,2016, as amended.
- Prepare a detailed roadmap for activities to build awareness and outreach among public on plastic waste management and reduction in the use of SUP items.
- Developing strategy for building a strong public movement for mitigation of plastic pollution by involving education institutions (school, colleges, universities),NCC and NSS units, Scouts, Youth Clubs, Eco clubs, opinion makers and voluntary organization with detailed action plans in this regard.

The State of Uttar Pradesh is also promoting sustainable packaging solutions and identifying start-ups to encourage suitable technology and product interventions to reduce plastic waste. Implementation of Green Protocols in government and private institutes, public gatherings etc. is another measure that the state is piloting for encouraging sustainable consumption and promoting alternatives.

CIRCULAR ECONOMY SOLUTIONS (CES) PREVENTING MARINE LITTER IN ECOSYSTEMS

AS INDIA IS ONE of the largest plastics producing countries worldwide, and one of the largest generators of plastic waste, it is essential to foster Circular Economy Solutions to prevent the leakage of plastic waste. Tackling the issue, a joint technical cooperation (TC) project has been initiated by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) in partnership with the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India. The circular economy approaches are tried to be piloted in the riverine ecosystems of state of Uttar Pradesh in close collaboration of the Department of Environment, Forest and Climate Change (DoEF&CC), Government of UP, and implemented by GIZ India. The project aims at demonstrating technological approaches to track, monitor and manage litter in the riverine ecosystems of while strengthening the implementation of the Plastics Waste Management Rules, 2016 and Extended Producer Responsibility (EPR) guidelines, in collaboration with civil society, public and private partners.

To address the serious concern of marine litter and understand the cycle of plastic production, consumption, and its impact on the environment, GIZ India along with FICCI as its Industry Partner, under the aegis of Department of Environment, Forest and Climate Change, Government of U.P organized a roadshow on "Creating awareness to prevent Marine/Riverine litter in ecosystem" on 27 December 2021.

Based on the various consultations and technical sessions held during the Roadshow, it was decided that a charter (UP Charter) which fulfil the broader objectives and vision to close the material cycle of marine litter needs to be prepared. The charter is hoped to deliver the measures and vision of the state of Uttar Pradesh in tackling plastic litter with a circular economy approach.

OBJECTIVE OF THE ROAD SHOW

The roadshow was aimed at creating awareness about plastic waste management, through government representatives and stakeholder (Sustainability Managers/Leaders, Industry Representatives, PIBO, Recyclers, Professionals engaged plastic waste management, PRO) engagement that are closely working in this space. The event looked into the policies and technologies available to address this issue, but also facilitated a holistic deliberation between the authorities and industry builders to highlight the loopholes in the current system resulting in limited adoption and impact. In addition, it also provided a platform to exhibitors to showcase their solutions/innovations to policy makers and industry to explore partnership opportunities.

KEY THEMES OF DISCUSSION

- Pathways for plastic free riverine and marine ecosystems
- Roadmap to implementing EPR through innovation in product design and technology
- Realizing a true circular economy for plastics

02

PATHWAYS FOR PLASTIC FREE RIVERINE & MARINE ECOSYSTEMS

Plastics are fundamental to the society and industry. It has become one of the classic examples of 'resource leakage' in the economy mostly owed to the current linear, take-make-use-dispose economy. The annual material losses and associated efforts to manage plastics are costing millions to the Indian economy. There clearly exists an opportunity for the economy to transform the system. It is essential to think, "How can the plastics economy be transformed to reduce plastic pollution and support the progress on climate goals of the state? What is the role of policy and governance in advancing the efforts of achieving plastic free riverine and marine ecosystems?"
In the recently concluded Noida Roadshow, one of the thematic session focused on ideas for creating "pathways for plastic free riverine and marine ecosystems". The session addressed aspects of policy development, actions and interventions by state and central government and most importantly approaches that address environmental and health impacts across the entire life cycle of plastics. It is imperative to create deeper reflections on raising public awareness, define waste responsibilities more clearly, work to change the habits and unsustainable practices of consumers and also develop 'upstream approaches' to work in partnerships (with private sector) to reduce the pollution at the source. Policy and financial instruments like the Extended Producer Responsibility (EPR) and its potential to contribute to the management of plastic pollution is huge for steadily growing economy such as the state of Uttar Pradesh.

For effective plastic waste management, the state needs to address:

- **Monitoring of plastic recycle units for functioning and and supply of recycled material**
- **Non uniform distribution of the recyclers in the state**
- **Issue of illegal plastic recycling/downcycling**
- **The issue of non recyclable plastic segregation, collection and use**
- **The state's potential for co-processing and challenges**
- **Adoption and promotion of plastic alternatives, innovations and circular economy business models**
- **EPR integration with local bodies**

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MANUFACTURING UNITS

23
INVENTORISED RECYCLERS

63
MLP MANUFACTURING UNITS

04
COMPOSTABLE PLASTIC UNITS

Evolving landscape of policy and regulations in India

The policy landscape of India has been evolving ever since the first set of laws were introduced in the country. The Environment (Protection) Act of 1986 still continues to be the major regulatory direction by the Indian government, and was intended to establish a good protection system for the environment. The EPA act enables the government to regulate all forms of waste and manage challenges in different regions of India. It is still India's primary legislation which covers many rules and acts concerning the Environment.

In 1999, the first plastic waste management law was introduced to restrict the use of plastic carry bags (thickness 20 µm or less) and prevent food from being packaged in recycled plastic. By 2022, these rules have now evolved into the stature wherein in the primary aim is focused on reduction of consumption and improvement in waste management. With the renewal of the Plastic Waste Management Rules (PWMR) in 2016 and through subsequent amendments (in 2018, 2020, 2021 and 2002), the Government of India has brought in an ambitious step to tackle the issue of plastic waste by a focused approach of ensuring accountability to all the stakeholders in the plastic value chain. The current regulations try to promote innovations in the upstream (for product and packaging redesign) including promotion of alternate products for transforming the current plastics economy which is built on the linear economic approach (take-make-use-dispose model).

> *Recycling can only address a part of the problem, and in order to tackle plastic waste, alternatives to plastics need to be developed. This also demands a change in the design approach of products made of plastics. The Government of India is facilitating programs in Ministry of Micro Small and Medium Enterprises (MSMEs) and NITI AAYOG to provide the necessary support to shift to alternatives to plastics.*
>
> — *MR. SATYENDRA KUMAR, DIRECTOR, HAZARDOUS SUBSTANCES MANAGEMENT, MINISTRY OF ENVIRONMENT FORESTS & CLIMATE CHANGE, GOVERNMENT OF INDIA*

> *Through institutional support of organisations like CPCB, Bureau of Indian Standards (BIS) and the Central Institute of Petrochemicals Engineering and Technology (CIPET), the packaging guidelines are getting revised and this will not only help in reduce packaging waste but will also pave the way for alternatives to plastics.*
>
> — *DR. DIVYA SINHA, DIVISIONAL HEAD AND SCIENTIST 'E', CPCB*

Local and coordinated action for a transformed plastics economy

Plastic pollution is by no means restricted to one locality or one state or nation; it is a global issue that transcend boundaries. The global scale of the plastic challenge demonstrates the need for local and cohesive action amongst various stakeholders. The implementation of laws and regulations require concrete and concentrated support as well as adoption of strategic time-bound action plans. It is essential to empower the system through capacity building, appropriate fund management and adequate institutional support. The local bodies and private-public partnerships must be empowered to finance the systematic collection and management of segregated wastes. Other kinds of partnership with the private sector must be explored for reuse and redesigning the functionality of plastics.

