Toxics Link
for a toxics-free world

TOXICS Dispatch

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Nonylphenol in India's Textile Products: Need for a Phased Transition to Safer Alternatives

By Piyush Mohapatra and Dr Deepak Marathe

Nonylphenol (NP) and its ethoxylates (NPEs) have become indispensable in various industrial processes due to their efficacy as surfactants, emulsifiers, and wetting agents. But despite their utility, these endocrine-disrupting chemicals are an environmental and health hazard, posing great risks of aquatic toxicity and serious health concerns in humans (Toxics Link, 2024). Recognising these chemicals as pollutants and endocrine disruptors, many developed countries (China, 2023; Denmark, 2005; ECHA, 2003; UNEP, 2012) have banned or restricted their use. But India continues to rely heavily on NP-based chemicals with the textile sector as one of their largest industrial consumers (Toxics Link, 2024).

What is Nonylphenol

Nonylphenol, discovered in the 1940s, is one of the high-production-volume chemicals and is considered as a xenobiotic compound. It is an estrogenic endocrine active chemical that is a derivative of ethoxylated alkylphenol, a non-ionic compound used as a surfactant, dispersing agent, emulsifier and wetting agent.

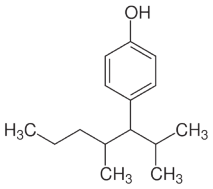
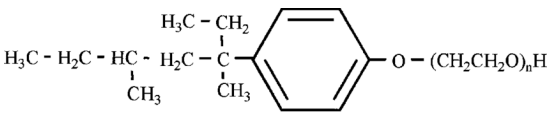


Figure 1: Chemical structure of 4 Nonylphenol



(Nonylphenol ethoxylates)

Figure 2: Chemical structure NPE

Why Is NP a Concern?

As a persistent pollutant, NP disrupts aquatic ecosystems by mimicking hormones, leading to reproductive and developmental abnormalities in fish and other organisms. Its endocrine-disrupting properties also cause serious health risks for humans, including hormonal imbalances and potential fertility issues. It is extensively used in industrial products like detergents, plastics and textiles, and is known to contaminate food and drinking water.

MANAGING EDITOR:
Satish Sinha
satish@toxicslink.org

EDITORIAL TEAM:
Sucheta Das Mohapatra
Mamta Gupta
comm@toxicslink.org

DESIGN BY:
Aspire Design
aspiredesign@gmail.com

IN THIS ISSUE

EDITORIAL

SATISH SINHA

Associate Director, Toxics Link

It's a great pleasure for us in bringing out the first newsletter of the year. Through this, we extend our warm greetings and best wishes for a safer and less toxic world. It is also an opportune moment for us to reflect on the year gone by and take stock of the challenges that lie ahead on issues concerning the environment and human health.

One of the major events in the previous year was negotiations for a global plastic treaty and adoption of measures to combat the issue of marine pollution, which unfortunately could not be finalised during the Inter-Governmental Negotiations at Busan. The reasons for this were several. However, the most important stumbling block was economic interest of a few nations overriding the global environmental interest. We also witnessed a setback on the global climate agreement as the new US administration decided to withdraw from the agreement thus jeopardizing the momentum of the effort. The new US Administration also announced its decision to withdraw financial support to the WHO and this could potentially have far-reaching impacts in mitigating global public health issues. These are serious setbacks to the global efforts on addressing the planetary crisis of climate change.

On a positive note, the world has successfully negotiated and finalised a global understanding of chemical management, namely the "Global Chemicals Framework" that holds promise to deal with issues and concerns associated with chemicals and health. While the treaty is not mandatory and legally binding on nations, it has built-in mechanisms to bring together all nations on a common platform in progressing towards a less toxic supply chain and production systems. Chemicals are extremely complex in understating and the evidence of their impacts on human health are far more complex to corelate and understand. The list of some of the most toxic chemicals termed as forever chemicals continues to grow as evidence of their characteristics is gradually studied and made public while nations continue to wrestle with finding solutions and safer alternates. Another group of chemicals broadly classified as "Endocrine Disrupting" also pose serious threats to human health with growing evidence of newer chemicals being added to the list. We are extremely hopeful that the globally accepted new framework will provide a roadmap to a safer chemicals regime.

Toxics Link has been engaged in studying some of these chemicals bringing out new data and catalysing meaningful conversations towards sound management of chemicals. We have in the recent past initiated significant and in-depth work on Nonylphenols, an endocrine-disrupting chemical, extensively used across diverse industrial sectors. We will require collaborative effort from all stakeholders in understanding the complexities and finding solutions in mitigating the human health issues caused by this compound. It is thus critical for us to adopt a precautionary approach towards chemical management while being mindful of the developmental needs of the country.

The issue of microplastics that are now omnipresent in the environment and found in various organs of human body are also deeply connected to a few chemicals that are recognised as EDCs and are of concern to human health. Our research report on presence of microplastics in both salt and sugar points towards serious contamination of the food chain and its serious impact on human health. Microplastics are nothing but very small and invisible particles of plastics that have found their way into the food chain and need global effort in how we design, use and manage plastics. Our initiatives on waste issues will largely incorporate adoption of Extended Producers Responsibility (EPR) and circular economy principles and opening up of conversations on a possible roadmap for transition.

We are also happy to inform all readers that Toxics Link is back in H-2, Jangpura Extension, New Delhi, our original home ground. We look forward to welcoming you in our new abode.

Warm Wishes for the joyous season of colours!

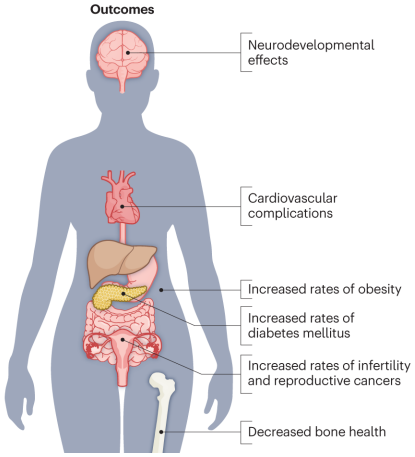


Figure 3: Impact of NP on human health

NP use in Textile Manufacturing

Nonylphenol and its ethoxylates are widely used in textile manufacturing due to their effective emulsifying, wetting, and dispersing properties. They are used in various stages of textile processing, including:

- **Wetting:** NPEs are used as wetting agents to reduce the surface tension between fabrics and dyes or chemicals, ensuring better penetration and uniform dyeing.
- **Scouring:** NPEs are used to clean and prepare fibres before the dyeing process by removing natural oils and impurities, especially in cotton.
- **Dyeing and Finishing:** NPEs enhance the effectiveness of dyes and other finishing agents, ensuring consistency and high-quality output.
- **Lubricants and Softening Agents:** NPEs also serve as lubricants in spinning and weaving operations and as softeners to improve the feel and texture of the fabric.

Replacing NP Usage With Sustainable Alternatives: The Challenges in Indian Textile Industry

The textile sector in India is highly dependent on NP and NPEs for cleaning, dyeing, scouring, and fabric finishing (Pavan et al., 2024). These chemicals are cost-effective but highly toxic and persistent when released into the environment (Toxics Link, 2024). Small- and medium-sized enterprises (SMEs), which form a large part of the textile industry, lack awareness about the environmental and health risks posed by NP/NPEs. They also have limited knowledge about sustainable alternatives and lack the technical expertise to implement changes.

Another challenge is the lack of data and monitoring system. There are insufficient studies or sector-specific data on the production, consumption, and discharge of NP/NPEs. This data gap hinders the ability of policymakers and regulators to create targeted interventions. Additionally, the enforcement of existing environmental regulations is weak, especially for informal or smaller units, which often discharge untreated or partially treated effluents into water bodies.

A major barrier to adopting sustainable alternatives is the financial burden associated with switching to NP-free solutions. These alternatives, though environmentally-friendly, are more expensive and may require significant modifications to existing processes. Many textile facilities, particularly SMEs, do not have access to advanced treatment technologies capable of effectively removing NP residues from effluents (Toxics Link, 2024).

Regulatory Oversight

Despite the harmful impacts of NP on human health and the environment, these chemicals are widely used due to their cost-effectiveness and industrial benefits. India's regulatory framework has not been able to pace with global standards. The country lacks specific regulations targeting NP and NPEs in the textile sector, despite its significant consumption of these chemicals. While the Bureau of Indian Standards restricts NP in cosmetics under *IS 4707 (Part 2): 2009*, the textile industry remains largely unregulated, resulting in the continued discharge of harmful substances into the environment.

Globally, many countries have taken stringent measures to address the risks associated with NP and NPEs. For instance, the European Union heavily restricts their use under the REACH framework due to their classification as endocrine disruptors and their toxicity to aquatic life (ECHA, 2002). In the United States, the Environmental Protection Agency (EPA) regulates these chemicals under the Clean Water Act and the Toxic Substances Control Act (TSCA), promoting safer alternatives and voluntary phase-outs (USEPA, 2004).

Japan has demonstrated the impact of consumer-driven change, with industries voluntarily eliminating NP from products following public concern. Similarly, Canada has classified NP and NPEs as toxic substances under its Canadian Environmental Protection Act (CEPA), implementing prohibitions and mandatory pollution prevention measures (Canada Environment, 2004).

Export Challenges and International Compliance

With many countries adopting stricter regulation on the use of NP in textiles, India's textile industry will face increasing pressure to comply with international standards. India is a key player in the global textile market, with a significant portion of its textile exports going to region like the European Union (EU) and United States, where regulations on chemical in consumer product are stringent.

- The EU has banned textile product with a concentration of NP exceeding 0.01%, effective from 2021. This poses a challenge for Indian textile exporters who must ensure their products are free from NP to remain competitive in the global market.
- If the Indian industry continues relying on NP-based Chemical, the country's textile exports could be affected as product with NP residues may be rejected or face stricter inspections at international ports

Textile waste and Nonylphenol

India generates approximately 7,793 kilotonnes of textile waste annually, representing about 8.5% of global textile waste. Notably, 59% of this waste is reintegrated into the textile industry through reuse and recycling. However, challenges remain as only a fraction of these recycled materials make it to the global supply chain due to quality and visibility constraints.

Out of the total waste, 34% is directly reused or repaired and converted into new products, while 25% is recycled into yarns. Despite being a global leader in mechanical recycling, India faces issues with low-grade recycling processes, which result in materials being confined to domestic markets. Additionally, 41% of textile waste is not effectively utilised, with 19% being downcycled, 5% incinerated, and 17% ending up in landfills. These figures highlight the need for enhancing the recycling quality and integrating more materials into global supply chain (Sattva Consulting & Fashion For Good, 2022).

The presence of harmful chemicals, such as nonylphenol and nonylphenol ethoxylates, present a significant barrier to managing textile waste. NP is commonly used in textile production for washing and dyeing processes. When textiles containing NP are recycled, the chemical can contaminate the recycling supply chain and pose environmental and health risks. By addressing harmful chemicals at the production stage and implementing upstream solutions, the circular economy offers a sustainable alternative to the linear model of production and consumption. It aligns with international frameworks aimed at reducing the release of hazardous substances into the environment, thus contributing to cleaner air, water, and soil.

However, the absence of comprehensive regulations addressing the upstream use of harmful chemicals like NP remains a critical gap. By phasing out toxic chemicals and investing in high-quality recycling processes, India can strengthen its circular economy and contribute meaningfully to global sustainability.

Impact on Environment

Textile production in India often leads to the release of untreated wastewater into rivers, lakes, and other water bodies (Dagwar et al., 2024). Moreover, improper disposal of textile waste into the

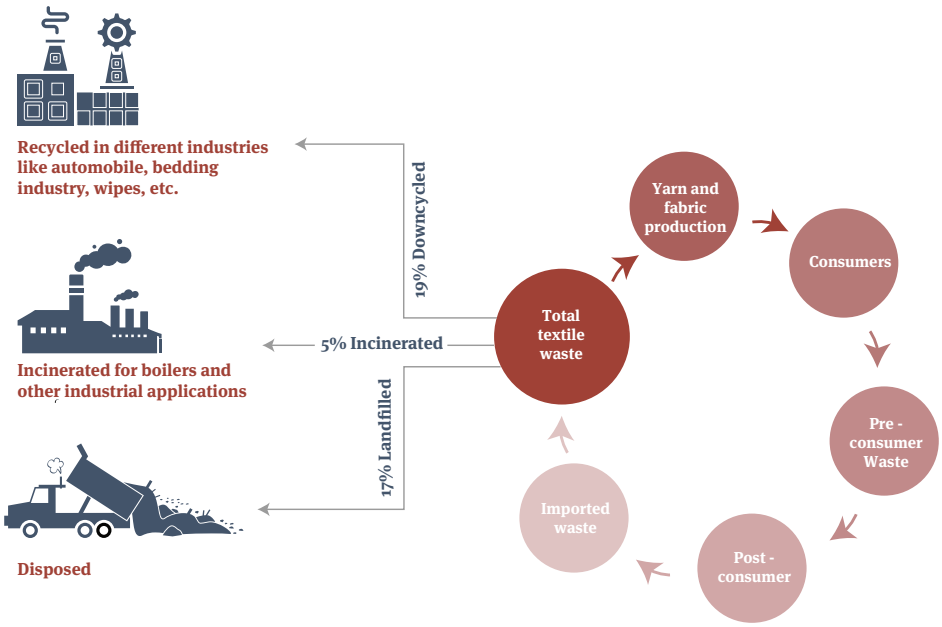


Figure 4: Total quantity of textile waste in India, end-use and destination of textile waste

environment can release nonylphenol ethoxylates into natural water systems (Pavan et al., 2024). The limited recycling capacity of textile waste by SMEs and MSMEs further exacerbates NPE pollution in the environment.

