Give more
Give sooner
Give better

# Philanthropy for Waste Management in India

## Sector Primer

## April 2025

We would like to acknowledge the contributors of this primer for their instrumental role in conceptualizing and providing invaluable insights. *Their expertise, dedication, and collaborative spirit have been indispensable to the depth of this project.*

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# DISCLAIMER

This primer is a perspective building resource that aims to provide philanthropists with a comprehensive understanding of the sector, including an ecosystem map, key issues, potential solutions, noteworthy philanthropic endeavors, and profiles of not-for-profit organizations. *While the primer attempts a deep-dive into the sector, it is neither exhaustive nor all-encompassing.*

*What it includes:*

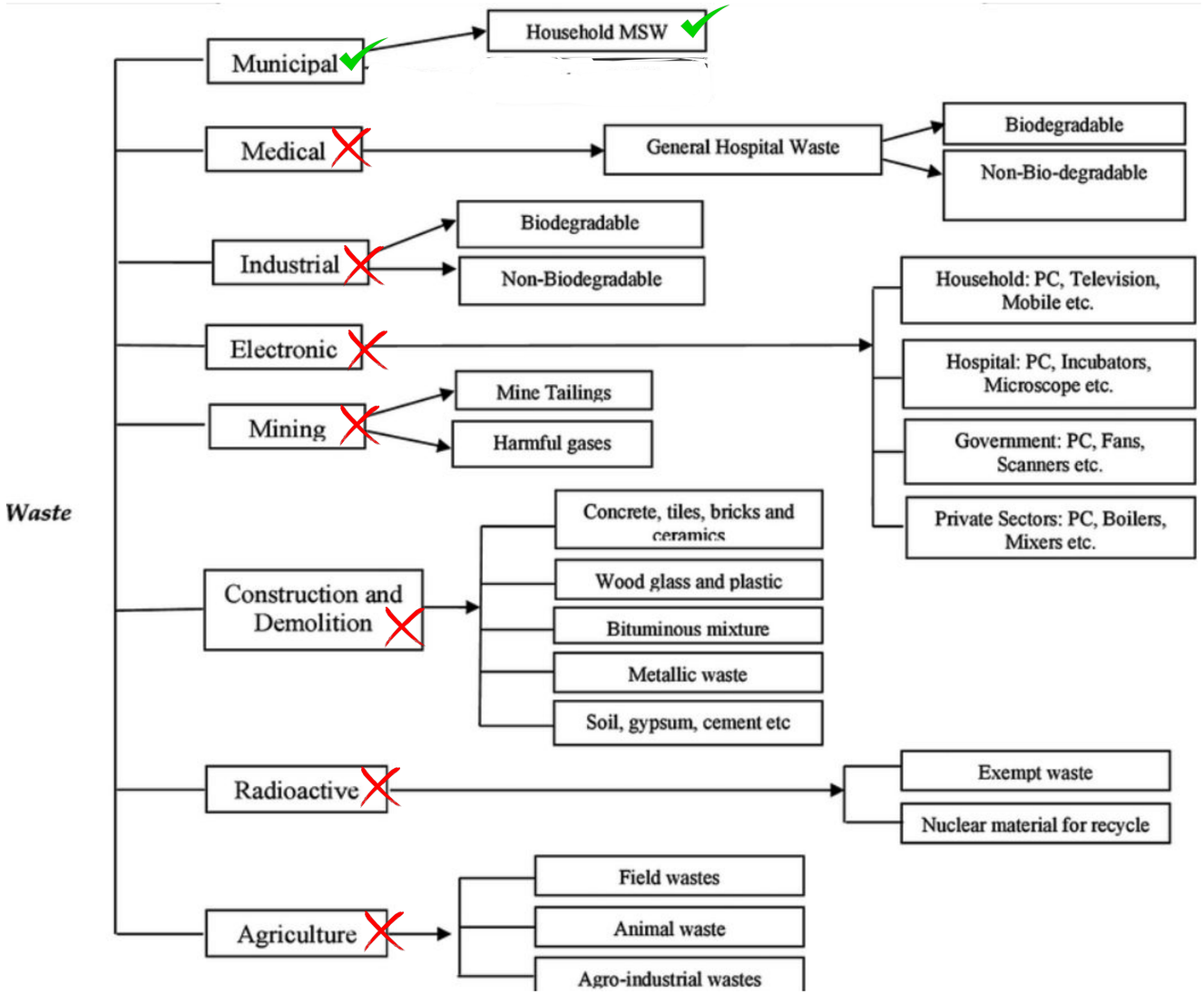
- Landscape of MSW in India – Scale, composition, and trends in waste generation
- Key Issues – Challenges in collection, segregation, processing, and disposal
- Interventions – Proven strategies, innovative models, and policy frameworks for effective waste management
- Philanthropists Working in the Space – Key funders driving impact and systemic change
- NPOs Doing Exemplary Work – Organizations leading efforts in waste reduction, recycling, and community-driven solutions