Source segregation is the first step towards responsible waste management practices. This ensures the sorting of bio and non-biodegradable waste and thereby complement the process of onsite composting. The mandate of the bulk generators (RWAs, Commercial Establishments, Offices etc.) must also be enforced for adequate resource recovery. Systems for door to door collection, realization of user charges, providing incentives for responsible consumer behaviour and enhanced user charges for un-segregated waste will further help in reinforcing strategies at community level. The EPR integration with local bodies will support financial and technical aspects of plastic waste management. Moving ahead, the plastic waste processors/PIBOs can be facilitated for setting up of RDF facilities in close coordination with the informal sector. These systematic approaches for plastic waste management must involve upstream and downstream interventions for the entire plastic value chain, and not only focus on end-of-life measures.

> *There exists a heightened need for inter-departmental coordination. All the departments need to work cohesively to address the challenges that emanate due to the waste that is generated in the state of Uttar Pradesh. All citizens must take cumulative action to reduce plastic consumption.*
>
> — *MR. MANOJ SINGH, ADDITIONAL CHIEF SECRETARY, DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVERNMENT OF UTTAR PRADESH*

Strengthening integrated waste management and ensuring resource efficiency

The global recycling rates for plastic remain 5 to 9% of the total plastics manufactured which could be attributed to several factors such as improper source segregation, weaker collection and transportation systems and support offered by producers for environmentally sound management of various products. For any systems of waste management, it is important to account for the role of stakeholders in the value chain, innovation at every step and most importantly manage the financial aspects of a sustainable solid waste management system. To ensure resource efficiency and circular economy, the 'polluter pays' principle and the practice of cleaner production needs to be at the heart of an integrated waste management approach.

> *EPR rules provide necessary thrust to recycling, provide financial assistance and will also support increased usage of recycled content and strengthen reuse targets.*
>
> — *DR. AMIT LOVE, SCIENTIST-D/JOINT DIRECTOR, MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE*

Role of partnerships and stakeholder engagement

The transformation of 'current plastic's economy' to protect the Gangetic ecosystem in the state of UP calls for partnerships and collaborations for effective management and systemic transformation. Plastic waste policy needs to be integrated with other sectors, and because of its nature as a global challenge there is a need for a global policy framework. These approaches must be supplemented by appropriate data and information emanating from the various tracks of existing value chain of plastics.

Local authorities have been traditionally entrusted with responsibility of solid waste collection and management. In recent decades, non-governmental and private organizations have also intervened to provide services. This has accelerated the process of end-of-life management of plastic waste. Both remedial and preventive strategies would be better realized through public-private partnerships. The activities must be complementary to the initiatives taken up by the government and local bodies and must address current gaps and challenges. Financial institutions like venture capitalists, donor agencies (bilateral and multilateral) could also play a major role by investing in integrated solid waste management systems incorporating circular economy principles.

> *There exists a dire need for developing partnerships and bringing together multiple stakeholders at the granular level such as local bodies for having a participatory and inclusive approach for plastic waste management.*
>
> — *MS. SALONI GOEL, HEAD, CIRCULAR ECONOMY, UNDP INDIA*

Role of awareness campaigns and capacity building

Awareness and capacity building plays a key role in any transformative change in the society and economy. The outreach of various awareness and capacity building activities will help to manage waste sustainably and divert maximum possible from landfills and dumpsites. Targeted campaigns and initiatives will help accelerate individual and collective actions of the citizens in the country. Geared up awareness and upskilling are essential for technology transfer, adaptation and use, improving the efficiency of resource recovery and offering rewarding employment opportunities.

Awareness raising activities must cover a parallel 'top to bottom' as well as 'bottom to top' approach, covering the national, state, district and ULB/GP levels for all stakeholders with priority focus on citizens, institutional waste generators, RWAs/Market associations. A massive public movement by engaging youth organizations such as NCC, NSS, NYK and school students will help in achieving the targets of reduction of waste and adoption of alternatives to plastic. Targeted campaign at littering hotspots such as tourist spots, places of religious and cultural importance, weekly markets, urban sprawls against littering, will make awareness movements people-centric. State government offices, attached subordinate offices, PSUs/organizations, corporate offices, schools and colleges can be active participants in such movements of plastic waste and litter management.

Competitions (like essay writing, video competitions) and hackathons will help in bringing together school and college students, graduates, researchers, start-ups, MSMEs along with industry experts to find innovative solutions that addresses plastic waste management. Solutions like digital tools, innovative reuse-reduce-recycle ideas for plastic waste management, and encouraging human behaviour change without compromise on convenience and profits will be the central focus of such crowdsourcing of ideas.

> *Identify the problem of plastic waste management as 'heterogenous' and 'multi-layered'. Role of campaigns and missions like Swachh Survekshan and Swachh Bharat Mission are crucial in assisting citizens to take ownership.*
>
> — *MR. J B RAVINDER , JOINT ADVISER, PHEE, CPHEEO, MINISTRY OF HOUSING & URBAN AFFAIRS, GOVERNMENT OF INDIA*

WAY FORWARD

GOVERNMENT AND INDUSTRY both plays significant role in transforming the current production and consumption patterns of plastics in the country. On the regulatory front, the Plastic Waste Management Rules and its subsequent amendments govern the management of plastic wastes in India. This applies to waste generators, local bodies, gram panchayats, manufacturers, importers and producers. Ban on identified SUP items with low utility and high littering potential is a crucial step in transforming an unsustainable product use in the market. The PWM rules also identify EPR as a mechanism through which Producers, Importers and Brand Owners (PIBOs) can contribute to the waste collection system through their own distribution channel or concerned local bodies. From case studies and experiences globally and nationally, it is evident that a single window approach will let alone suffice in preventing plastic waste leakage into the natural environment, or help in managing the waste that has already found its way into land and water bodies. Hence, partnerships are crucial.