NPE residues, which do not break down easily in the environment, accumulate in these bodies of water, affecting aquatic life and contaminating our drinking water sources (Toxics Link, 2023).

Major textile hubs like Surat, Tirupur, and Ludhiana face significant challenges with wastewater management, releasing harmful chemicals such as NP into rivers (Omsakthi-A-Overseas, 2023). NP has been detected in major rivers like the Ganga, Cauvery and Noyyal, with concentrations far exceeding safe limits. Studies have found NP concentrations in some rivers of India ranging from 9.2 mg/L to 41.3 mg/L, a level that poses significant ecological risks (CPCB, 2013).

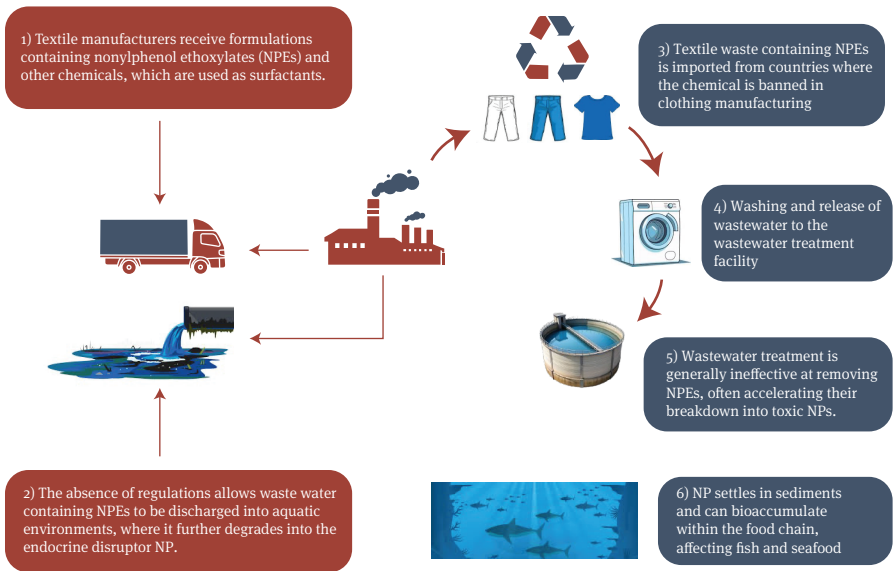
In addition, Toxics Link found 18-11160ppm of NPE in 11 out of 23 cotton textiles (wt.) (Toxics Link, 2023) and NP in concentration of 29-80.5µg/L in drinking water collected from different locations in India (Toxics Link, 2022).

NP is toxic to aquatic organisms, disrupting the reproductive systems of fish and other wildlife. It accumulates in aquatic ecosystems, leading to long-term environmental damage (Patisaul, 2009; USEPA, 2024).

Strategies for Phasing Out of NP from India's Textile Products

A strategic shift towards sustainability, supported by policy reforms, technological advancements, and financial incentives would be required to phase out NP/NPEs usage from the textile sector. One of the key steps is to promote the adoption of NP-free alternatives through government subsidies and financial incentives. This will help offset the higher costs of sustainable chemicals and encourage industries, especially SMEs, to transition to safer practices. Developing affordable and scalable solutions will ensure even smaller enterprises can address effluent contamination effectively.

Figure 5: Fate of Nonylphenol in textile sector



Stronger regulations and enforcement mechanisms are necessary to drive accountability in the textile sector. Introducing mandatory reporting on NP usage and discharge, and stricter compliance requirements will help monitor and reduce the environmental impact. Aligning domestic standards with international Eco-Labelling frameworks (European Union, 2002), such as ZDHC (Zero Discharge of Hazardous Chemicals) (ZDHC, 2024), Oeko-Tex (Oeko-Tex, 2023), DfE Safer Product Labelling and Criteria for Safer Surfactants, The CleanGredients® Database (CleanGredients, 2024) and Global Organic Textile Standard (GOTS), can further incentivise industries to adopt sustainable practices, as global buyers increasingly demand environmentally-friendly products.

The increasing global demand for sustainable textiles represents an opportunity for the Indian textile sector to lead in eco-friendly production. However, targeted support for SMEs is crucial to ensure inclusive progress. Financial assistance, affordable remediation technologies, and technical training can enable smaller enterprises to meet sustainability standards without compromising their competitiveness. Transitioning the textile industry in India to NP-free processes is a complex yet necessary task. To achieve a gradual, sustainable, and economically viable transition from Nonylphenol, several key strategies may be implemented in the sector. Promoting alternatives to NP, despite their initial costs, is crucial, as large-scale production and adoption of substitutes can deliver long-term economic benefits to producers and manufacturers.

The Central Pollution Control Board (CPCB) may strengthen water quality standards specific to NP, and lab testing facilities across the country need to be enhanced to improve monitoring and enforcement. Additionally, implementing stringent regulations to phase out NP in various products, revising industrial effluent standards, and adopting advanced wastewater treatment technologies can effectively prevent NP release and ensure the decontamination of water sources.

By bridging regulatory gaps, fostering ethical accountability, and upgrading testing infrastructure, India can significantly reduce its environmental footprint, secure its export markets, and position itself as a global leader in sustainable textile industry practices.

– The authors are Senior Programme Coordinator and Senior Programme Officer, Chemicals and Health, Toxics Link

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Landscape report on endocrine disrupting chemical Nonylphynol released

At the conference on "Global Framework on Chemicals: Protecting Human Health and Environment" organised at India Habitat Centre on October 17, 2024, Toxics Link released a landscape report, "Nonylphynol- An Endocrine Disrupting Chemical." The report based on a study done by Toxics Link in collaboration with Environmental Defense Fund (EDF) found NP and NPEs being used across all sectors (textiles, detergents, metal working fluids, paints, agrochemicals, food packaging material, and construction chemicals) in India.

Read the report here: https://toxicslink.org/publications/reports/nonylphenol-an-endocrine-disrupting-chemical

Embracing Circular Economy: A Path Towards Sustainable Waste Management

By Jitender Taneja

With an increasing number of environmental issues threatening to engulf the planet, the determination for a circular economy (Ellen McArthur Foundation, 2019), which provides solutions to sustainable production and consumption, has become commonplace. The goal is to attack waste and the release of carbon dioxide by reusing, repairing, and recycling the products (UNCTAD, 2024) and at the same time promote a thriving, if not an aggressive, economic and environmental agenda. We at The Just Environment Charitable Trust, also referred to as Toxics Link, have been actively campaigning for a ban on various toxic substances while advocating for effective alternatives. Toxics Link advocates for a circular economy as a key solution to safeguarding environment and health.

What is a circular economy?

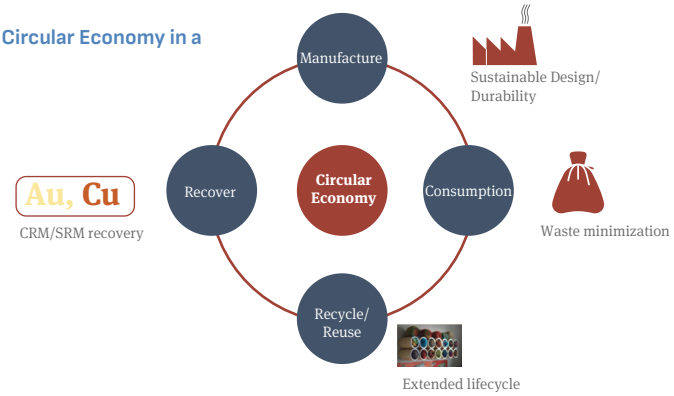
A circular economy is an economic system that aims to maximise the use of goods and services for as long as reasonably possible. Activities such as product sharing, product leasing, product reuse, product repair, product refurbishment, and product recycling (Ellen McArthur Foundation, 2019) are a part of this system. This incorporates a policy of usage for these products (Sinha & Shekhar, 2023) which would otherwise be discarded as waste. As the amount of waste continues to rise globally, there is an urgent need to increase the lifecycle of products and reduce waste generation.

For instance, the European Union produces more than 2.1 billion tonnes of waste each year, giving rise to the need to adopt a new economic order (UNCTAD, 2024). This situation is likely to get worse given that global annual production of plastic is projected to be 1.1 billion tonnes (Mahesh, et al., 2023). With the growing challenges of waste management, rethinking waste as a resource has become more important than ever.

The overarching objective of a circular economy is to transform the way we regard waste. While in a conventional economy, waste is regarded as nothing but an unwanted by-product that is thrown away, in a circular economy such 'waste' is seen as a valuable material that can be used again within the production processes helping reduce the environmental costs of raw material acquisition and waste disposal (USEPA, 2024). This goes hand in hand with the goals of Toxics Link, which is to advocate for the use of green materials and efficient waste disposition methods.

With such principles in place, effective initiatives on circular economy address the demands imposed on manufacturers to take into consideration their products' entire life cycle. From the design phase, industries have to embrace restorative and regenerative approaches (Ellen McArthur Foundation, 2019). It is a revolution that cannot be achieved without a full paradigm shift of adjusting product design and production techniques from a linear approach (take-make-use-dispose) of an economy (Ellen McArthur Foundation, 2019). In a circular economy, it is expected that producers will manufacture products that have a longer lifespan and high recyclability (Sinha & Shekhar, 2023). These shifts in design and production practices highlight the growing importance of the circular economy in addressing sustainability challenges and shaping a more resilient future.

Figure 1: Circular Economy in a nutshell



Why is the circular economy important?

It is crucial for a country like India, where large amounts of waste are produced every day, to work towards a circular economy. The per capita waste generation in India has been estimated at an average of approximately 118.35 grams per day over the past six years (CPCB, 2022). Overall, India generates approximately 62 million tonnes (MT) of waste annually, with nearly half of it being disposed of without any form of treatment (ITA, 2023). A circular economy can enable India to tackle some, if not all, of these issues. For India, transitioning to a circular economy is critical for the following reasons:

Environmental Protection: In a circular economy, there is a reduced need for extraction of natural resources (Sinha & Shekhar, 2023), which in turn helps to reduce the rate of habitat destruction and loss of biodiversity, due to better recovery systems. Doing so would limit the emission of greenhouse gases (European Parliament, 2023), which are released mainly due to the extraction and processing of raw materials. This is further supported by findings from the International Resource Panel, which indicates that half of the world's greenhouse gas emissions are linked to resource extraction and processing (UNEP, 2019).

A linear economy model coupled with poor waste management exacerbates the strain on natural ecosystems. When the waste is not properly managed, it ends up in our lakes, rivers, and ponds, contaminating our water bodies (see Fig.2). Poor waste management has led to our streets being littered with single-use plastics and other waste. By adopting a circular economy, we can significantly reduce waste, conserve natural resources, and lessen the overall environmental impact.

Economic benefits: Besides its environmental benefits, the circular economy has potential economic advantages. It is predicted that the transition to a circular economy will generate some 7,00,000 jobs within

A drain covered with waste (Image source: Toxics Link)

A pile of e-waste at a recycling centre (Image source: Toxics Link)

the EU by 2030 (European Parliament, 2023). By designing durable products and materials, there is a potential for innovation in most of the sectors which encourages competition and economic development. It's not just the businesses that stand to gain; end users will also benefit in the long run by spending less on durable products (European Parliament, 2023).

In India too, the market share for repaired and refurbished goods is expected to grow in the coming years, potentially driving employment opportunities and generating revenue (Sinha & Shekhar, 2023). The economic benefits of recycling cannot be understated. The production of recycled steel, for instance, consumes 70% less energy than the production of virgin steel (Arora, et al., 2023). Hence, the transition towards a circular economy is the need of the hour. In addition to its economic benefits, a circular economy also reduces dependence on limited natural resources.

Resource Security: As the global population grows and the demand for raw materials rises, a circular economy would help reduce our over-reliance on finite resources. One way to mitigate the risks associated with import dependence, particularly for critical raw materials (CRMs) is through recycling (Sinha & Shekhar, 2023) resource recovery (See Fig. 3(a)). These materials are often scarce, of strategic significance (Bhaskar & Sinha, 2023), and can disrupt supply chains during crises, such as the recent COVID-19 pandemic. Their availability is crucial for a country's economic and industrial development (Bhaskar & Sinha, 2023).