***What it does not include:***

This primer does not cover other categories of waste that require specialized handling, processing, and regulatory frameworks, including:

- Biomedical Waste (hospital waste, infectious materials)
- Industrial Waste (hazardous chemicals, manufacturing byproducts)
- Electronic Waste (E-Waste) (discarded computers, mobile phones, appliances)
- Mining Waste (mine tailings, harmful gases)
- Construction and Demolition Waste (concrete, bricks, metallic waste)
- Radioactive Waste (nuclear materials, exempt waste)
- Agricultural Waste (field residues, animal waste, agro-industrial byproducts)

# Scope of the Waste Management Primer (1/2)




This primer focuses exclusively on ***Municipal Solid Waste (MSW)*** management, encompassing ***both urban and rural contexts***. It does not cover other waste categories such as medical, industrial, electronic, mining, construction and demolition, radioactive, and agricultural waste, as they fall outside the scope of this primer.

***Why Focus on MSW?***

Municipal solid waste is one of the most pressing environmental challenges in India. According to the Annual Report of the Central Pollution Control Board (CPCB) for 2022, the ***daily MSW generation in India exceeded 170,300 metric tons***. Given its sheer volume and impact on public health, environmental sustainability, and urban-rural infrastructure, effective MSW management is a critical area for intervention.

By focusing on MSW, this primer aims to explore key challenges, interventions, and opportunities in collection, segregation, processing, and sustainable disposal, providing insights for philanthropists, policymakers, and stakeholders working to improve India's waste management ecosystem.

# Scope of the Waste Management Primer (2/2)

The Waste Management Primer is designed **to provide philanthropists with a comprehensive understanding of the waste management ecosystem in India, with a focus on key interventions that can drive environmental sustainability, social equity, and resource efficiency**. This primer aims to:

- **Examine the Waste Management Landscape:** Explore waste management through three lenses—planet, people, and waste as a resource—providing insights into how effective waste management contributes to global and national goals, including the Sustainable Development Goals (SDGs), and how these are being integrated into Indian policies and regulatory frameworks.
- **Present the Ecosystem:** Offer insights into the key stakeholders, including government bodies, private enterprises, non-profits, and informal waste workers, and their role in shaping policies, scaling innovations, and implementing sustainable waste solutions.
- **Highlight Key Issues:** Identify critical challenges such as infrastructure gaps, unprocessed waste accumulation, environmental degradation, and the socio-economic vulnerabilities of informal waste workers.
- **Levers of Change:** Present targeted interventions across on-ground implementation, technological innovation, and policy advocacy, aligned with the three lenses to drive scalable and sustainable impact.
- **Showcase Philanthropic and NPO Solutions:** Feature key initiatives by Indian philanthropists, non-profits, and social enterprises that are working to improve waste processing, promote circular economy solutions, and support marginalized waste worker communities.

In developing this primer, we have drawn on the insights of subject matter experts (SMEs) who have significantly contributed to the field of waste management. Their perspectives provide valuable recommendations for advancing sustainable waste solutions and fostering systemic change in India.

# Table of contents

*"Waste should not be treated as a burden but as a resource. Adopting sustainable practices is crucial for achieving economic resilience, environmental sustainability, and social security"*

**Shri Bhupender Yadav**

**Union Minister for Environment, Forest and Climate Change**

# Executive Summary

**Key Takeaways:**

- India's waste problem impacts both people (health risks, livelihood challenges, and behavioral gaps) and the planet (pollution, landfill overflows, and low-value waste, as shown in the executive summary framework.
- Despite managing up to 90% of waste, informal workers lack recognition, protection, and fair pay y—posing both a social justice issue and a missed opportunity for system efficiency.
- Limited Material Recovery Facilities (MRFs), poor segregation, and underdeveloped reuse/recycling markets constrain circular economy potential and lead to downcycling or landfilling.
- Philanthropy can enable catalytic change by improving on-ground waste systems, backing innovative technologies, securing rights for waste workers, and shaping inclusive, data-driven policy advocacy.

# Executive Summary

India faces a growing waste management crisis, ***driven by rapid urbanization, rising consumption, and inefficient waste disposal systems.*** The country generates **62 million tons of municipal solid waste annually, yet nearly half remains untreated, leading to severe environmental, social, and economic consequences**. Over-reliance on landfills, lack of segregation at source, and poor waste processing infrastructure exacerbate challenges, contributing to pollution, climate change, and public health risks.