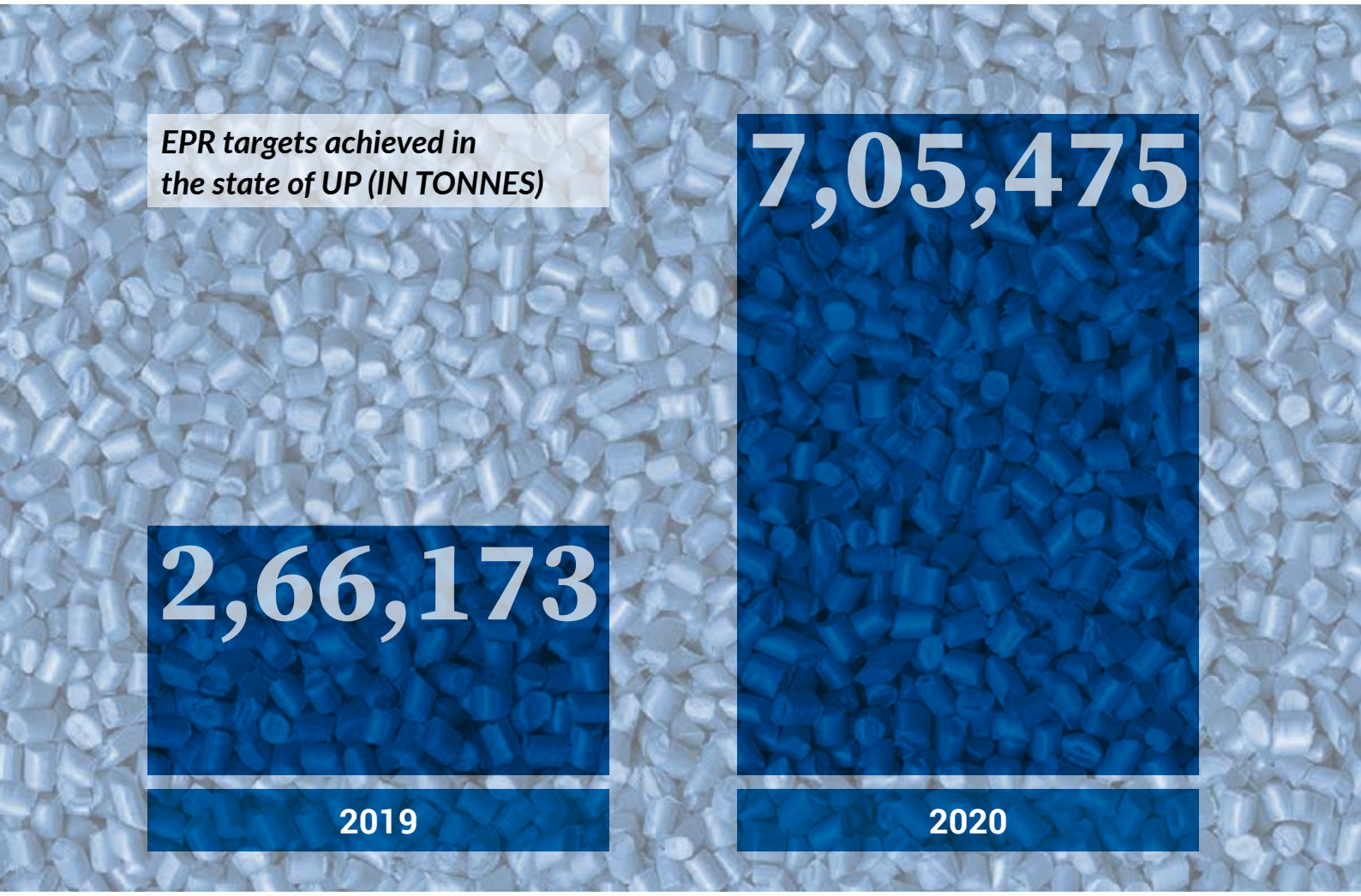
03

ROADMAP TO IMPLEMENT EPR THROUGH INNOVATION IN PRODUCT DESIGN & TECHNOLOGY

Extended Producer Responsibility (EPR) is one key mechanism to realize a true circular economy for plastics. According to the PREVENT Waste Alliance, EPR system is defined as a 'mechanism which involves producers taking responsibility for the management of products after it reaches End of use; Collection; pre-treatment, e.g. sorting, dismantling or de-pollution; (preparation for) reuse; recovery (including recycling and energy recovery) or final disposal'. EPR systems can allow producers to exercise their responsibility either by providing the financial resources required and/or by taking over the operational aspects of the process from municipalities. They assume the responsibility voluntarily or mandatorily; EPR systems can be implemented individually or collectively[11].

The Plastic Waste Management Rules, 2016, has included the Extended Producer Responsibility (EPR) as part of the plastic management system. As per the recently notified Plastic Waste Management (Amendment) Rules 2022, a framework has been put forward to strengthen the circular economy of packaging waste through the systems of EPR. The rules classify plastics into four categories: Category 1- rigid plastic packaging; Category 2 - Flexible plastic packaging of a single layer or multilayer (more than one layer with different types of plastic), plastic sheets or like and covers made of plastic sheet, carry bags, plastic sachet or pouches; Category 3- Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than; Category 4- Plastic sheet or like used for packaging as well as carry bags made of compostable plastics. With respect to plastic packaging, the EPR framework covers reuse, recycling, use of recycled plastic content and end of life disposal by producers, importers and brand owners. To operationalize EPR, it is important to understand the current legal framework for the EPR schemes, understand the advantages and weaknesses of the models and also identify the barriers that hinder the transition to a true circular economy.

Plastic to Fuel Facility at Prayagraj Municipal Corporation



STATE ACTION UNDER THE THEME

The state of UP has been gearing up the mechanism to set up an EPR system for packaging. The legal framework provided by the central government will further accelerate the transition in the state level EPR activities. India's EPR system is mandatory from the outset which will enable the states to further enforce PIBO obligations at the state and local levels. Many producers and importers are already participating voluntarily in the EPR system in the state and has already started reporting to the state PCB. 77 brand owners and producers have submitted an EPR plan in the state of UP. 9.7 Lakh MT plastic waste has been collected and disposed of by brand owners and producers under the EPR scheme as illustrated above. PRO (Producer Responsibility Organizations) model of EPR implementation has been tried effectively in the state of Uttar Pradesh. PROs are collective entities set up by the companies, which responsibly collects

and provides management of waste to meet the disposal obligations of the individual PIBOs. These collectives are responsible for setting up, developing, operating and maintaining the system. PROs allow the PIBOs to take joint responsibility for the products and the packaging waste that is introduced in the market. The key PROs that are working in the state of UP are: GEM Enviro Ltd., Shakthi Plastics India Ltd., IPCA, Karo Sambhav.

To ensure effective enforcement of Plastic Waste Management Rules, 2016, about Extended Producer Responsibility (EPR), UPPCB has imposed Environmental Compensation (EC) on several brand Owners for violating the obligations for managing plastics introduced in the market. In addition, 48 Paper Units of Muzffarnagar, Meerut, Ghaziabad, Noida and Bijnore have also entered into an agreement with M/s Ultratech Cement for co-processing of their plastic waste. Total Plastic Waste sent for co-processing from July 2020 to January 2022 is 23849.57 tonnes.

The state has also tried to engage with PIBOs for promoting consultations to develop and enforce the EPR system. A state Level Workshop on "Workshop on Extended Producers Responsibility Plastic & E-Waste" was held on 25 June 2019 in Lucknow. The Workshop was attended by dignitaries like Principal Secretary, Environment, Forest & Climate Change, UP; Principal Secretary, Urban Development Department; Secretary, Urban Development Department; Secretary, Environment, Forest & Climate Change; U.P.PCCF; Director, Environment; CPCB; Member Secretary, UPPCB. More than 400 Producers, Brand Owners, Recyclers & PROs had participated in the Workshop.

77 BRAND OWNERS AND PRODUCERS HAVE SUBMITTED AN EPR PLAN IN THE STATE OF UP

9.7 LAKH MT PLASTIC WASTE HAS BEEN COLLECTED AND DISPOSED OF BY BRAND OWNERS AND PRODUCERS UNDER THE EPR SCHEME

Non-recyclable fraction of plastic wastes especially the legacy wastes (age-old waste that is collected in the landfill or waste that remains piled up in an open dumpsite or uncontrolled sites) has low value and local bodies often struggle to economically manage such waste streams.

The state of UP is partnering with GIZ India to enable a circular economy approach for the management of legacy waste by activating the EPR framework and connecting the cement plants for co-processing of the waste. The system is piloted in the cities of Prayagraj (legacy waste of 12 Lakh Tonnes) and Mirzapur (legacy waste of 80,000 Tonnes) for developing “Business Models” for such rejects.

Role of EPR in ensuring circularity for plastics

EPR builds on the principle of polluter-pays which clearly attributes that "the producer of waste should bear the costs of waste management" to ensure the health, protection and safety of the environment and human health. EPR system provides an opportunity for PIBOs to create an ecosystem for circular economy and resource efficiency while sharing the burden of waste management. EPR schemes provide financial support to facilitate the collection, sorting and recycling of waste. The approaches of EPR drive innovation in product design aspects as well as propel for an eco-modulation of fees (as seen globally) so that they reflect the recyclability of the packaging being placed on the market. The system of EPR remains effective depending on the active role of government and the strategies put forward to provide a conducive environment to achieve the mandated recycling targets.