India should consider adopting a system similar to the European Union's 'digital product passport' to enhance the management of critical materials in the country's supply chain (Sinha & Shekhar, 2023). This system provides comprehensive information about a product and its entire value chain, enabling the tracking of a product throughout its life cycle. By implementing such a system, countries can monitor and prevent the over-extraction or unsustainable import of scarce resources. A shift from excessive reliance on external sources to greater self-reliance, at least to some extent, is essential. The circular economy model offers a viable solution to achieve this transition, promoting sustainability and resource efficiency.

Implementation: The transition to a circular economy comes with a lot of benefits, however, it is not without its challenges. One of the critical challenges is the mindset that has been deeply ingrained in the linear economy that focuses on maximising every opportunity for profit so that there is little concern for sustainability in the long run. Many products are still purposefully designed to break down in a short time and are therefore not easy to fix or recycle. To tackle these issues, there is a need for a concerted effort on the part of all the players, including governments, businesses, and consumers.

Legislation: For such changes to occur, strong legislative measures are of utmost importance. The European Parliament has called for the revision of existing policies on waste management and eco-design, in particular, orientated at the right to repair crimes and curbing the use of toxic constituents in products (European Parliament, 2023). The Indian context is more complicated. For example, India announced a ban on the usage of single-use plastic items effective July 1, 2022 (Mahesh, et al., 2023), in order to combat mechanical pollution and uplift the principles of eco-friendliness. Nevertheless, some products such as thermocol, plastic bubbles, plastic stick earbuds, and so on are still available (Mahesh, et al., 2023) creating concerns about the effectiveness of the ban imposed by the authorities.

Also, the Rules for Plastic Waste Management fail to be inclusive of the informal waste collectors (Singh, et al., 2024) who have an important role to play in the recycling process. That group is outside of any regulatory regime and therefore lacks protection from exploitation notwithstanding their role in managing waste. This situation needs to be corrected by providing protection to the groups and ensuring that they function in better environments.

Another contentious issue was found with the Extended Producer Responsibility (EPR) portal for the registration of producers, importers, brand owners, and recyclers of plastics. Trouble arose from the fact that the producers and brand owners were able to receive false recycling certificates from the corresponding agencies (Singh & Bose, 2024), and therefore post-implementation monitoring was suggested to avoid repetition of similar situations. Proper measures, including offering incentives to consumers who use products over and above their intended use (UNCTAD, 2024), can help encourage both businesses and consumers to embrace green habits. On the other hand, the situation is improving and legal action is being taken against the recyclers and manufacturers who were involved in fraudulent activities. While legislation plays a vital role in setting the framework for circular economy practices, education and awareness are equally crucial in ensuring

implementation at the consumer level.

Education and Awareness: For the effective implementation of circular economy ideals, education is a fundamental bedrock. In this regard, imparting knowledge on the gains of circularity to consumers would encourage changes in their behaviour towards adopting more sustainable ways of living. Aiming to educate people about recycling, repairing and reusing products is also important in creating a sustainable society.

An informal sector employee recovering copper from waste

Dedicated to waste management and reducing harmful chemicals, Toxics Link is well-positioned to promote circular economy principles, promoting development strategies that embrace safe, non-toxic, and health-conscious methods and replace linear economies (Sinha & Shekhar, 2023) that have proven harmful.

At the forefront of spreading awareness about the importance of a circular economy, Toxics Link recently conducted workshops at schools encouraging children to repair things rather than throw them away. It is important to impart such values to young children, as it helps create a generation that is conscious of waste and the need for sustainability.

In one of the reports written for the Ministry of Electronics and Information Technology, Toxics Link focused on the concept of circular economy in India and came up with different possibilities for the electrical and electronics (E&E) sector of the country (Sinha & Shekhar, 2023). Critical aspects of resources such as their limited availability, CRMs that remain unused, waste management problems, and the effects of e-waste are examined in this report along with some opportunities to address these challenges. In the same way, the organisation has been encouraging the use of less hazardous substances in products. Campaigns are conducted to create awareness among consumers about hazardous substances in products. While this informs and alerts the customers, manufacturers are also encouraged to avoid using hazardous materials in their products.

Collaborative initiatives

To further promote the concept of circular economy, it remains important to partner with other organisations, businesses, and government authorities. Toxics Link has been facilitating several stakeholder discussions, which promote sustainable production practices geared towards the circular economy.

The organisation has also collaborated with Central and State Governments to implement waste management strategies. The teams are engaged with both the organised and the unorganised sectors, as both groups are important stakeholders. Collaborating in this manner will also help to integrate solid waste management and resource recovery.

A Call to Action

The transition to a circular economy is not just a beneficial change; it is a necessary one. As we face mounting environmental challenges and resource scarcity, embracing circularity offers a sustainable path forward. By reducing waste, promoting resource efficiency, and prioritising social equity, we can create a healthier planet for future generations. The consequences of a linear economy, environmental degradation, and myopic waste management strategies (such as the waste-to-energy plants and open-air burning of waste) are evident in the severe air pollution plaguing cities like Delhi.

As an NGO committed to waste management and reducing harmful chemicals, Toxics Link invites our community to join us in this endeavour. Together, we can advocate for policies that support circular economy principles, raise awareness about sustainable practices, and work towards a more equitable and sustainable future. A holistic approach is needed that ensures that the benefits of circularity are accessible to all, particularly those most affected by environmental degradation.

Let's embrace the circular economy and pave the way for a more sustainable and just world (European Parliament, 2023). The time for action is now!

– The author is Senior Programme Officer, Waste and Sustainability, Toxics Link

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Cultivating a Culture of Repair In Young

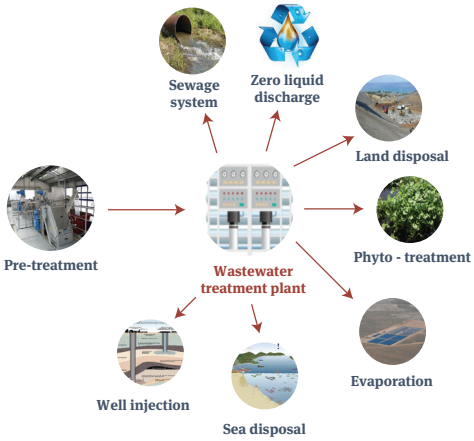
As part of the Green Action Week campaign, Toxics Link organised several workshops in schools and colleges of Delhi/ National Capital Region to create awareness about the need to revive the "culture of repair". The aim was to equip the young with practical skills to minimise waste generation and find innovative ways to reuse a product. While they learnt to fix and reuse old items, discussions on circular economy helped them understand the value of resources and efforts, and thus abstain from disposing of things mindlessly. The three-month-long campaign that started in September culminated with a webinar on November 6, 2024, where environmental experts, policymakers, students and the community discussed e-waste management and repair culture.

Tackling Chemical Pollution in India with Advanced Wastewater Treatment Technologies

By Dr Deepak Marathe

One of the fastest-growing economies with industrialisation and urbanisation on the rise, India also faces an increasing environmental burden due to water pollution. Industries such as agro-food processing, leather tanning, textiles, and paper production, contribute significantly to wastewater discharge. These sectors generate chemical-laden effluents that contain heavy metals, nutrients, organic pollutants, and other toxic compounds (Singh, et.al., 2023). The unregulated disposal of such wastewater into natural water bodies leads to severe ecological consequences, including degradation of water quality, loss of aquatic biodiversity, and risks to public health (Karri, et.al., 2021). The Central Pollution Control Board (CPCB) has identified industrial wastewater as a critical concern, urging for the adoption of robust treatment technologies. While traditional methods are in use, the complexities of wastewater demand innovative, sustainable, and integrated approaches (Marathe, et.al., 2021).

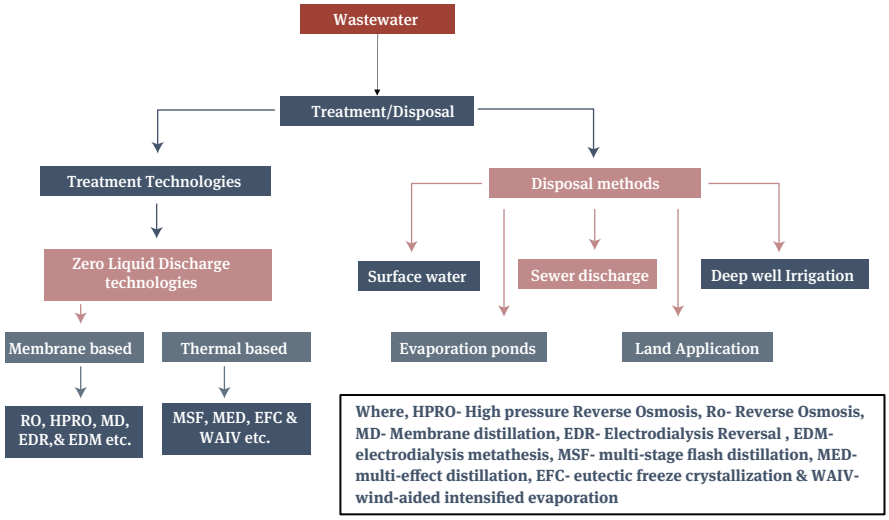
Figure 1: Wastewater treatment process in India



Challenges of wastewater treatment in India

India's adoption of advanced wastewater treatment technologies is essential to address the growing challenge of water pollution. While the potential of these technologies is immense, their implementation requires overcoming challenges like high costs, energy demands, and the need for skilled operation. Strengthening regulations, offering incentives, and fostering innovation will be key to scaling these solutions (Choudhury,et.al., 2023). Collaborative efforts from industries, policymakers and communities will ensure that India moves towards a cleaner and sustainable future.

Figure 3: Technologies for wastewater treatment in India (Marathe et.al. 2021)

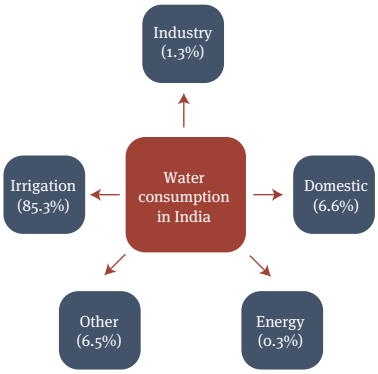


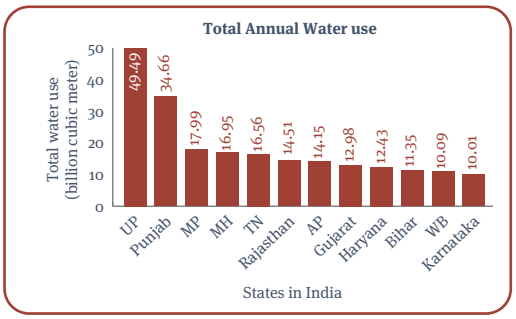
India, with a population of 1.38 billion and rapidly urbanising cities, faces the dual challenge of chemical pollution and increasing wastewater generation. Urban centres, home to 35% of the country's population, are at the forefront of this challenge. The country generates 72,368 million litres per day (MLD) of wastewater in urban areas, yet only 28% of it is treated. This leaves a staggering 72% of untreated wastewater polluting rivers, lakes, and groundwater (Marathe et.al., 2021; Choudhury,et.al., 2023).

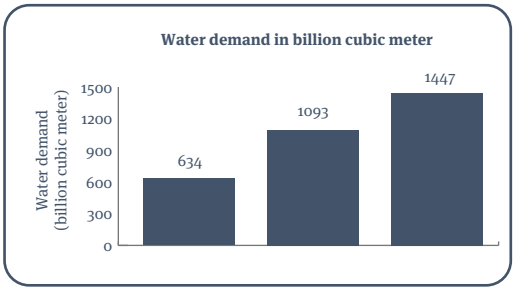
The Rising Threat of Wastewater Pollution

India's rapid urbanisation is exerting immense pressure on freshwater resources and wastewater management systems. As urban populations grow, sectoral demands for water—for drinking, industry, agriculture, and energy—are also rising. Wastewater

Figure 3: Water consumption and demand in India (Source: Water Resource Institute, 2020)







discharge from urban centres contributes significantly to chemical pollution, affecting river systems, groundwater aquifers, and agricultural lands (NITI Aayog, 2022).

Studies by the Central Pollution Control Board (CPCB) reveal a significant gap between sewage generation and treatment capacity. While the installed capacity is 31,841 MLD, only 26,869 MLD is operational, leaving 72% of urban wastewater untreated and flowing into water bodies. Of the total sewage generated, an additional 4,827 MLD of treatment capacity is proposed, but even then, a gap of 35,700 MLD (49%) will remain. At the city level, Class I cities and Class II towns generate 33,212 MLD of wastewater, with an installed treatment capacity of only 6,190 MLD—a 79% gap between sewage generation and treatment infrastructure (CPCB, 2021).

India faces a significant challenge in managing its unreated sewage wastewater, necessitating substantial investment in infrastructure. Establishing a one million liter per day (MLD) sewage treatment plant costs approximately Rs 1-1.5 crore. This estimate includes the cost of constructing treatment plants to process the entire volume of untreated sewage. Addressing this issue is critical to improving water quality, safeguarding public health, and achieving enviromental sustainability.