India's waste management ecosystem is diverse, involving government bodies, private enterprises, non-profits, and informal waste workers who play a critical role in collection and recycling. **Key policies such as the Solid Waste Management Rules (2016) and Extended Producer Responsibility (EPR) aim to promote circular economy principles, yet gaps in enforcement, infrastructure, and behavioral change persist. Emerging technologies like AI-based waste tracking, smart waste monitoring, and waste-to-energy solutions offer new opportunities to reduce landfill dependency and improve resource recovery.**

Philanthropy has the potential to **catalyze systemic change by supporting on-ground implementation, driving technological innovation, and advocating for policy reforms**. **Strategic investments in waste infrastructure, social protections for informal workers, and circular economy models** can help transform India's waste management landscape into a sustainable, equitable, and efficient system.

# Executive Summary - identifying the issues and interventions for philanthropy to enable catalytic impact

## Issues

### People

#### Health Risks

Poor waste management harms low-income communities. Women face discrimination and lower wages. Manual scavengers risk toxic exposure, disease, and fatal working conditions.

#### Livelihood Challenges

Despite managing up to 90% of waste, informal workers lack recognition, social security, and fair pay. Their expertise is undervalued, and they face housing discrimination.

#### Behavioural Gaps

Low public awareness, inconsistent messaging, and the NIMBY (Not in my backyard attitude) mindset hinder waste segregation, recycling, and critical infrastructure development.

### Planet

#### Changing Waste Composition

Modern waste, especially multi-layer plastics and e-waste, poses serious environmental risks during disposal and recycling. The breakdown of plastic into microplastics contaminates soil, water bodies, and even the food chain, making it a widespread ecological threat..

#### Low Value Waste

Nearly 60% of waste generated is of low value, reducing its chances of being recycled and increasing landfilling or incineration. The early extraction of high-value recyclables by informal collectors disrupts the recycling chain.

#### Improper Disposal Methods

Open dumping and burning of waste, particularly in urban outskirts and rural areas, release harmful pollutants, worsening air pollution and climate change. Communities near dumping grounds often protest due to concerns about becoming waste repositories.

#### Landfills at Capacity

With over 800 million tons of untreated waste in existing dumpsites, landfills are overflowing, leading to severe soil and groundwater contamination. Many landfills have exceeded their designed capacity.

### Waste as a Resource

#### Circular Economy Challenges

The “waste to wealth” narrative overlooks that most consumer products aren’t designed for reuse or recycling due to complex materials. Limited technology and unstable markets hinder true circularity, leading to downcycling.

#### Resource Recovery Constraints

A lack of Material Recovery Facilities (MRFs) and advanced processing infrastructure hampers recycling efforts. Funding for facilities and micro-enterprises remains a challenge.

#### EPR (Extended Producer Responsibility

Low EPR rates fail to drive industry investment in sustainable recycling. Without transparent tracking, producers can claim recycling credits without actual waste reduction.

## What can philanthropists do

### On-Ground Implementation

Enhance waste management infrastructure across collection, segregation, processing, and disposal. Support waste workers through training, safety measures, and formal recognition.

### Innovation

Develop and implement advanced technologies for efficient waste segregation and processing. Promote waste-to-energy solutions and upcycling innovations to maximize resource recovery.

### Policy Advocacy

Advocate for inclusive and effective waste management policies. Drive public awareness campaigns to encourage responsible waste disposal and recycling habits.

# Executive Summary - Organisations

## Non-Profit Organisations

chintan
environmental research and action group

WASTE WARRIORS
REDUCE RE-USE RECYCLE

GREEN COMMUNITIES FOUNDATION

Saahas Zero Waste

ಹಸಿರು ದಳ Hasiru Dala

गूंज..
GOONJ.. a voice, an effort
www.goonj.org

## Philanthropists-led Organisations

ROHINI NILEKANI philanthropies

Azim Premji Foundation

Marico Innovation Foundation™

Individual Philanthropic Initiatives

Godrej

apollo TYRES

IndiGo

SERUM INSTITUTE OF INDIA
Cyrus Poonawalla Group

CSR Initiatives

> *To eliminate the concept of waste means to design things-products, packaging, and systems from the very beginning on the understanding that waste does not exist.*
>
> **-William McDonough**
>
> **American architect and environmental engineer**