> *For an effective Circular economy for plastics, the loop of technological and biological nutrient cycles need to be closed.*
>
> — *DR. RACHNA ARORA, TEAM LEADER, CIRCULAR ECONOMY SOLUTIONS (CES-ML) PREVENTING MARINE LITTER PROJECT AND EUROPEAN UNION RESOURCE EFFICIENCY INITIATIVE (EU- REI), GIZ INDIA*

Circular economy and bioeconomy **for plastic alternatives**

The role of bioresources is essential in promoting alternatives to plastics. EPR concept helps to internalize the costs of collection, treatment and disposal of plastic waste so that they have an incentive to design durable and recyclable products (following eco-design criteria), which in turn contributes to reduced leakages and land & water-based pollution. Innovation in bioproducts especially biodegradable plastics is growing rapidly. Globally, it has been observed that many organisations are trying to reinvent their operation value chain based on bio-plastics, biodegradable plastics, compostable alternatives and other biopolymers. By 2025, the market of biopolymers and bio-based plastics are expected to grow by $27.9 billion from the 2020 market share of $10.5 billion[12]. India already has a system of plastic alternate products which is supplemented by the massive forest economy of the country. It is crucial to sustainably integrate and economically optimize biobased alternatives (like bamboo, jute, coconut fibres, areca leaves) into the mainstream consumption patterns.

Growing economy on biobased products and other eco-friendly alternatives of plastics must be looked in through the lens of the life cycle approach. It is crucial to understand the end-of-life options as well as the recovery pathways for the alternate products. Certification and standardisation along with incentives for operationalisation and promotion will help to communicate to consumers and also capture a wider market that is currently monopolised by plastic items.

> *Enforcement of rules and promotion of alternatives like products made of bamboo are essential for effective plastic waste management.*
>
> *— MR. C.P. GOYAL, DIRECTOR GENERAL OF FOREST & SPECIAL SECRETARY, MOEF&CC*

Holistic value chain for plastics

There exists a dire need for a holistic approach to evaluate, transform and implement policies and technological interventions that could foster a resilient system. EPR framework which demands achieving recycled content targets can promote financial incentives to foster circularity in the system. While incorporating recycled plastic content in products, the role of standardisation also needs to be developed. EPR can effectively act to tackle the growing challenge of microplastics which is already finding its way to items like salt, seafood, crops etc. While EPR may incentivize and drive manufacturers to design resource-efficient and low impact products, the ideas of alternatives to plastic also must be analysed holistically across the entire life cycle stage to ensure that the alternatives can be effectively managed as they approach their end-of-life.

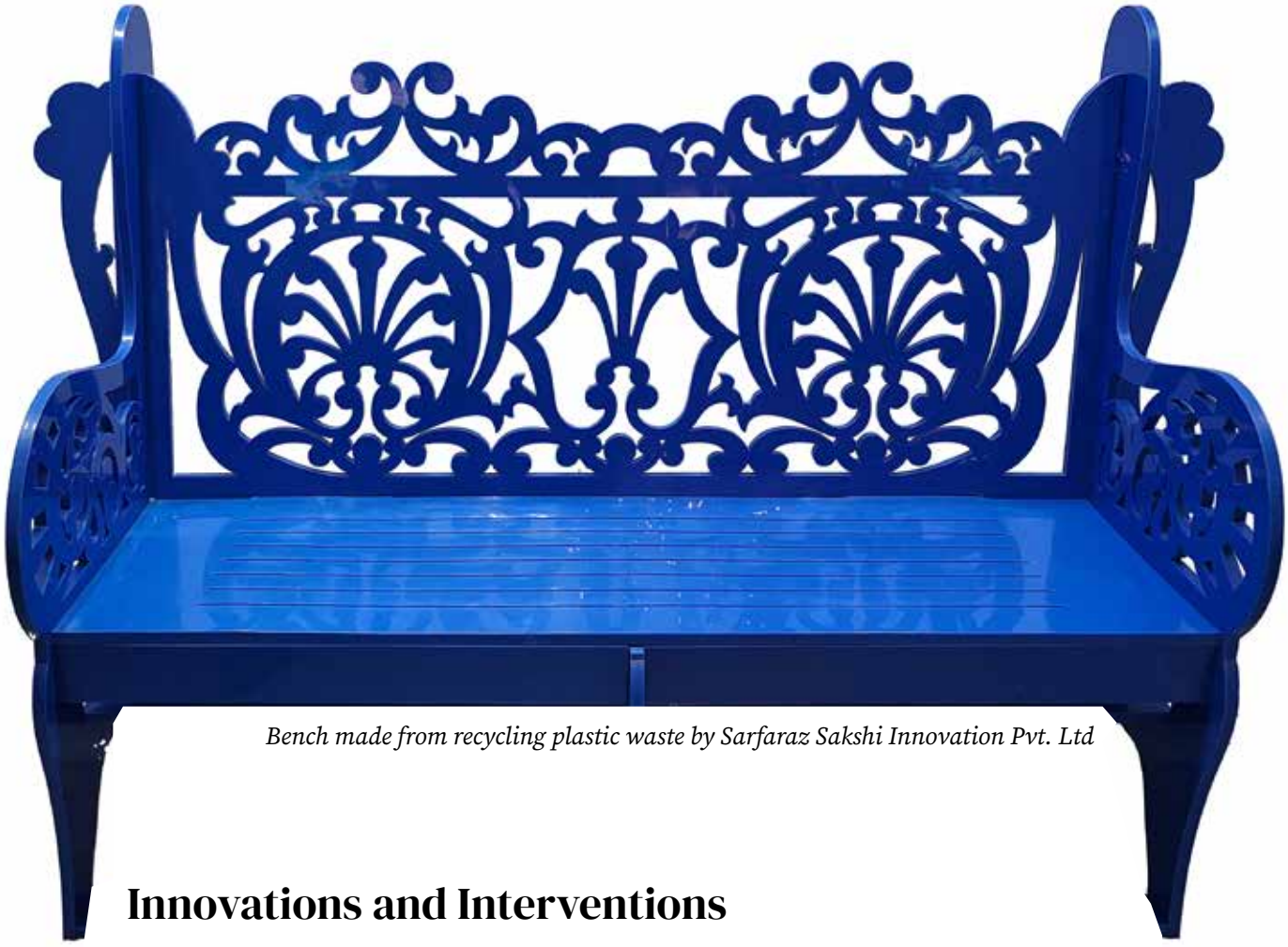
> *Efforts for tackling littering must be local, regional and global. EPR could be explored as a tool for tackling macro and microplastic challenges.*
>
> — *DR. SUMIT SHARMA, PROGRAMME OFFICER, UNEP*

Co-processing approach for plastic waste management

Co-processing indicates substitution of primary fuel and raw materials by waste in industrial process such large combustion plants. Non-recyclable plastic waste finds its application in the co-processing of plastic waste in cement kilns. EPR can act as a funding mechanism to effectively channelize the non-recyclable plastic waste to systems such as waste to energy or co-processing in cement kiln. Co-processing is quite common in India, especially in the state of Uttar Pradesh wherein recovery of energy happens within the process of cement manufacturing. Co-processing represents the final treatment step in a series of integrated waste management processes. In cement plants, plastic waste is used as Alternate Fuel and Raw-material (AFR), subjected to higher temperature around 1400°C-1500°C. During the process, energy is recovered while burning of plastic waste and its inorganic content get fixed with clinker[13].

GIZ, Holcim and FHNW, Switzerland has developed guidelines on (Pre- and) Co-processing of waste as Alternate Fuel Residue in cement production in 2006 which was updated in 2020[14]. These guidelines stresses that avoiding and reducing waste is the best way of dealing with current waste problems all over the world. It is also highlighted that the concepts of resource efficiency, circular economy, recycling and reuse must be given first priority in any integrated waste management approach. The quantities of plastic waste available for pre-and co-processing will shrink over time as stricter principles of circularity are applied. In addition, pre-and co-processing will also require a robust legal and institutional framework for effective implementation and management.