The untreated wastewater finds its way into rivers, lakes and aquifers, contaminating the waterbodies. CPCB has identified 351 stretches across 323 rivers as polluted, with 13% classified as severely polluted. The levels of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), heavy metals, and hazardous chemicals are alarmingly high in several river systems (NITI Aayog, 2022).

Status of Sewage Treatment Plants (STPs) in India

India's sewage treatment infrastructure has not been able to keep pace with its growing urban population and wastewater volumes. Despite an installed treatment capacity of 31,841 MLD, only 26,869 MLD is operational, reflecting an operational efficiency of about 84%, with 16% of capacity lying idle due to inadequate maintenance, power shortages, and inefficient designs. Many sewage treatment plants (STPs) remain underutilised, further exacerbating the problem. While an additional 4,827 MLD of treatment capacity is under development, it will still fall short of addressing the increasing wastewater load driven by rapid urbanisation. Regional disparities are also evident, with southern and western India better equipped with treatment infrastructure compared to the northern and eastern regions, including the critically underserved Ganga basin. Furthermore, most existing STPs rely on conventional treatment technologies, which are inadequate for addressing emerging contaminants such as pesticides, pharmaceuticals and heavy metals (PIB, 2021).

It is essential to enhance the operational efficiency of existing facilities through better maintenance, reliable power supply, and real-time performance monitoring. Scaling up infrastructure is equally critical, including accelerating the commissioning of proposed projects and incorporating decentralised wastewater treatment solutions for underserved areas. Bridging regional disparities will require targeted investments and policy interventions in the northern and eastern regions. Upgrading to advanced technologies such as membrane bioreactors, advanced oxidation processes, and nanotechnology is vital to tackle emerging pollutants effectively. Strengthening regulatory frameworks, fostering public-private partnerships, and increasing public awareness about sustainable wastewater practices are also crucial steps. By adopting an integrated approach, India can improve its wastewater management system, addressing present inefficiencies while preparing for future challenges.

Chemical Pollution and the Need for Advanced Solutions

Chemical pollution from industrial and urban sources compounds the wastewater crisis. Pesticides, nonylphenols, heavy metals, and pharmaceutical residues are contaminating water sources, posing risks to human health and ecosystems. India's conventional wastewater treatment plants are not equipped to handle these complex pollutants.

These advanced wastewater treatment technologies offer a viable solution to address these challenges:

- **Membrane Bioreactors (MBR)** are ideal for high pollutant loads, combining biological treatment with advanced filtration.
- **Advanced Oxidation Processes (AOP)** is capable of degrading complex organic pollutants, including pharmaceutical residues.
- **Reverse Osmosis (RO)** is effective in removing dissolved salts and chemical contaminants.
- **Tertiary Treatment** helps in advanced nutrient recovery, disinfection, and pollutant removal for water reuse.

Reverse Osmosis (RO): Reverse osmosis is a widely used technology for removing dissolved salts and organic pollutants from wastewater. It uses semi-permeable membranes to separate contaminants, making it suitable for various industrial applications. RO systems are efficient but require significant operational and maintenance investments. To optimise their use, pre-treatment steps such as ultrafiltration can enhance membrane lifespan and efficiency. RO is particularly effective for producing high-quality effluent for reuse in industrial processes or as feed water for boilers.

Advanced Oxidation Processes (AOPs): AOPs involve chemical treatments like ozonation, photocatalysis and Fenton's reactions to degrade persistent organic pollutants. These processes generate highly reactive radicals that break down contaminants into less harmful substances. AOPs are effective in treating effluents from pharmaceuticals, textiles and dyes, where conventional methods may fall short. The integration of AOPs with biological treatments can further improve pollutant removal rates.

Ion Exchange Systems: Ion exchange technology is primarily used for water softening, demineralisation, and selective removal of heavy metals. It relies on resins to exchange undesirable ions in wastewater with less harmful

ones. Modern advancements, such as magnetically enhanced ion exchange, have improved its efficiency and reduced fouling issues. These systems are particularly useful for industries dealing with high concentrations of toxic metals.

Membrane-Based Technologies: Membrane technologies include ultrafiltration, nanofiltration and electrodialysis, which separate contaminants based on size or charge. Ultrafiltration removes suspended solids and colloids, while nanofiltration and reverse osmosis target dissolved salts and smaller organic molecules. Electrodialysis is effective for desalination by using electric currents to separate ions through selective membranes. These techniques are adaptable to various wastewater compositions and are widely used in industrial and municipal settings.

Membrane Bioreactors (MBRs): Membrane bioreactors combine biological treatment with membrane filtration. The biological process degrades organic matter, while the membrane filters out suspended solids and pathogens. MBRs are compact and capable of producing high-quality effluent suitable for reuse in agriculture, landscaping, and industrial applications. Their ability to handle high organic loads and varying wastewater compositions makes them a versatile solution.

Anaerobic Membrane Bioreactors (AnMBRs): AnMBRs extend the concept of MBRs to include anaerobic processes, which are effective for high-strength wastewater. These systems generate biogas as a by-product, contributing to energy recovery while achieving high removal rates of nutrients and pollutants. AnMBRs are particularly suited for industries like food processing and dairy, where organic waste is abundant.

Constructed Wetlands (CWs): Constructed wetlands are a cost-effective and eco-friendly approach for wastewater treatment. These systems use plant species and microbial communities to remove pollutants through physical, chemical, and biological processes. CWs reduce heavy metals, nitrogen, and organic pollutants while functioning as sustainable green infrastructures. They also require minimal operational costs, making them suitable for rural and semi-urban regions in India. For example, *Typha angustifolia* has demonstrated efficiency in treating tannery wastewater. Studies show pollutant reduction rates of 41-73% for Chemical Oxygen Demand (COD) and 41-58% for Biochemical Oxygen Demand (BOD). Despite their potential, challenges such as substrate toxicity and salt buildup necessitate innovative design improvements.

Land-Based Treatment Systems: These systems involve the application of treated wastewater to land for irrigation or green belt development. The wastewater interacts with soil, plants, and microorganisms to remove pollutants through natural processes like adsorption, degradation, and filtration. Such systems are effective in regions with ample land availability and can contribute to resource recovery and environmental sustainability.

Countries like Germany, Japan and Norway have successfully implemented advanced wastewater treatment systems. These nations demonstrate how innovative technologies and robust policies can enable the reuse of treated wastewater for irrigation, industrial processes, and even potable water supply (Helluy, 2023).

Key global practices include:

- **Wastewater Reuse:** High-income countries reuse up to 70% of treated wastewater, compared to India's minimal reuse (NITI Aayog, 2023).
- **Energy-Efficient Systems:** Integration of renewable energy, like solar and biogas, in wastewater treatment plants.
- **Decentralised Treatment:** Small-scale plants cater to peri-urban and rural areas, reducing the burden on centralised systems (NITI Aayog, 2023).

India can leverage bilateral collaborations to adopt and customise these global solutions. Partnerships with developed countries can provide technical expertise, financial support, and capacity-building opportunities to bridge the wastewater management gap. In addition, upgrading conventional systems to incorporate advanced technologies like MBRs and AOPs; encouraging smaller, community-scale wastewater treatment systems to reduce the load on centralised infrastructure; and strengthening enforcement of environmental laws to ensure proper monitoring and compliance, can enhance the wastewater treatment processes in India.

Way Forward

India's wastewater crisis is both a challenge and an opportunity. By adopting advanced treatment technologies and improving the efficiency of STPs, India can transform its wastewater liability into a resource. Investments in innovation, capacity building, and international collaborations are essential to bridge the gap between sewage generation and treatment.

As an organisation committed to environmental sustainability, we call for urgent action to tackle chemical pollution and safeguard India's water resources. With collective efforts, India can achieve a cleaner, healthier, and more sustainable future.

— The author is Senior Programme Officer, Chemicals and Health, Toxics Link

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Urban Flooding: Causes, Consequences and Solutions Discussed

The Public Lecture on "Rising Phenomenon of Urban Flooding: Causes, Consequences & Sustainable Solutions" was organised at India International Centre (IIC) saw environmentalists, students, academia, researchers and the general public debate on the growing problem.

The session was moderated by Mr Ravi Agarwal, Founding Director, Toxics Link and in the panel were Dr Mrutyunjay Mohapatra, Director General of Meteorology, India Meteorological Department; Dr Syamal Sarkar (Retired IAS), Distinguished Fellow and Director, Water Resources Division, The Energy and Resources Institute (TERI); Dr Jaideep Chatterjee, Dean, Jindal School of Art and Architecture; and Mr Manu Bhatnagar, Principal Director, Indian National Trust for Art and Cultural Heritage (INTACH).

Read what ensued here: https://toxicslink.org/publications/public-lectures/public-lecture-on-rising-phenomenon-of-urban-flooding-causes-consequences-sustainable-solutions

Refused Derived Fuel: A Toxic Deception

By Senerita Swamy

Have you heard of "Best out of Waste"? Of course, you must have – it was a childhood activity that made us feel content, knowing that we were doing something good for the environment. Today, when you hear about energy being generated from waste, it sounds so pleasing, isn't it? As first thought, burning waste to generate power may seem like a practical solution. However, upon closer inspection, a more troubling reality unfolds. The waste is being incinerated under the guise of waste management and resource conservation, often leading to significant environmental and health risks.

One such example is the practice of Waste-to-Energy (WtE), that is, burning waste as a substitute for coal. This waste is processed into pellets known as Refused Derived Fuel (RDF), a concept that has been around since the 1950s. In India, this practice of using non-recyclable plastic waste as an energy source, was first mentioned in the Municipal Solid Waste (Management and Handling) Rules 2000 framed under Environment Protection Act, 1986.. In October 2017, the Union Ministry of Housing and Urban Affairs (MoHUA) established an Expert Committee to explore the potential of incinerating plastics as RDF.

Before getting more deeper, lets know what comprises RDF. It includes non-recyclable plastics (such as multilayered packaging, plastic bags, and styrofoam), contaminated household textiles, and non-recyclable domestic hazardous waste, including soiled paper, cloth, pieces of leather, rubber, tires, and non-usable items. It is a well-defined secondary fuel with specific standards for composition, quality, and environmental impact. In places like the EU, US and Germany, RDF is strictly regulated, with a focus on calorific value, contaminant levels, and its role in WtE or industrial energy recovery processes.

RDF production involves segregating recyclables (e.g., metals, glass) and hazardous materials (e.g., biomedical, e-waste) from MSW. The remaining waste, which includes plastics, is then shredded, dried to reduce moisture, and densified into pellets for easier transport and use. Quality tests are conducted to ensure the RDF meets required standards. These pellets are majorly used in WtE plants and cement kilns.

For effective incineration, waste with low moisture content and high calorific value is ideal. The proper selection of waste ensures efficient energy recovery while reducing landfill burden. RDF is marketed as a solution to two major environmental issues: waste management and resource conservation. However, the reality of RDF's environmental impact is complex and concerning. To fully understand this, we need to trace back to the roots of RDF.

RDF's reliance on combusting mixed waste in industrial furnaces leads to harmful emissions like dioxins and furans, posing health risks and contributing to air pollution

Process of making RDF

Plastic, the primary feedstock for RDF, is a synthetic material made largely from fossil fuels such as oil and natural gas. Incinerating plastic in the form of RDF, essentially means burning fossil fuels, which releases harmful emissions, including toxic chemicals and greenhouse gases, into the atmosphere. This undermines the claim that RDF is a sustainable or environmentally-friendly solution. To make matters worse, the production of plastic is itself resource-intensive. It relies heavily on virgin fossil feedstocks and consumes vast amounts of water—around eight litres to produce just one litre of plastic.

Plastics already account for about 6% of global oil production, a figure expected to rise to 20% by 2050, if current consumption patterns continue. Furthermore, plastics are a significant source of greenhouse gas emissions, not only because of extraction and processing of fossil fuels but also from combustion. In 2012 alone, burning waste plastics contributed 390 million tonnes of CO_2 to the atmosphere. If these trends persist, emissions from the global plastic sector are projected to increase from 1% of global CO_2 emissions in 2014 to 15% by 2050. This underscores the failure of green technologies in addressing the issue, as the emissions released from plastic production and incineration are considerable. Another significant consequence is the diminishing mindset to reduce plastic pollution. This is crucial because plastic pollution poses a serious environmental threat, with microplastics accumulating in various environmental matrices, further exacerbating the problem.

Current Indian scenario

In India, the RDF sector is still in its early stages, and the efforts required to make RDF a successful waste management solution would be significant. WtE plants use the Build-Operate-Transfer (BOT) model to address both waste management and energy needs, combusting RDF to generate electricity for the national grid. Countries such as Sweden, Norway, Germany, and the United States have waste with high calorific value that ranges between 1,900 kcal/kg and 3,800 kcal/kg, which makes incineration an effective means of disposal. In India, however, studies on waste tell a different story: domestic waste in the country typically contains high moisture content and has low calorific value, making it unsuitable for efficient combustion in WtE plants.