> *Waste avoidance is the key to a circular economy for plastics and co-processing can aid in integrated waste management systems of local bodies and cities.*
>
> — **DR. DIETER MUTZ**, *UNIVERSITY OF APPLIED SCIENCE AND ARTS, NORTHWESTERN, SWITZERLAND*



Bench made from recycling plastic waste by Sarfaraz Sakshi Innovation Pvt. Ltd

Innovations and Interventions

Innovation can spur environmental and economic benefits – by reducing virgin plastic usage, extending the life cycle of products and facilitating recycling. Environmental policies such as extended producer responsibility can help in encouraging innovation in plastic waste recycling and adopting circular economy models like refillable systems or reuse models or adoption of alternatives.

Germany has been a front runner in waste regulations globally and has shown that the German packaging ordinance of 1991 (the first kind of EPR system globally) had enhanced the plastic recycling capacities by a factor of four. The ordinance had a huge impact on the innovation space of plastic recycling. Producers had to rethink and redefine the value chain operations to manage plastic waste and incorporate recycled materials back into the system. New technologies (hydro cyclones or centrifuges to separate individual plastics) for sorting plastics were developed due to the drive created by the ordinance in the country[15].

Evidence from various global scenarios has shown that circular economy policies (e.g. EPR schemes, DRS schemes, take back models, refillable and reuse systems) can incentivise innovation efficiently. However, tangible policies and frameworks are needed for a paradigm shift towards closing the loop of plastics in the ecosystem. These policies and frameworks must be supplemented with adequate investments in innovation while aiming for a reduction of total plastics consumption.

PLASTIC PRODUCERS AND PRODUCT MANUFACTURERS

The producers of plastic resins, as well as the manufacturers of plastic products and packaging are well positioned to innovate, diversify and develop new solutions that will address plastic waste in addition to ciomplying with the obligations as per the regulatory instruments.

RECYCLERS

Recyclers also need to re-invent the wheel for systemic transformation in the plastic economy by effectively and efficiently recycling all the plastics collected and also re-introducing high-quality recyclable plastics back into the system. This will serve as feedstock replacement to the virgin material and drive investments in recycling operations, other innovations in material separation and technologies.

ALTERNATIVES AND NEW TECHNOLOGIES

Innovations addressing the interrelationship between conventional, bio-based and biodegradable plastics will be critical to support the growth of new technologies. The resource efficient and circular economy approach can provide a framework for material innovations to high standards for sustainably sourcing feedstocks and building end-of-life recovery pathways that recapture material value after use.

> *For managing litter, adopting a value-chain approach and a market-based ecosystem enabled by innovation and entrepreneurship is needed for the EPR implementation in the country.*
>
> — *MR. GAUTAM MEHRA, DEPUTY TEAM LEADER, CIRCULAR ECONOMY SOLUTIONS PREVENTING RIVERINE/MARINE LITTER IN ECOSYSTEMS (CES-ML) PROJECT, GIZ INDIA*

Technology upgradation and informal sector integration are highly needed for the sustainable management of marine litter in the country. EPR credits can help in bringing accountability in the system and also support waste management agencies in their operations.

— *MR. K. K. JAIN,* GANESHA ECOSPHERE

Product eco-design, design for sustainability are a few approaches that ITC is undertaking at the upstream of the plastics value chain. In the roadmap of ITC for being sustainability and impact-driven organization, the 'Sustainability 2.0' vision aims to have recyclable or compostable materials in product design by 2028. At downstream, focuses are driven towards effective waste collection and segregation process along with informal sector integration.

— *MS. MALAVIKA GOPINATH,* MANAGER-SUSTAINABILITY, ITC

Digital tools supported by traceable data is needed for implementing proper systems of scientific waste management.

— *MS. EKTA NARAIN,* CO-FOUNDER & VICE PRESIDENT, RECYKAL

WAY FORWARD

GLOBALLY, EXTENDED PRODUCER RESPONSIBILITY (EPR) has proven to be an efficient mechanism for waste management and tackling the issues of marine litter. Well-designed EPR schemes can reduce the burden on public budgets and incentivize effective collection, sorting, and promote better end-of-life management of wastes. EPR guidelines incorporate circularity and give producers substantial responsibility for the treatment and disposal of post-consumer plastic waste. An appropriate ecosystem enabled by digital platforms will help in monitoring the EPR targets and tracking the material flow in the plastics value chain. For EPR, monitoring compliance (like third party audits) will be a crucial part for managing the obligations. This will facilitate effective enforcement and also bring accountability to the system. The EPR framework also needs to take account of local characteristics and adapt accordingly for the operations and engagement. This will smoothen the downstream management of plastic waste and also meet the targets of recycling. Appropriate incentives and investment to promote EPR will drive the PIBOs to take more responsibility for the life cycle of products and also adopt sustainable materials to ensure sustainable production and consumption in society.

Seating Stools made from recycling plastic waste and old tyres by Sarfaraz Sakshi Innovation Pvt. Ltd,

04

REALIZING A TRUE CIRCULAR ECONOMY FOR PLASTICS

The current economic system which is based on the 'take-make-use-dispose' model has propelled the global economy to rely on depleting finite resources. To achieve sustainable growth, it is crucial to understand that such linear systems will not be suitable to society, economy and environment as it accelerates the global challenges of rapid climate change and loss of biodiversity. The circular economy system builds on the natural, human, social and financial capital while reducing / eliminating waste and pollution.

Designing for circularity is not limited to the product level, rather the approach is systemic. As with so many environmental issues, addressing the problem of marine litter requires multidisciplinary actions and cross-boundary cooperation. The actionable areas include coherence across policies, coordination of public and private organizations as well as key deliberations between the government officials and industry representatives. Amongst the regulatory frameworks, EPR plays a key role in potentially impacting the upstream of the plastics value chain and driving pollution prevention efforts. To realize a true circular economy for plastics, multiple level governance, the institutional framework for waste management and cooperative actions involving all stakeholders is essential. Since the issue of littering transcends national and international boundaries, cooperation amongst local and global organizations as well as collaboration between different projects should be strengthened.

Material Recovery Facility at Varanasi set up by GIZ India-Nama Facility

Policy and financial framework

In recent years, the policy landscape for plastics is evolving globally as well as in India. The Government of India (GOI) has considered and enacted various legislations and regulations at the national, state, or local levels for end-of-life management and mitigation of plastic waste pollution. These are embedded in the principles of resource efficiency and circular economy while trying to unlock the market potential of secondary plastics as well as promoting alternatives and alternate business models.

The policy instruments must also design and define financial systems to manage plastic waste by encouraging recycling. Major investments (public and private) are required in basic waste management infrastructure. Government financing plays a critical role in scaling up plastic waste solutions. Private financial institutions also need to allocate their capital for investments in recycling and other sustainable end-of-life options. Circular economy for plastics value chain can influence the climate change outcomes globally. Investments are required to increase the amount of recycled plastic available to meet the growing demand for high-quality, recycled content in products and packaging. Other segments of investment include the development of biodegradable materials as well as circular business models (like refillable, or reuse models) to redefine the current pattern of linear economy.

Collaboration and coordination for a true circular economy

Collaborations for enabling circularity in plastics and packaging may help to ensure increased processing volumes of plastic waste and sharing costs of innovations across upstream and downstream of the products. In realizing true circularity, responsible authorities need to develop long-term strategies and targets as well as clearly distribute roles and responsibilities amongst the public and private actors. This will help to break down the national and state policies and provide guidance on enforcement and implementation. The circular economy approach has to be framed to go beyond recycling solutions. Design for Environment (DfE), Design for recycling (DfR) and Design for Disassembly (DfD) has to be embedded in the value chain with the support and collaboration of many partners.

Partnerships of brand owners, waste management agencies etc can increase competitive advantage as the resource usage and management may span business boundaries[16]. In a circular economy model, resource sharing is the key approach to resource efficiency. Organisations have to think about how actors in the plastic value chain can work together on managing the costs involved in going circular, and how necessary innovations can be financed. Collaboration also helps to gather as well as share knowledge to help the execution of the circular business models.

> *Collaboration and coordination need to be supplemented with grassroots level awareness and capacity building activities. Karo Sambhav leads a consortium of major FMCGs in the country, working in partnership with the Packaging Association for Clean Environment (PACE), to resolve the challenges posed by plastic waste.*
>
> — *MR. PRANSHU SINGHAL, CEO & FOUNDER, KARO SAMBHAV*

> *There exists a serious need for mutual exchange of ideas as well as integration of technology and market interventions. Countries and nations must collaborate to manage plastic pollution and marine littering.*
>
> — *MR. BRIJESH PATEL, GERMAN RETECH PARTNERSHIP*

Realizing the role of the formal and informal economy

Globally, the waste management system is supported by the formal sector which is funded, regulated and managed through the network maintained by local governments or designated authorized waste management agencies (WMA). They are responsible for the collection, transport and adoption of end-of-life management options including recycling. In developing countries like India, there exists a gap in the waste ecosystem for managing the waste which is often not collected by a formal system. This gap is filled by the informal sector. This shadow system falls outside the purview of the current formal economic system.

Waste pickers collect recyclable (high-value) waste from dumpsites as well as from households and earn a livelihood from it. These high-value products are sold to small scrap dealers (kabadiwallas) who further categorise the waste and sell it to a small or medium aggregator. This is then channelized to a wholesaler or stockist, and finally, to recycling units. Some parts of India including Uttar Pradesh has high PET recycling rates in the world which are supported by the informal economy. The existence of the parallel formal and informal economic systems of waste management is now acknowledged in India as evident from the policy and regulatory framework of the country. It is also important that a gender-sensitive approach is crucial as women also play a central yet further invisible role in the informal economic system.

Grassroots initiatives that enable the integration of the informal and the formal sector is an effective solution for waste management. The recent publication by NITI Aayog and the Centre for Science and Environment[17] has reported that decentralised systems supported by public-private partnerships would help India in achieving the objectives of developing 'smart cities'. The informal sector needs to be accounted for in the plastic waste management operations supported by mechanisms like EPR.

> *A holistic approach is needed for plastic waste management. This would include creating a decentralized operating model, creating and strengthening waste management infrastructure, leveraging technology, integrating the informal waste collectors, and creating business models that sustain the process.*
>
> — *MS. SHOBHA, COO, SAAHAS*

> *The role of the informal waste collectors in plastic waste management needs to be acknowledged and it is essential to transfer benefits to these informal workers who try to ensure clean cities*
>
> — *MR. ASHISH TIWARI, SECRETARY, DOEF&CC, UP*

Innovation and technology

Innovation and collaboration across and beyond the plastics value chain is crucial. Plastic consumption permeates across various sectors and sections of society and therefore mechanisms that strengthen the system needs to be developed in a strategic manner. Innovative solutions must be embedded at the systems level and include multiple stakeholders.

Digital technologies, such as mobile apps, artificial intelligence (AI) and connected devices, blockchain etc have a critical role to play in improving citizen engagement in recycling, ensuring efficiencies and increasing transparency in the value chain. Technologies for upcycling needs to be encouraged so as to reduce the consumption of virgin plastics. For innovations and scaling up of ideas, partnerships are crucial with converters, brand owners, waste management companies as well as the academia, universities, research institutes and other, public-private organizations. Collaborative decision making on technological choices for plastic waste management and supported by schemes like EPR also promotes innovation and inclusiveness while ensuring compliance.

> *Data plays a key role in identifying plastic waste generation and for supporting the value chains.*
>
> — *MR. SIDDHARTH HANDE, CO-FOUNDER, KABADIWALLA CONNECT*

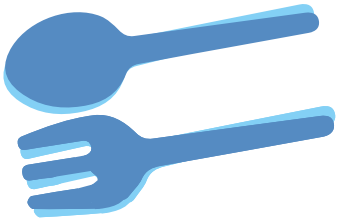
Foodware made by sugarcane residue(bagasse) by Yash Pakka Ltd.

WAY FORWARD

MOVING AWAY FROM the long-time approach of linear economy wherein raw materials are manufactured, processed, used once and thrown away, circular economy ensures that resource-efficient approaches are tested and policy instruments like EPR are promoted. Financial systems like EPR schemes can promote - Collaborative decision making on technological choices which are considerate of different interest groups that drive waste management; Inclusive approaches that ensure socio-economic benefits for different sets of stakeholders; and Sustainable waste management opportunities that ensure a better economy, safe environment and peaceful society.

While aiming for the circularity of plastics, the state and central governments have to decouple the usage of unnecessary plastics as well as incentivize models of reuse and recycling. Other measures include the use of recycled plastics as a substitute for virgin polymers, eco-design to reduce material consumption and adoption of sustainable methods for the design of final products (like the design for disassembly). Capacity building, awareness and knowledge exchange are crucial for each member of the plastics value chain.

"Responsibility for plastic waste management lies not only with the consumer but with the entire production chain."



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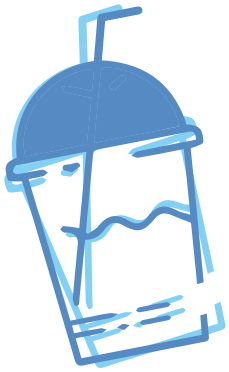
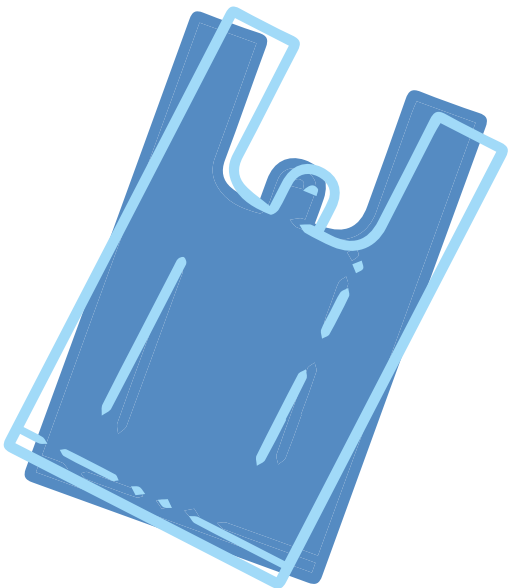
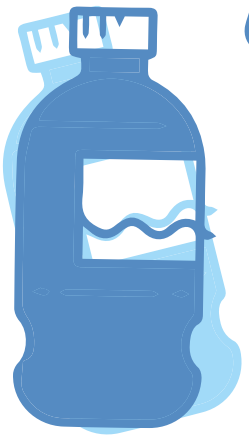
UP CHARTER ON PLASTIC WASTE MANAGEMENT







UP CHARTER ON PLASTIC WASTE MANAGEMENT

IN THIS GLOBALIZED ERA, where everything has been fast-tracked, handy solutions that save our time to ease the rate of development have been promoted widely. "Plastic" commodities are one of these items, that helps to save time and has boosted the culture of use and throw. Due to the negative effects of plastics on maritime ecosystems, as well as being a considerable accelerator of climate change, there is an urgent need to reduce plastic waste and its consumption along the entire value chain and to foster Circular Economy. Aware of the growing concern, the Government of India announced the ambitious target of phasing out single use plastics by 2022. Moreover, the Indian national framework on plastic waste management, 2022 aims at the implementation of Extended Producer Responsibility (EPR) and integrating eco-design by mandating the use of recycled content related targets.