Regulations require advanced emission control technologies, such as electrostatic precipitators and flue gas scrubbers, to capture pollutants like dioxins and particulate matter. However,

monitoring dioxins and furans is a costly process. As a result, many RDF facilities fall short in implementation, with inadequate or poorly monitored pollution control systems. This gap leads to significant emissions, negatively impacting air quality and public health.

Over the past decade, the use of RDF in the cement industry has gained significant boost, driven by its potential to reduce landfill waste and improve energy recovery. The Indian Government is actively promoting RDF use, with the target of achieving 25% thermal substitution rate (TSR) in the cement sector by 2025. As of now, 74 cement plants are registered on the CPCB EPR portal for RDF usage. The cement industry is picking up about 15,000 to 20,000 MT of RDF waste every month for use as fuel. As of now, five cement companies, located as far as Chittorgarh in Rajasthan, are picking up RDF from Delhi's landfill sites.

Additionally, 35 other industries, including WtE plants, are also utilising RDF, as per the Right to Information (RTI) response received by Toxics Link from the Central Pollution Control Board. Paper mills located in western Uttar Pradesh, in districts such as Shamli, Muzaffarnagar, and Itawa, have begun lifting nearly 100 tonnes of RDF waste per day from Delhi. Over the past three years, from May 2019 to May 2022, 5.1 million tonnes of waste have been disposed of. The monthly disposal rate has significantly increased, surpassing 400%, with an average of 6,00,000 tonnes now being disposed of compared to the previous average of 1,41,000 tonnes.

Given the strong push for its adoption, is RDF really worth the investment? As mentioned earlier, the efficiency of RDF is relatively low compared to traditional fuels, primarily due to the high moisture content in MSW. As a result, the cost-effectiveness and low emission claims of RDF is questionable.

Navigating through regulatory reforms

India's Solid Waste Management Rules, 2016, along with the CPCB 2017 and MoHUA 2018 guidelines, focus on the production and use of RDF from MSW. However, it is important to distinguish RDF from co-processing, which involves a broader range of materials. The Plastic Waste Management (PWM) Rules emphasise Extended Producer Responsibility (EPR) to hold manufacturers accountable for the lifecycle of their products, encouraging better waste management and responsible production.

Despite government efforts to promote RDF as an alternative to fossil fuels and increase its thermal substitution rate (TSR), challenges such as the variability of waste characteristics in India and operational difficulties hinder the success of RDF initiatives. Furthermore, RDF's reliance on combusting mixed waste in industrial furnaces leads to harmful emissions like dioxins and furans, posing health risks and contributing to air pollution.

Incinerating plastic waste, a derivative of fossil fuels, also exacerbates climate change. RDF, therefore, is not a sustainable solution, and there is an urgent need for strategies focused on waste reduction and responsible resource management.

Veiling secrecy behind the RDF trade

In recent years, global plastic waste trade has sharply declined, dropping by 49% from 12.4 million metric tonnes (Mt) in 2017 to 6.3 Mt in 2022. This decline was accelerated by stricter Basel Convention regulations aimed at promoting responsible waste trade. However, import of plastic waste to non-OECD (Organisation for Economic Co-operation and Development) countries in South and Southeast Asia, especially Indonesia, remain high, raising concerns about waste transfer from wealthier to poorer nations, with potential environmental and health risks.

In India, the Ministry of Environment, Forest, and Climate Change (MoEFCC) regulates the import and export of hazardous and other wastes through the PWM, 2016, and the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, which align with Basel Convention guidelines. India prohibited the import of solid plastic

Guidlines on Co-Processing in Cement/Power/Steel Industry (2010): Promoted the use of non-recyclable, non-hazardous waste in cement, power, and steel industries.

→

CPCB Reports (2015): Assessed the progress of co-incineration in cement kilns, identifying challenges since the 2010 guidelines.

→

Solid Waste Management (SWM) Rules (2016): Formalized co-processing within a broader regulatory framework, aiming for better compliance and standardization.

Hazardous and Other Wastes (Management and Transboundry movemnt) Rules (2016): Gave preference to co-processing hazardous waste over disposal and extended provision for co-processing in industries.

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CPCB Guidlines for Co-processing of RDF in Cement Plants (2017): Provided specific guidlines, including materials exempted from use (e.g., biomedical waste, radioactive waste), operating conditions, and monitoring

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Plastic Waste Management Rules (2016): Focused on managing plastic waste through EPR, recycling, and public awareness initiatives.

Amedment to Plastic Waste Management Rules (2022): Introduced a ban on certain single-use plastic, strengthened EPR obligation, and enhanced oversight and compliance mechanisms.

waste in 2019, but it has not ratified the Basel Ban Amendment, which restricts waste imports for recycling. Some relaxations to this ban were introduced in 2022, allowing imports of certain recyclable plastics (under HS Code 3915), but not RDF, which remains a regulatory grey area. The classification of RDF as either waste or a product is unclear, leading to challenges in enforcement and regulatory clarity, as it currently attracts Goods and Services Tax (GST), which may exempt it from some regulations. Overall, India's regulations are evolving, but gaps remain, especially concerning RDF and its trade status.

The Hidden Dangers

RDF plants are evaluated for their environmental impact using metrics like global warming potential (GWP), acidification potential, and human toxicity. While RDF can reduce methane emissions compared to landfills, its overall impact on global warming remains significant, primarily due to CO2 emissions from combustion. RDF also releases toxic chemicals, including PM2.5, nitrogen oxides (NOx), sulfur oxides (SOx), dioxins, furans, PFAS, polycyclic aromatic hydrocarbons (PAHs) and heavy metals, which are lipophilic (tend to accumulate in fatty tissue) and also contaminate soil and water, posing risks to human health and wildlife. Monitoring of the harmful chemicals is difficult because it is expensive.

These substances pose serious health risks, including respiratory issues, skin boils, black phlegm production, lung damage, and increased cancer risk. Dioxins, known for their toxicity, can harm the immune system, disrupt hormones, and cause cancer. Furans primarily affect the liver, increasing cancer risk. These dangers have become a reality for residents living near the WtE plant in Okhla, New Delhi, as media reports state. Their appeal to the Supreme Court filed in 2017, is yet to be heard.

An investigative report by *New York Times* also recently shed light on mismanagement of bottom ash in the WtE plant at Okhla, where the ash from the plant was found being dumped in the open ground with improper precaution measures taken. The report uncovers the harsh truth: local communities living near these plants are suffering from a range of serious health issues, yet no significant action has been taken to address their plight.

Inefficient burning also results in large discharge of bottom ash, which could be as high as 30-40 per cent of the total feed. It ends up in open dump sites, contaminating the groundwater and soil with toxic chemicals. It is also hazardous for waste pickers who work at these landfills. However, unfortunately, there are no comprehensive studies on the direct impact of incinerators on public health in India yet.

Despite being seen as a better alternative to landfills, RDF fails to adequately address emissions and continues to release harmful toxins during combustion. These issues undermine the claimed environmental benefits of RDF, highlighting the need for more effective emission controls and cleaner waste management solutions.

Debunking the Myth

One of the key myths surrounding RDF is that it serves as a cleaner alternative to fossil fuels, especially coal. But the reality is quite different. If we look at the entire value chain of plastic—from extraction and manufacturing to burning as RDF—the emissions associated with plastic waste can be bewildering. While RDF may release fewer pollutants than coal, it can still emit toxic chemicals used as additives in plastic production. Further, RDF has low calorific value than coal and so more RDF must be burned to match coal's efficiency, ultimately leading to higher emissions.

A report by International Pollutants Elimination Network (IPEN) highlights additional challenges associated with RDF. Cement plants, such as Prism Cement in Satna, Madhya Pradesh, impose penalties on waste suppliers for low calorific value and high moisture content, as poor-quality RDF can cause plant malfunctions and compromise cement quality. Moreover, transporting RDF over distances of 500-1,000 kilometres is highly inefficient, requiring nine trucks of RDF to match the calorific value of just one truck of coal. Waste handlers, like Trashonomy Pvt Ltd in Udaipur, also face difficulties, including injuries from handling hazardous waste and a lack of long-term planning by solid waste management authorities. These challenges undermine the claims that RDF is a cost-effective and low-GHG alternative, exposing its inefficiencies and significant environmental drawbacks.

What's even more concerning is that these plants are receiving carbon credits, despite the damage they are causing. It is disheartening to realise that we continue to label these initiatives as "green solutions," when, in fact, they are exacerbating environmental and public health problems. The situation is a stark reminder that we cannot turn a blind eye to the consequences of so-called "green" technologies, especially when they come at the expense of the people who live closest to them.

The problem is evident to all who are paying attention, yet we persist in promoting these plants as part of the solution. It's a sobering reality that underscores the need for genuine, sustainable alternatives, not quick fixes disguised as eco-friendly innovations. Instead of mitigating environmental harm, RDF exacerbates the very issues it is supposed to solve. Rather than offering a true solution to waste management or resource conservation, it contributes further to pollution and climate change.

Incinerating RDF does not close the loop on plastic waste; it simply shifts the problem from landfills to the atmosphere, perpetuating a cycle of environmental damage. Ultimately, RDF is not the sustainable solution we need. To address plastic waste and its harmful environmental impact, we must move towards truly sustainable practices—such as reducing plastic production, improving recycling systems, and investing in alternative materials—that do not rely on burning fossil fuels or further polluting the planet.

— The author is Programme Officer, Waste and Sustainability, Toxics Link

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Quotes from the Earth in its Tenth Edition

The tenth edition of the biennial film festival "Quotes from the Earth" was organised on December 6-7, 2024. Organised by Toxics Link in collaboration with India International Centre, the Cinefest saw an overwhelming response from school and college students, environmental advocates and enthusiasts, and film lovers. This year, 36 films from 19 countries were selected for screening from 1,400 submissions received from 79 countries. Ambassador of Norway to India May-Elin Stener was the chief guest at the inaugural ceremony.

Besides screening films on environmental justice, sustainability, biodiversity and climate change, an engaging panel discussion on the topic "Future of Environmental Filmmaking: Navigating the Challenges" and scintillating cultural performances on environmental conservation and sustainability were the other attractions of the two-day fest.

Know the details: https://toxicslink.org/about-us-2

In a tête à tête with Vimlendu Jha

Vimlendu Jha, the Founder and Executive Director of Swechha, a Delhi-based youth and environment organisation, has been working relentlessly for the revival and conservation of River Yamuna for 25 years now. The environmental crusader, through his fair-trade initiative, also upscales waste and converts those into something new and useful. Read what the green changemaker and entrepreneur, says about ways to address environmental challenges plaguing the country.

Toxics Link (TL): The International Youth Foundation profiled you as a youth icon in 2004. We are in 2025 now. Tell us about your journey, challenges, and how you navigated those.

Vimlendu Jha (Jha): My first exposure to issues of environment and environmental justice was when I was a student of St. Stephen's College. Narmada Bachao Aandolan (NBA) was at its peak and there was also a lot of conversation around Bhopal gas tragedy. Many other campaigns were also going on in the country and I used to volunteer. In 2000, when I finished my graduation, I started a small campaign called "We for Yamuna", a campaign that talked about the river which was completely forgotten by the city. There were very few NGOs talking about Yamuna, there was very little conversation in the press, and government was not talking about it at all. It was almost like an ignored national asset. We, young people, stood up, shouted and screamed for the rights of the river and held people and the government responsible. That was the genesis of my so-called professional work.

Soon we realised that simply being angry, protesting on the streets, doing theatre and calling out the government, wasn't enough. We had to go beyond these actions because the issues with the Yamuna River reflected larger gaps in environmental governance and strategy. Confrontation alone wouldn't solve anything; we needed to engage, collaborate, and work continuously on these issues. The challenge was how to make environment everybody's concern and environmental conversation become part of policy making, policy deliberation, and politicking rather than a drawing-room conversation for the elite and under-a-tree conversation for NGOs.

Today, when I retrospect, I feel delighted. Air, water and Yamuna are going to be key issues in the 2025 Delhi Assembly elections. Our, including Toxics Link, Centre for Science and Environment (CSE) and many other organisation's efforts, have helped bring environmental issues into the mainstream political agenda. Not a milestone but a partial achievement, indeed.

TL: You said you were part of the Narmada Bachao Andolan. Did that inspire you to work for Yamuna?

Jha: Not exactly. They were two different issues. NBA was about the displacement of thousands of people and Yamuna campaign was to address pollution. But yes, NBA as a movement inspired me. I used to do a lot of theatre and was part of the Delhi Solidarity Group where my understanding of development and environment, ecology, and river ecosystem increased. I never thought that I would be doing this all my life. I had only taken one year off from studies to work on Yamuna and then pursue civil services but it's been 25 years and still going.

TL: You inspired the youth, brought them together and continue to work for Yamuna...

Jha: Absolutely. We do something called Yamuna Yatra every year, which has been going nonstop for the last 24 years. Every year, I go on a journey from Yamunotri (where the river originates) to Agra with around 70/80 people/students showing them the extent of damage we humans have done to the river. But Yamuna is only one among many other environmental issues that I work for. It includes creating awareness among people and asking for government accountability on sewage treatment plants (STPs), air pollution, clean water, etc.