The state of Uttar Pradesh generates over 1.6 lakh tons (as reported in the annual PWM report 2019-20, CPCB). To address this serious concern and to deliberate on the plastic production, consumption, and its impact on the environment, GIZ India along with FICCI as its Industry Partner, under the aegis of the Department of Environment, Forest and Climate Change, Government of U.P had organized a roadshow on "Creating awareness to prevent Marine/Riverine litter in the Ecosystem". The roadshow aimed at creating awareness about plastic waste management, through government representatives and stakeholders (Sustainability Managers/Leaders, Industry Representatives, PIBO, Recyclers, Professionals engaged plastic waste management) engagement that are closely working in this space.

The event not just highlighted the policies and technologies available to address this issue, but also include holistic deliberation between the authorities and industry to highlight the loopholes in the current system resulting in limited adoption and impact. In addition, it also provided a platform for exhibitors to showcase their solution/innovation to policymakers and industry to explore partnership opportunities. Based on the various consultations and technical sessions held during the Roadshow, it was decided that the Uttar Pradesh Charter on Plastic Waste Management must fulfil the broad objectives and vision to close the material cycle of marine litter. The charter aims to deliver the vision of the state of Uttar Pradesh in tackling plastic litter through a circular economy approach and create an enabling implementation framework.

KEY FOUNDATIONAL PILLARS OF THE UP CHARTER

By 2030 overall waste generation must be significantly reduced through prevention, reduction, recycling and reuse. The approaches must ensure the reduction of micro and macro plastics in the natural ecosystem in the state of Uttar Pradesh.

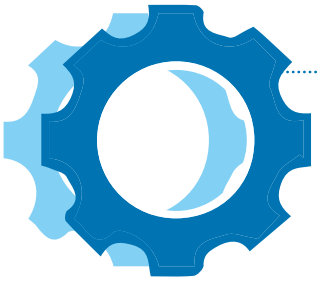
By 2050, plastic consumption will account for 20 % of total oil production in the world. This will also accelerate the effects of climate change. Hence for achieving SDG 13, the Charter proposes a state action focused on

Entire life-cycle of plastics including production, consumption and end-of-life management

For achieving a sustainable growth, a significant reduction of marine debris by 2025 is crucial. The Charter focuses on

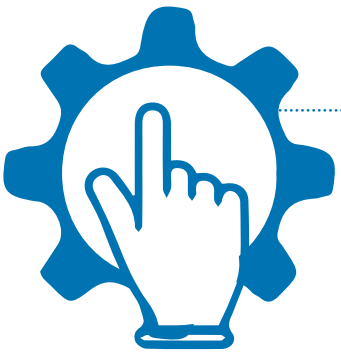
Circular economy approaches and appropriate stakeholder engagement that includes adoption of upstream and downstream measures that will help in achieving the target of riverine litter reduction by adopting suitable measures around the gangetic ecosystem.

The key activities proposed under the "UP Plastic Waste Charter" are:



Implementation framework on plastic and circular economy

- Effective implementation of Plastic Waste Management (PWM) Rules, 2016 and operationalization of Extended Producer Responsibility (EPR) to streamline and channelize take back system of plastics waste with the engagement of Plastic Waste Processors (PWPs) and Producer, Importer and Brand Owner (PIBOs) while promoting the concept of "Circular Economy". The framework for EPR integration with Urban Local Bodies (ULBs) and Gram Panchyats needs to be developed along with the capacity building of the concerned personnel.
- To develop a framework and business model for enabling co-processing of non-recyclable plastic in the state by involvement of ULBs, Gram Panchayats, PIBOs and Cement Plants while developing holistic understanding of the plastic waste value chain.
- To promote design innovation and policy support to eliminate the use of multi-layered plastic (MLP), phasing out low utility plastic packaging and single-use plastic items.
- Enforcement on imposition of the ban on the use, manufacture, sale, distribution, storage, transport, import, or export of all kinds of plastic carry bags, single-use plastic and thermacol disposables in all rural, urban, and industrial areas of the state.

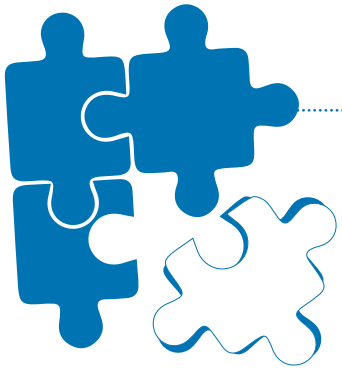


Governance Mechanism and Monitoring

- To strengthen "State Level Monitoring Committee" and "Special Task Force (STF)" for the effective execution of the PWM rules enabling multi-level governance to manage plastic waste till end-of-life and also provide PMU/Secretariat with sectoral experts.
- To prepare the comprehensive plastic waste management action plan with tangible timelines and allocate resources for its effective implementation while closely monitoring the implementation of the rules in rural, urban and industrial boundaries of the state.
- Development and strict enforcement of a Green Protocol in the state

to enable implementation of plastic waste management action plan. This will also encourage schools, colleges business entities, transport hubs, government offices to develop a green premise by transitioning to circular economy-based approaches. The primary aim of "Green Protocol" is waste minimization through prevention of use of disposables and promote reusable alternatives.

- Framing amended by-laws by the urban local bodies for plastic waste management and monitor city level action plan on quarterly basis to meet the targets in a time bound manner.
- Adoption of 4R (Reduce, Reuse, Recycle, Recover) principle to reduce overall consumption of plastic.



Equitable Inclusion

- Development and promotion of inclusive business models with social enterprises and informal sector workers to create sustainable value chains.
- Development of policies and strategies for the recognition of organisations of waste pickers and establish an integrated system with local bodies for an inclusive ecosystem in the state.
- Inclusion of women led cooperatives towards waste minimization and channelization of waste to the formal recycling value chain.
- Integration of PIBOs with the local bodies, connecting the informal sector for collection and segregation of plastic waste and also developing the adequate infrastructure.

Sustainable Consumption and Alternatives

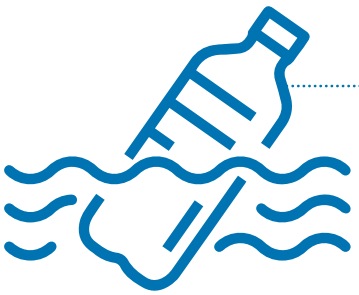
- Sustainable consumption patterns and adoption of alternatives for plastics are key for implementing waste reduction. This also requires behaviour change to ensure waste reduction both at pre-consumption and post-consumption stages.
- Promotion of sustainable packaging solutions and identifying start-ups to encourage suitable alternative packaging technology.
- Implementation of sustainable procurement policies in public and private organisations.
- Development of IEC modules for local bodies, recyclers, producers, NGOs to raise public awareness about adverse effects of plastic on environment and encourage practices like carrying cloth bags for shopping, using reusable water bottles etc.

Stakeholder Engagement

- Engagement of stakeholders across the value chain- upstream (like manufacturers/PIBOs in designing/manufacturing the plastics), midstream (consumers) and downstream (like recycling industry, co-processing in cement kilns).
- Create deeper reflections on raising public awareness, defining responsibilities, developing sustainable practices in partnerships (with the private sector) to reduce waste generation.
- For sustainable plastic waste management, all stakeholders from the private and public sectors, communities and other organizations need to adopt the circular economy principles, thereby reducing and offsetting the plastic waste leakages.