TL: We saw your interview with Mr Rahul Gandhi at India Gate. And as far as we know, you have submitted a petition as well. Can you tell us about it? What were your suggestions to curb air pollution in Delhi?

Jha: Air pollution is the biggest environmental and public health issue that India is facing right now and it is not restricted to Delhi/NCR only. Data coming from scientific community shows that every third child, at least in Delhi NCR, has a pulmonological disorder. We need to have full-fledged discussions and tangible solutions. The idea behind meeting Mr Gandhi was to make the Leader of Opposition aware of the issue and tell him why it's important for politicians to raise environmental concerns in the parliament.

A week after that one-hour walk with him, I along with other citizen delegates met him in the parliament and submitted the petition. We have asked for a joint parliamentary committee and multi-party deliberation on the issue, and an immediate overhaul of the public transport system.

TL: As you said, air pollution is a problem in the entire country now. Where do you think the solution lies, only in the politicians or do we need more mass awareness campaigns and behaviour change in people?

Jha: It is not only the masses who need to be aware but also the elites. Awareness of the politicians is extremely critical. All stakeholders should come together but certain actions can be taken by the government alone. The masses need to adopt public transport and not look at private cars as a status symbol. But if public transport is clean, accessible, affordable, safe and provides last-mile connectivity, the richest of the rich will also use it as is the case in Europe. It's the government that can take action for removal of thermal power plants from the 300-kilometre radius of Delhi/NCR, regulate construction/demolition activities, control roadside dust, etc.

TL: How do you view the government's climate adaptation programmes?

Jha: The Government of India has made many promises to the international community with respect to our commitments to Net-Zero Emissions. But it should be coherent with what's happening on the ground. India's vulnerability to climate change is much higher because of its demographic profile. The most vulnerable are the poorest of the poor. Agriculture is the most affected sector and 50 per cent of Indians still directly or indirectly depend on agriculture for their livelihood.

We need to have proportionate action with regard to allocation of funds and political will. I am not saying India is responsible for climate change. There are historical polluters and they need to be called out and held responsible, which India rightly did at the COP event recently. But irrespective of what these historical polluters do, it's our responsibility to act because it's no more somebody else's problem; it is our problem.

TL: How do you view India's renewable energy programmes?

Jha: Renewable again sounds very interesting, but the solution is not just in renewables, it is in having a decentralised renewable system. Our aim should be to reach out to the last household in the last village on top of the mountain or inside a forest. In our current renewable plan, new big corporations are being created and a lot of it is happening in western India. The challenge will be in transportation of renewable energy from the west to the east. Theoretically, it looks like we are moving towards the Net-zero commitment of 2030 or 2070. But this should not end up creating a different kind of haves and have-nots and a different kind of regime where renewable energy mafias take over the energy requirement of the country.

TL: As renewable energy plants are coming up in a big way in west India, do you believe that would create a new divide between haves (west) and have-nots (east)?

Jha: Undoubtedly, fossil fuel needs to go. But the transition should be just and gradual. It's not just about coal, but also about people, families, cities and allied economies. There are cities like Dhanbad, Durgapur, and many others which survive on thermal power plants. We will have to look at moving everything and cannot just move coal out of the city. I work in the space of environment, but that does not mean that we take away people's right to life for our right to a better life or a better environment. Issues of hunger, food, and habitat are real concerns and need to be addressed simultaneously.

TL: You advocate for sustainable lifestyle and the government has also launched the LiFe programme. Do they align?

Jha: The LiFe programme has more to do with sustainable lifestyle and that's where education plays a very important role. That's also the work we do with more than 100-150 schools in Delhi/NCR. But while we are promoting a sustainable lifestyle, we are also seeing a cultural shift to fast fashion, of increased consumption, production and wastage. Therefore, there needs to be cohesion in our conversation. If we are promoting organic farming, we cannot give subsidies for chemical fertilizers; if we are expecting sustainable lifestyle choices from children, we will also have to look at how many trees we are cutting down to build more and more malls in a city. The difference between standard of living and quality of life needs to be discussed more often and more vehemently.

TL: How do you think an attitudinal change can be brought in children and youth?

Jha: Attitude cannot change overnight; it has to happen gradually. It will happen over a period of time. Our success would be when people ask for sustainable lifestyle, cleaner air, and good quality of life on their own instead of we going and preaching them.

TL: We would like to know more about your youth-centred programmes.

Jha: Besides campaigns on clean air, Yamuna, and the work we do with schools and colleges, we also create modules on environment. There is a journey-based programme that we do with young people, called Naturescapes, where we take them to ecologically vulnerable ecosystems. We have lots of action projects also. In the last five years, we have created more than 200 butterfly gardens, herb gardens, food parks, and mini forests in various pockets of Delhi and NCR.

TL: You do lot of upscaling from waste under the fair-trade initiative, Green the Map? From where do you source the waste and what kind of products do you make?

Jha: The idea behind Green the Map initiative is how to delay the journey of waste from a consumer to a landfill. We work with abandoned tyres, plastic, old fabric, tubes, rubber, etc. which we collect either from roadside waste collectors or organised waste dealers and convert those into products. The idea is two-fold: to give more life to material rather than ending the material cycle of a particular thing and also tell people that look the wallet that you are using is made out of your car seatbelt or your punctured tyre.

TL: Do you have a good market for these products?

Jha: No, we don't. It's a challenge. In India or otherwise, there's almost a

sense of disgust for waste and very little respect for fair trade and fair value for labour. If we give fair wages, don't engage children, have fair employment conditions, are soft on the planet, and spend more time to conserve energy, the product is going to be more expensive. It also takes more time and energy to make a product by hand than by a machine. But unfortunately, the middle class is not yet ready to appreciate that.

TL: Do you think government intervention and bigger grants are required to scale up such initiatives?

Jha: Yes, we need their support. Disposal of waste or management of waste throughout the product life cycle is the responsibility of the manufacturer/ producer as per the extended producer responsibility (EPR). And that's the kind of mainstreaming that government needs to do in its procurement policy. A circular economy is also about upscaling of goods. Historically, upcycling and recycling have been a virtue of Indian culture and society. Now that needs to be mainstreamed and promoted by the government, bringing forth more entrepreneurs and more community-level upcycling projects. Small can be beautiful and small is beautiful.

TL: With new innovations and the growing purchasing power of people, e-waste generation has also increased. How do you see it?

Jha: E-waste is Toxics Link's domain, but I have my anxieties around batteries. As much as we are moving towards electric vehicles and scooters, we should start planning for safe disposal of batteries, before things go out of hand. Also, while fast fashion has a lot of footprints when it comes to production, fast electronic consumption has a huge post-consumption impact as well. We have more phones than toilets in our country today.

The middle class is growing, which is good. But are we safeguarding the systems that enable the middle class to live happily? As I said earlier, our focus should also be on good quality of life and not just standard of living.

STUDENTS CORNER

Fast Fashion: The Environmental Burden of Changing Clothing Trends

— By Aryan Mohapatra

Roti, Kapda aur Makaan, which translates to food, clothing and shelter, are the three basic essentials of human life. Of these, food and clothing are temporary, while shelter is permanent. With the global population growing, the demand for food, shelter and clothing is rising significantly. However, the demand for clothing has grown out of proportion, boosting the textile market but putting immense pressure on our resources.

The rise of digitalisation has driven an increase in demand for trendy, fashionable clothing. Often endorsed by celebrities and social media influencers, major clothing brands constantly update their designs and have a huge market for it too. However, this fast-paced turnover of fashion trends leads to vast amounts of waste.

With the constant introduction of new styles, people have started reusing clothes less frequently, typically wearing an item only eight to ten times before discarding it. While it takes little effort to throw away a piece of clothing, the environmental cost of the waste generated is staggering. Studies have found that the textile industry alone contributes to 10% of global carbon emissions. Every second, a truckload of discarded clothing ends up in landfills across the globe.

Reports state producing just one kilogram of cotton requires around 20,000 litres of water, while about 2,700 litres—enough water for one person to drink for nearly 900 days—is required to make a single T-shirt. Moreover, according to World Resources Institute (WRI), the dyeing and finishing processes of clothes contribute to 20% of global water pollution. Studies also point to a loss of $500 billion annually due to its failure to recycle worn-out clothes.

Low-cost and poor-quality garments made from synthetic materials like nylon and polyester also shed microplastics, which travel through sewage systems and eventually end up in the oceans. The environment bears the cost of our clothing habits. Is it not our responsibility to use resources more sustainably?

In India, there has been a longstanding tradition of reusing and recycling clothes, which is deeply embedded in the culture of sustainability. Old garments are often repurposed as cleaning rags or mops, or are donated to those in need. Additionally, traditional Indian handicrafts, such as Pattachitra, are also created with old used cloths. Despite this cultural emphasis on "reuse" in the country, the ever-increasing demand for new clothes continues to contribute to environmental degradation.

As global citizens, it is our duty to protect the planet we call "home". Small changes in our consumption habits can collectively lead to a larger, positive impact. By embracing sustainability and making conscious choices, we can work towards a more responsible and eco-friendly future.

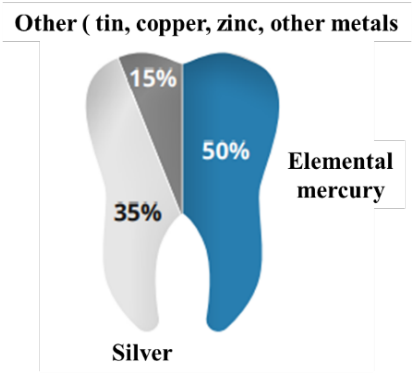
- The author is Class XI student of SRDAV Public School, Dayanand Vihar, Delhi

Phasing out Dental Amalgam For Toxin Free Smiles

By Archana Prajapati

Mercury is a heavy metal recognised by the World Health Organization (WHO) as one of the top ten chemicals of public health concern. Its toxic properties pose significant risks to both human health and the environment. The outbreak of Minamata disease in Japan caused due to methylmercury poisoning in late 1950s not only underscored the severe health risks associated with mercury exposure but also catalysed a global re-evaluation of mercury use in various applications, including dental practices. Mercury amalgam, a common dental filling material composed of about 50% mercury and 50% other metals, has been widely used for over two centuries due to its durability and effectiveness. However, the Minamata incident brought to light the potential dangers of mercury, prompting health professionals and regulatory bodies to reconsider its usage, particularly in light of its known neurotoxic effects.

Following the adoption of Minamata Convention on Mercury, there has been mounting pressure to phase down and subsequently phase out mercury amalgam from dentistry, driven by increased awareness of its environmental and health risks. This shift reflects a broader commitment to protect public health and the environment. The transition is also catalysed by the fact that suitable alternative materials are now available to replace mercury amalgam. The shift away from the restorative model and use of dental amalgam is now becoming an underpinned reality. This article explores the implications of mercury use in dentistry, the status of mercury amalgam in India, and the efforts required to transition to mercury-free dental practices.



Composition of dental amalgam
Source- Europe.noharm.org

Health risks of mercury

Dental amalgam fillings may release small amounts of mercury as a vapour (gas), depending on the number and age of existing fillings and actions such as tooth grinding and gum chewing. The health effects of mercury exposure can be severe, particularly for vulnerable populations. In this context, the Minamata Convention prohibits use of mercury by dental practitioners in bulk form. It does not allow the use of amalgam for the treatment of deciduous teeth, in children under 15 years, and pregnant and breastfeeding women. Mercury has been detected in human blood, urine, milk, and hair. Human biomonitoring studies have shown that consumption of fish is the largest source of dietary exposure to methylmercury for all age groups. Mercury is known to affect the nervous system, leading to cognitive impairments, developmental delays, and other neurological issues. Even low levels of exposure can result in serious health problems, including:

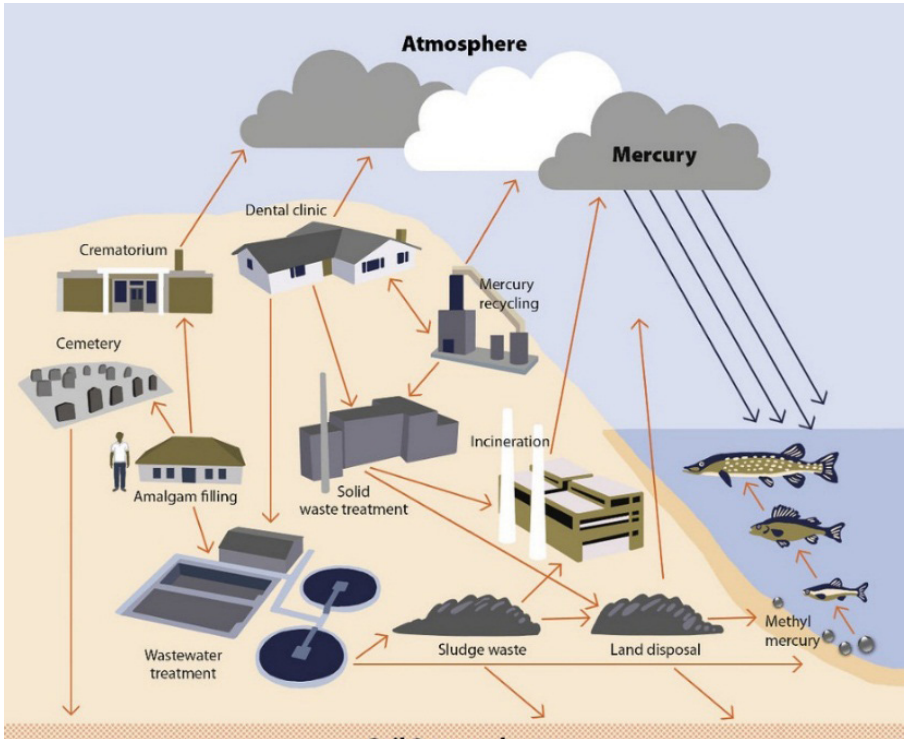
- **Neurological Damage**: Mercury can cause damage to the brain and nervous system, leading to symptoms such as tremors, memory loss, and mood swings.
- **Kidney Damage**: Mercury is toxic to the kidneys, and prolonged exposure can lead to renal dysfunction.
- **Reproductive Issues**: Mercury exposure during pregnancy can harm foetal development, leading to birth defects and developmental disorders.
- **Immune System Effects**: Mercury can compromise the immune system, making individuals more susceptible to infections and diseases.

Given these risks, it is crucial to consider using alternatives to mercury amalgam in dental practices.

Environmental impact of mercury

The environmental consequences of mercury use in dentistry are equally concerning. When dental amalgam is disposed of improperly, mercury can enter the water supply and accumulate in aquatic ecosystems. Bacteria in water can convert elemental mercury into methylmercury. This highly toxic form bioaccumulates in fish and shellfish (Fig. 1) and poses a significant risk to human health, particularly to pregnant women,

Figure 1: Mercury releases to the environment from dental care



1. Source: Concorde 20074

young children, and those who consume large amounts of fish.

The Minamata Convention, an international treaty aimed at reducing mercury pollution, highlights the need for countries to take action to minimise mercury releases into the environment. India ratified the Minamata Convention in 2018, committing to reduce mercury use and emissions, including those from dental practices. However, implementing these commitments requires concerted efforts at both regulatory and implementation levels.

Risk of mercury exposure in dental practitioners

A dentist can be exposed to mercury during amalgam preparation, its placement in the tooth, and its removal from the tooth. Even while removing the dental filling, the aerosol particles generated due to high-speed handpiece drilling remains suspended in the air. This causes an increase in the concentration of indoor mercury, subjecting the dentist and dental assistants to the ill effects of mercury. As per the Occupational Safety and Health Administration (OSHA) guidelines of the US Department of Law, a worker's exposure to mercury vapour shall at no time exceed 0.1 mg/m^3 level over an eight-hour workday. Occupational exposure to 1 to 44 mg/m^3 of mercury vapour for four-eight hours causes chest pain, cough, hemoptysis, impaired lung function, and inflammation of the lungs. Other ways of exposure include handling amalgam without protective gears, inadequate disposal of amalgam waste, and poorly ventilated workspaces. Even if amalgamators are used along with chair-side trappers to reduce mercury from entering the environment, it still needs to be managed effectively.

Where India Stands

Given the significant health risks associated with mercury exposure and the growing global consensus on the need for safer dental materials, India must prioritise the complete phase-out of mercury amalgam rather than merely phasing it down. But India still continues to manufacture, import/export mercury for dental sector. As per the Minamata Convention report, India was one of the top two importers of elemental mercury globally, with a share of 113-141 tonnes from 2018-2020. Data also shows that India has emerged as a prominent trading hub for mercury, both for domestic consumption and export to other countries.

Stricter regulation and enforcement for the complete phase-out of mercury is the need of the hour. The Indian armed forces have set an example by completely banning use of mercury in dental practices, setting a strong precedent for other sectors to emulate. Besides reflecting the forces commitment to safeguarding the health of its personnel as well as minimising the environmental risks associated with mercury exposure, this decisive action also demonstrates the feasibility of transitioning from use of hazardous substances to safer alternatives.

The armed forces model can serve as an effective blueprint for the dental sector in India, showcasing how a systematic approach to phasing out mercury can be achieved through regulatory measures supported by public awareness campaigns and promotion of alternative materials. By following the defence forces' example, the healthcare sector can accelerate its efforts to eliminate mercury amalgam, protecting public health and aligning with global standards for environmental safety.

The Central Pollution Control Board (CPCB) has issued guidelines for managing mercury waste, emphasising the importance of environmentally-

sound practices. These guidelines outline procedures for safe disposal of mercury-containing materials and encouraging use of mercury-free alternatives in healthcare facilities. The Indian Dental Association (IDA), representing dental professionals nationwide, has also acknowledged the concerns surrounding mercury amalgam. The IDA has recommended that alternative materials, such as composite resins, glass ionomers, and resin-modified glass ionomers, be considered for dental restorations, particularly for patients at greater risk due to mercury sensitivity.

Status Globally

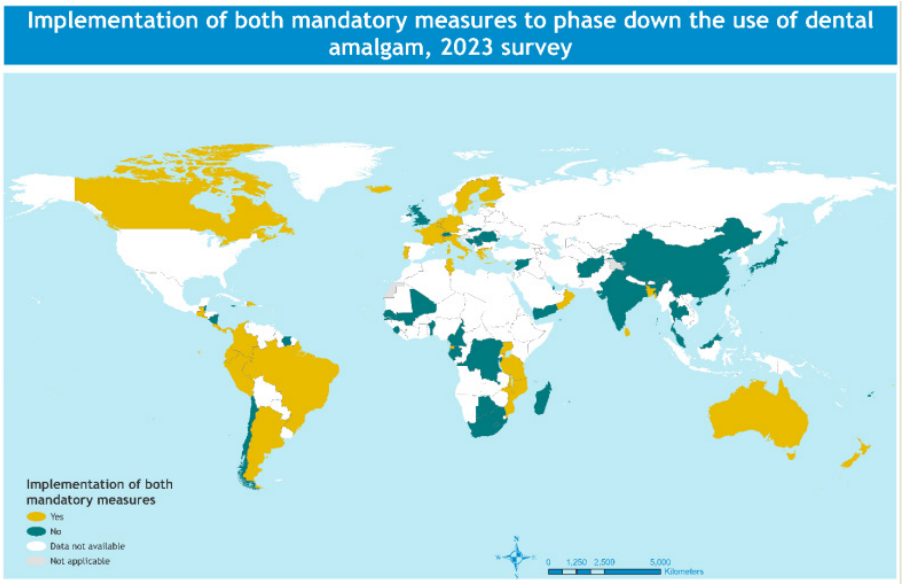
Countries that have banned Mercury Amalgam	
Ban for all	Ban for specific population
Indonesia	Mauritius Island
Japan	Tunisia
Georgia	Bangladesh
Moldova	Nepal
Syria	Philippines
Bolivia	Vietnam
Guyana	Former Soviet Union
Suriname	Syria
Denmark	European Union & Monaco
Norway	Romania
Switzerland	Iceland

The phase-out of mercury amalgam from dentistry is gaining significant momentum globally. Countries like Denmark, Netherlands and Finland have adopted comprehensive public health campaigns to educate both dental professionals and the public about the risks of mercury amalgam, while providing incentives for use of mercury-free alternatives. Further, the European Union has established regulations limiting mercury use in dental care, encouraging member states to transition to safer practices.

According to documents submitted to the Secretariat of the Minamata Convention, many countries have banned amalgam for all while others have banned it for specific population (see table above).

Recently, at the WHO Global Oral Health Meeting held in Bangkok, Thailand, from November 26 to 29, 2024, representatives from 110 countries agreed to phase-down use of mercury-containing dental amalgam, in alignment with UN initiatives on climate change and planetary health. They committed to establish or strengthen cross-sectoral collaboration to phase down, or phase

Figure 2: WHO Member States implementing mandatory measures adopted at COP4 to phase down the use of dental amalgam



out where feasible, the use of dental amalgam in accordance with the Minamata Convention on Mercury.

Way Forward

India can effectively phase out mercury amalgam by adopting similar strategies, including creating strong regulatory framework, public awareness initiatives, and support for research on alternative materials. A multi-faceted approach is essential to effectively phase out mercury amalgam from dentistry.

The following strategies can be adopted to facilitate this transition:

Awareness Campaigns

Public awareness is critical in addressing the mercury menace. Educational campaigns should be launched to inform the general public and dental practitioners about the hazards of mercury and the importance of choosing safer dental filling materials. Various platforms, including social media, community events, and educational workshops, can be used to reach out to a wider audience.

Dental professionals must be educated about the risks associated with mercury and the benefits of using alternative materials. Continuing education programmes and workshops can help dental professionals stay informed about the latest dental materials and techniques.

Dentists should also educate their patients about the potential risks of mercury amalgam and inform about safer alternatives available. By fostering open communication and providing patients with accurate information such as tooth colour and aesthetics, dental professionals can empower individuals to make informed choices about their dental care.

Regulatory Measures

Stricter regulations governing the use and handling of mercury in dental practices are needed. The government should prioritise policies that limit mercury use, especially among vulnerable populations. This may include implementing a phased ban on mercury amalgam and providing incentives for dental practices that adopt mercury-free alternatives under the Make in India initiative. The government should bring strict regulations prohibiting the use of dental amalgam in children below 15 years, and pregnant and lactating women. The government shall also impose stringent norms for handling and managing mercury waste.

Education and Training

It is one of the crucial areas to be addressed. The teaching of mercury amalgam restoration in dental colleges has become a point of debate. Dental institutes are reluctant and face challenges in eliminating mercury amalgam practices due to historical reliance, especially in low-resource settings. Additionally, faculty familiarity with amalgam contributes to its persistence in curricula.

However, it is important that dentistry institutes transition towards safer, more environmentally friendly, and aesthetically appealing materials. Institutes shall also introduce students to safer alternatives and techniques as part of their undergraduate and postgraduate curriculum. The Dental Commission of India (DCI) could help research institutes and dental colleges to reframe curricula and change syllabi. Other than that, it is important to note that incentives can be introduced in institutes, such as implementing a system where students, faculty, and clinics within the medical college are rewarded or recognised for using mercury-free materials and practices. This can create a positive reinforcement cycle. However, financial support or subsidies should be provided to students and faculty who wish to use mercury-free alternatives, as these materials can sometimes be more expensive than traditional mercury-based ones.

Research and Development

Researchers are exploring better alternative materials, such as resin-based composites and glass ionomers, to replace amalgam. Encouraging and investing in research and development and collaboration between academic institutions, dental associations, and industry stakeholders can lead to the development of innovative dental restorative materials that meet safety and efficacy standards.

Join the Movement!

The transition from mercury amalgam to safer alternatives is not just a matter of dental practice; it is a public health imperative. By embracing safer alternatives, we can protect the health of our patients, safeguard the environment, and contribute to a sustainable future.

The journey towards mercury-free dental practice in India is underway, but it requires collective efforts from healthcare providers, regulatory bodies, and the public. By raising awareness, implementing stringent regulations, and fostering education, we can pave the way for a healthier future—one smile at a time.

— The author is Programme Officer, Waste and Sustainability, Toxics Link

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Dental Practitioners meet to phase out Mercury Amalgam

Toxics Link, in collaboration with Indian Dental Association (IDA), organised conferences with dental practitioners in Punjab, Madhya Pradesh, and Rajasthan to phase out the use of dental amalgam in dentistry. The conferences held in Hoshiarpur, Indore, and Jaipur brought together both private practitioners and those employed with the state health department to discuss the dangers of mercury amalgam use. Most practitioners said they understand that mercury is a health and environmental hazard and so they have transitioned to using safer alternatives.

Jaipur

Indore

Hoshiarpur

INC–5 Concludes in Busan without Final Agreement on Global Plastic Pollution Treaty

By Alka Dubey

The fifth session of the Intergovernmental Negotiating Committee (INC-5) to develop an international legally binding instrument on plastic pollution, including in the marine environment, held from November 25-December 1, 2024 at the Busan Exhibition and Convention Centre in Busan, Republic of Korea, ended without a treaty. Attended by 3,300 delegates, including government representatives from 170 countries and observers from over 440 organisations worldwide, the INC-5 saw extensive engagement during marathon sessions, working through technical and political disagreements.

Nations struggled to find common ground on key issues, including the treaty's scope, financial commitments, and enforcement mechanisms. Developing nations, in particular, voiced concerns about financial support and capacity-building to address plastic pollution while high-income countries pushed for more stringent commitments on production and waste management. Informal consultations also took place on Article 5 (product design), Article 7 (releases and leakages), Article 8 (plastic waste management), and Article 9 (existing plastic pollution), Article 10 (just transition), Article 12 (capacity building), Article 13 (implementation and compliance), Article 14 (national plans), Article 15 (reporting), and Article 19 (health).