EPR compliance

- EPR guidelines incorporate circularity and give producers substantial responsibility for the collection, treatment and disposal of post-consumer plastic waste.
- The concept of EPR promotes the principle of "Polluter Pays" and a broader insight has been made with the release of EPR rules by MoEFCC, Govt. of India in February 2022. The guideline sets the targets of PIBOs to ensure recycling from 25% to 100% into four classified categories (Rigid Plastic, Flexible plastic, Multi-layer Plastic & Compostable Plastic).
- Ensuring the compliance to the online web portal by CPCB to fulfil the obligation of EPR. The portal is not just limited to the registration of the PIBOs, Recyclers/Plastic waste processors but also acts as single point data repository for the implementation of EPR guidelines in the country. The platform developed by CPCB with the support of GIZ India will bring an end-to-end IT Framework for EPR that ensures ease of doing business and manage plastic waste with the support of PIBOs. The system will bring in accountability, traceability and transparency of fulfilment of EPR obligations within the states .
- To developa replicable business models on EPR implementation and strenghtening plastics value chain in selected sites in UP with public and private sector partnerships.



Mitigation of Riverine and Marine Litter

- Enforcement of Plastic Waste Management Rules which prohibits identified single-use plastic items with low utility and high littering potential (like earbuds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice cream sticks, thermocol for decoration, etc.).
- Compulsory screening and regular cleaning of the stormwater drains which are the primary source of plastic waste entering the riverine and marine ecosystem.
- Issue guidelines with its strict implementation for local bodies to identify hotspots of littering and adopt appropriate mitigation mechanisms.
- Ensure convergence with national missions such as the Swachh Bharat Mission and National Mission for Clean Ganga and bilateral/multilateral agencies for enabling knowledge and infrastructure enhancement for managing litter.

Enabling Infrastructure and technological measures

- Infrastructure plays a key role in the effective management of plastic waste, but source segregation of waste is the primary requirement. Recycling and other techniques of managing plastic waste can only be successful if plastic is received in an uncontaminated form which is why more emphasis needs to be placed on source segregated waste transportation.
- The waste management infrastructure in the State needs to be strengthened through the Swachh Bharat Mission (SBM).
- GIS mapping of all legacy waste along with waste estimation, creation of sustainable business models and ensure timebound disposal of wastes.
- Strengthning the plastic waste collection channel, to ensure the availability of plastic waste that can be used in road construction and as a alternate fuel/raw material in cement plants.

Ghaziabad Municipal Corporation which is promoting "Plastic Tourism" in the city has setup Garbage Factory to process waste in decentralised way. In this premise plastic waste is recycled into resourceful items like lamps, tree guards, benches, maurals for beautification of city, etc. More such plastic waste management infrastructure to be promoted in the state.

Innovation and Circular Business Models

- For sustainable plastic waste management, market-driven innovative and circular business models are the need of the hour. For the state like Uttar Pradesh, one model can't be a success. Providing opportunities to multiple new waste management models to showcase on pilot mode based on the waste profile of the regions, would encourage more ideas to float in. This will also eliminate the dependency on one model/ business entity.
- The Plastic Waste Management rules and amendments emphasize reducing the use of virgin plastic material and increasing the usage of recycled material. Standardization for eco-friendly plastic products and coordinating with the national policies while aligning with international standards standards is essential to ensure innovators in the state of Uttar Pradesh scale up their business.
- Financing is a crucial aspect for business models to become viable and sustainable. Encouraging start-ups and alternative material producers by being part of competitions, hackathon and providing marketing/ funding support to new ideas.
- Mapping and establishing a channel between local bodies and Plastic waste processers to establish a financially and sustainably sound plastic waste lifecycle.
- Development of strategies for the safe scientific disposal of non-recyclable plastic in cement kilns and waste to energy/fuel plants. Also, defining the use of non-recyclable plastic waste in multiple ways through mandating its application in road construction, manufacture of plastic bricks, furniture, murals for city beautification etc.

Digitalization and Traceability

- The Plastic Waste Management in the state requires digitalization as an important cornerstone covering traceability, accountability and digital governance. This will be aligned with the 'Digital India' mission. Various stakeholders such as waste pickers, recyclers, ULBs PIBOs, PWPs and citizens will be integrated to the system. This would enable access of real-time data covering the complete value chain: waste generation, collection, processing and disposal.
- Adopt and promote digital platforms for effective monitoring of various environmental laws and understanding waste flows (in and out) within the state of Uttar Pradesh. This system will be integrated

with the centralised platform developed by CPCB/MoEFCC.

- Tracking waste flows at every stage, including at the material recovery centers/transit centres as well as to identify the source of waste and the concerned waste collectors/waste pickers. This has to be enabled through the unique systems of QR codes, GPS based tracking etc. to ensure security, compliance and easy governance. Multiple reports can be generated for various stakeholders such as local bodies, pollution control boards, and other implementation partners.
- Online portal for ULBs, PIBOs, Recyclers, plastic waste processors to track and monitor plastic waste right from generation to disposal, and integrate with the National platform for Data Registry under the Extended Producer Responsibility (EPR) Compliance.

Sources

1. UNEP (2021). Drowning in Plastics – Marine Litter and Plastic Waste Vital Graphics.
2. EY (2020), https://assets.ey.com/content/dam/ey-sites/ey-com/en_in/webcast/2020/05/tapping-into-the-globally-competitive-indian-manufacturing-opportunity.pdf <accessed on 21 February 2022>
3. OECD (2022), Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD Publishing, Paris, https://doi.org/10.1787/de747aef-en <accessed on 21 February 2022>
4. https://chemicals.nic.in/sites/default/files/SUP_Expert_Committee_Report.pdf <accessed on 23 February 2022>
5. NMCG-NIUA (2020), A Strategic Framework for Managing Urban River Stretches in the Ganga River Basin (URMP), https://www.nmcg.nic.in/writereaddata/fileupload/48_Urban%20River%20Management%20Plan%20framework.pdf <accessed on 21 February 2022>
6. The World Bank (2014) Ganges Strategic Basin assessment: a discussion of regional opportunities and risks.
7. https://www.npcindia.gov.in/NPC/Uploads/file%20upload/Plastic%20Leakage%20Pathways.pdf <accessed on 22 February 2022>
8. Whitehead, P. G., Barbour, E., Futter, M. N., Sarkar, S., Rodda, H., Caesar, J., ... & Salehin, M. (2015). Impacts of climate change and socio-economic scenarios on flow and water quality of the Ganges, Brahmaputra and Meghna (GBM) river systems: low flow and flood statistics. Environmental Science: Processes & Impacts, 17(6), 1057-1069.
9. Napper, I. E., Baroth, A., Barrett, A. C., Bhola, S., Chowdhury, G. W., Davies, B. F. R., Duncan, E. M., Kumar, S., Nelms, S. E., Hasan Niloy, M. N., Nishat, B., Maddalene, T., Thompson, R. C., Koldewey, H. (2021) The abundance and characteristics of microplastics in surface water in the transboundary Ganges River. Environmental Pollution, 116348.
10. Sarkar, J.D., Sarkar, D.S., Das, K.B., Manna K.R., Behera, K.B. & Samanta, S. (2019). Spatial distribution of meso and microplastics in the sediments of river Ganga at eastern India. Science of The Total Environment, 694, 133712.
11. PREVENT Waste Alliance. 2020. Factsheet 00: Introduction Preface, introduction, glossary and key readings EPR Toolbox. https://prevent-waste.net/en/epr-toolbox/ <accessed on 24 February 2022>

12. https://www.marketsandmarkets.com/PressReleases/biopolymers-bioplastics.asp <accessed on 24 February 2022>
13. https://cpcb.nic.in/uploads/plasticwaste/Co-processing_Guidelines_Final_23.05.17.pdf
14. https://www.giz.de/de/downloads/giz-2020_en_guidelines-pre-coprocessing.pdf
15. OECD (1998), "Extended Producer Responsibility Phase 2: Case study on the German packaging ordinance".
16. Dyer, J. H., Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage, Academy of Management Review, 23, 660– 679.
17. Atin Biswas, Subhasish Parida et al. 2021, Waste-Wise Cities: Best practices in municipal solid waste management, Centre for Science and Environment and NITI Aayog, New Delhi.

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