The Indian delegation requested consensus-based decisions to achieve legally binding agreements and suggested adoption of an inclusive and transparent vision for constructive engagement. India suggested not to appeal Rule 38 (1) till the final adoption of Rules of Procedure by INC. The delegation also raised concerns over the scope of the draft instrument, requesting that it focus solely on plastic pollution and not overlap with other environmental agreements. The country opposed regulating primary plastic production, citing potential development impacts, and called for financial and technical support to help developing nations implement the agreement.

Reaffirming its commitment to a fair, inclusive, and transparent process, India urged that its statement be included in the meeting report, emphasising that consensus should remain the foundation of future negotiations. The Indian delegation also proposed the creation of a dedicated multilateral fund modelled on the Montreal Protocol's Multilateral Fund, to provide financial and technical assistance, including technology transfer, to developing countries. The goal is to help these countries comply with the control measures agreed upon in the new environmental instrument.

During the plenary session, interventions were also made by the Indian Plastic Association and India Plastic Recycling Associations. They urged for promotion of circularity and support to recyclers as they play a key role in developing countries' micro and nano economies. They reasoned that the treaty should not burden micro and nano economies by restricting the production line.

Though significant progress was made in framing the issue, delegates acknowledged the difficulty in reconciling diverse national interests and economic priorities. The INC Chair, with the consensus of the members, thus, decided to suspend the session.

The "Chair's Text" outlines the key principles and provisions that would form the foundation of a future treaty, offering a framework for further discussions when the committee reconvenes in the second half of 2025. All parties have agreed to consider the text as the basis for continued negotiations in the upcoming sessions.

– The author, Programme Coordinator (Chemicals and Health), Toxics Link, was present as an observer at INC-5 in Busan

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NEWS BRIEFS

'Climate diplomacy': Can smog bring India and Pakistan together?

November 1, 2024: Relations between nuclear-armed neighbours Pakistan and India have largely remained tense and stagnant for years. Now, an unlikely catalyst is promising to facilitate dialogue between them: deadly smog that is enveloping key cities in both countries. A senior government official from Punjab, Pakistan's most populous province, which borders Indian Punjab, revealed that Chief Minister Maryam Nawaz has shown an interest in visiting her Indian counterpart to address the pressing issue.

More: *https://www.aljazeera.com/news/2024/11/1/climate-diplomacy-can-smog-bring-india-and-pakistan-together*

Starmer: New UK target for 81% emissions cut by 2035

November 13, 2024: Prime Minister Sir Keir Starmer has announced fresh climate change targets at a global summit, saying he wants the UK to lead on cutting emissions. The UK will now aim for an 81% cut in its emissions by 2035, he told the UN conference of parties (COP29) in Azerbaijan. The target updates a 78% pledge by 2035 under the previous Conservative government, although that also included international aviation and shipping emissions, and goes beyond another pledge of a 68% reduction by 2030.

More: *https://www.bbc.com/news/articles/cx2ny8zndpxo*

Earth had its warmest November on record

December 14, 2023: The average global land and ocean surface temperature for November 2023 was 2.59 degrees F (1.44 degrees C) above the 20th-century average of 55.2 degrees F (12.9 degrees C), which makes it the warmest November on record for NOAA. November 2023 marked the 47th-consecutive November and the 537th-consecutive month with temperatures above the 20th-century average. Africa, Asia and South America all had their warmest Novembers on record.

More: *https://www.noaa.gov/news/earth-had-its-warmest-november-on-record*

Denmark Proposes to Ban PFAS in Clothing Footwear and Waterproofing Agents by 2026

November 27, 2024: Denmark notified the European Commission of a draft Order to ban per- and polyfluoroalkyl substances (PFAS) in consumer products. The proposed measure targets clothing, footwear, and waterproofing agents containing PFAS in order to reduce their environmental and health impacts. The draft order introduces a ban on the import and sale of clothing, footwear and waterproofing agents containing PFAS at concentrations above 50 mg F/kg.

More: *https://gpcgateway.com/common/news_details/MTgxMQ/Mw/RXVyb3Bl*

Lindt chocolate accused of having dangerous levels of lead and cadmium, misleading consumers: Report

November 13, 2024: Swiss chocolatier Lindt & Sprüngli is facing legal scrutiny due to a class action lawsuit by the US-based Consumer Reports, which accuses its dark chocolate bars of containing dangerous levels of lead and cadmium. Filed in February 2023, the lawsuit raised such concerns from the chocolates of several other manufacturers as well, news agency *AFP* reported.

More: *https://www.hindustantimes.com/business/lindt-chocolate-accused-of-having-dangerous-levels-of-lead-and-cadmium-misleading-consumers-report-101731556714346.html*

Study claims potential links between pesticides use and prostate cancer

November 6, 2024: In a recent study published in CANCER, a peer-reviewed journal of the American Cancer Society, researchers established a correlation between the use of specific pesticides, 295 of them, in some US counties and the increase in prostate cancer incidence and death. Researchers identified 22 pesticides consistently associated with the incidence of prostate cancer in the United States, with four of the pesticides also linked with prostate cancer mortality. Four pesticides that were linked to prostate cancer incidence were also associated with prostate cancer mortality: three herbicides (trifluralin, cloransulam-methyl, and diflufenzopyr) and one insecticide (thiamethoxam).

More: *https://www.theweek.in/news/health/2024/11/06/study-claims-potential-links-between-pesticides-use-and-prostate.html*

'Uninhabitable': Push to move India's capital as New Delhi's 33 million residents brave toxic smog

December 1, 2024: "Is Delhi still fit to be India's national capital?" questioned Member of Parliament Shashi Tharoor, as pollution levels soared to "extremely severe" levels shortly before politicians were summoned there for a session of the National Congress. Tharoor was prompted to post his complaint to social media as the city's Air Quality Index (AQI) exploded to over 1,700 milligrams of pollutants per square metre of air.

More: *https://news.com.au/lifestyle/health/health-problems*

Govt to roll out star ratings to show ease of repair of house-hold appliances

December 19, 2024: The government will introduce star ratings for consumer goods, such as appliances, to indicate repairability, a move that aims to widen the Centre's right-to-repair initiative and reduce electronic waste, Union Minister of Food and Consumer Affairs Pralhad Joshi said.

More: *https://www.hindustantimes.com/india-news/govt-to-roll-out-star-ratings-to-show-ease-of-repair-of-household-appliances-101734616145367-amp.html*

'In Delhi, 3,000 tonnes of untreated solid waste generated daily': Supreme Court says situation 'shocking'

December 19, 2024: Stating that 3,000 tonnes of untreated municipal solid waste are generated every day in Delhi, the SC Thursday termed the issue "disastrous" and "shocking". The bench of Justices A S Oka and A G Masih cautioned that if "illegal dumping" of solid waste continues, someday it will have to take a call to stop some kind of development activities in the city so the generation of solid waste can be controlled."

More: *https://indianexpress.com/article/cities/delhi/in-delhi-3000-tonnes-of-untreated-solid-waste-generated-daily-supreme-court-says-situation-shocking-9735085/*

Centre proposes new rules to manage solid waste across the country with effect from October 1 next year

December 15, 2024: In a move that will have far-reaching implications on managing solid waste across the country, the Centre has proposed new rules enlisting ways and means on how to manage such waste in both urban and rural areas. It also has provisions for empowering 'safai karamcharis' (cleanliness workers) in cities to levy fines/penalties on unsegregated waste and to refuse waste collection. The rules will come into force from October 1 next year.

More: *https://timesofindia.indiatimes.com/india/centre-proposes-new-rules-to-manage-solid-waste-across-the-country-with-effect-from-october-1-next-year/articleshow/116343031.cms*

As IT sector thrives, Pune grapples with e-waste pile-up: rules remain on paper as 90% of recycling done through informal channels

December 5, 2024: With rapid urbanisation and the increasing use of technology, Pune generates over 20,000 metric tonnes of e-waste each year. However, the city's collection rate for e-waste is only around 20 per cent, which is significantly below the national target of 70 per cent.

More: *https://indianexpress.com/article/cities/pune/it-sector-pune-e-waste-recycling-informal-channels-9706024/*

Protection of Ladakh Bird Sanctuary: NGT issues notice to CPCB, others

December 7, 2024: The National Green Tribunal has sought a response from the member secretary of the Central Pollution Control Board and others on the issue of the urgent need to protect the Ladakh Bird Sanctuary. The green body was hearing a matter where it had taken suo motu (on its own) cognisance of a media report regarding the issue.

More: *https://www.dailyexcelsior.com/protection-of-ladakh-bird-sanctuary-ngt-issues-notice-to-cpcb-others/#google_vignette*

"Complete Failure": Supreme Court On Solid Waste Management Rules In Delhi

November 17, 2024: The Supreme Court has flagged the "complete failure" of agencies in implementing the Solid Waste Management Rules, 2016 in the national capital and directed the chief secretary of the Delhi government to call a meeting of all stakeholders to discuss the issue. The top court observed it is a matter of immense importance that the 2016 Rules are implemented in their true letter and spirit in the capital city.

More: *https://www.ndtv.com/delhi-news/complete-failure-supreme-court-on-solid-waste-management-rules-in-delhi-7039251*

Country saw 72 per cent increase in e-waste in 5 years: Government

December 16, 2024: According to a written reply to a question by Union Minister of State for Housing and Urban Affairs Tokhan Sahu, 10.14 lakh tonnes of e-waste was generated in 2019-20 and the figure climbed to 17.51 lakh tonnes in 2023-24. Sahu said 13, 46,496 tonnes of e-waste was generated in 2020-21, 16,01,155 tonnes in 2021-22 and 16,09,117 tonnes in 2022-23. Under the E-Waste (Management) Rules, 2016, 21 EEE items were notified and information about e-waste generated from these items is available for the last four years (2019-20 to 2022-23).

More: *https://economictimes.indiatimes.com/news/india/country-saw-72-per-cent-increase-in-e-waste-in-5-years-government/articleshow/116377023.cms?from=mdr*

CDMA takes corrective action after sanitation lapses in Hyderabad

November 18, 2024: The Municipal Administration department has initiated measures for upkeep of sanitation and to improve solid waste management (SWM) in ULBs (urban local bodies) in a sustainable mode. The commissioner and director of the Municipal Administration department (CDMA) took the decision after lapses were noted in upkeep of sanitation. In an advisory to ULBs on SWM activities, the department insisted on strict compliance with the directions.

More: *https://www.newindianexpress.com/cities/hyderabad/2024/Nov/17/cdma-takes-corrective-action-after-sanitation-lapses-in-hyderabad*

NGT Slams Varanasi Administration Over Ganga's Polluted State

November 18, 2024: Varanasi, where spirituality meets sewage, is now the site of yet another scathing rebuke from the National Green Tribunal (NGT) over the Ganga's lamentable state. The water, once revered as sacred, is now apparently unfit for even a holy dip—according to the NGT's latest verdict.

More: *https://www.freepressjournal.in/india/uttar-pradesh-national-green-tribunal-slams-varanasi-administration-over-gangas-polluted-state*

Kannur panchayat study warns of microplastic risk at Azhikkal estuary

November 4, 2024: A recent study has revealed alarming levels of microplastic pollution in the Azhikkal estuary, a significant marine ecosystem in Kerala's Kannur district, where the Valapattanam River empties into the Arabian Sea. This is the first time that a local body in the state has initiated a study on microplastics in seawater.

More: *https://thesouthfirst.com/kerala/kannur-panchayat-study-warns-of-microplastic-risk-at-azhikkal-estuary/*

CPCB proposes high-level panel to study toxic heavy metals in Bengaluru vegetables

October 24, 2024: The Central Pollution Control Board (CPCB) has proposed a high-level committee for a comprehensive study to assess the heavy metal contamination of vegetables in Bengaluru. The development comes after the National Green Tribunal's southern bench sought details on the contamination of the vegetables found in a study by the Environment Management Policy Research Institute (EMPRI).

More: *https://www.deccanherald.com/india/karnataka/bengaluru/cpcb-proposes-high-level-panel-to-study-toxic-heavy-metals-in-bengaluru-vegetables-3246402*

About Toxics Dispatch

Toxics Dispatch was started in 1998 with the primary objective of creating awareness about environmental pollution related to the management of waste and hazardous chemicals and their impact on the environment and public health.

Toxics Dispatch was born out of the need to reach out to various stakeholders, including government officials, judiciary, youth, and the general public, to sensitise them about the extent of toxic pollutants and their damaging effects on the environment.

Since its inception, Toxics Dispatch has highlighted pressing issues of hazardous, biomedical, municipal solid waste, e-waste, international waste trade, and the emerging issues of pesticides and Persistent Organic Pollutants (POPs). The newsletter aims to disseminate information to help strengthen the campaigns against toxic pollution, provide cleaner alternatives, and bring together groups and people affected by this menace.

Toxics Dispatch comes out thrice a year and is available online and in print. You can subscribe by writing to us at info@toxicslink.org.

All issues of Toxics Dispatch can be viewed at

https://toxicslink.org/dispatch

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Toxics Link (The Just Environment Charitable Trust)

Toxics Link
H-2, Jangpura Extension, Delhi
Delhi-110014
Tel: 91-11-49931863, 49981921
E: info@toxicslink.org,
comm@toxicslink.org

www.toxicslink.org