# Landscape of Waste Management in India

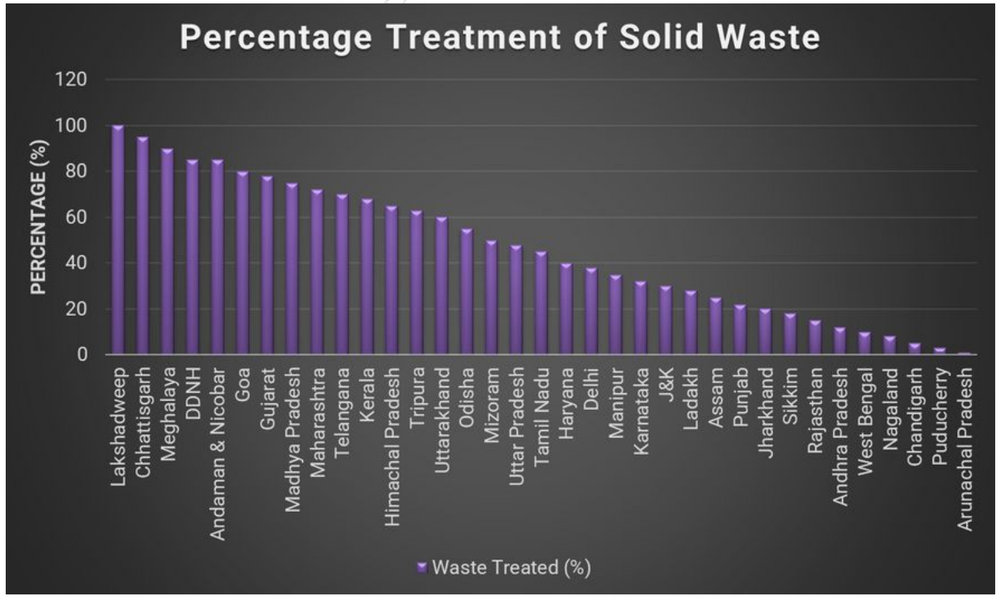
**Key Takeaways:**

- India's waste management challenge is systemic, with nearly half of the waste remaining untreated. Addressing inefficiencies in collection, segregation, and processing is crucial to reducing landfill dependency and environmental harm.
- A shift towards a circular economy, supported by policies like Extended Producer Responsibility (EPR) and waste management rules, is essential for improving resource recovery and sustainability.
- Waste management must be viewed through three interconnected lenses—planet (reducing environmental damage and emissions), people (ensuring equity for informal waste workers and affected communities), and viewing waste as a resource (unlocking economic value through recycling and reuse).
- Technology-driven solutions, including AI-based waste monitoring and waste-to-energy initiatives, can enhance efficiency, create economic opportunities, and align with India's climate and sustainability goals.

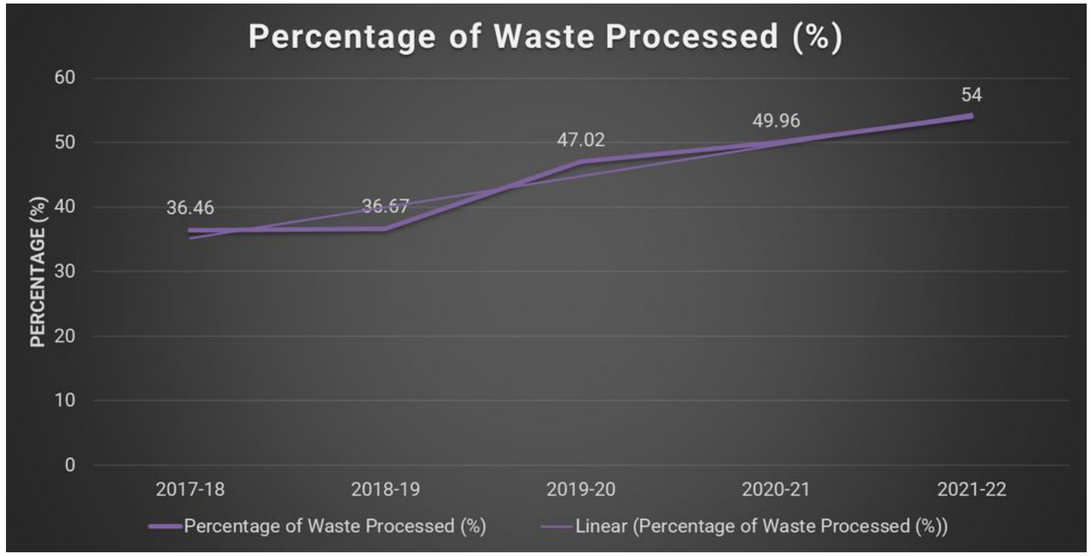
# India faces a growing waste management challenge as half of the waste generated is dumped in landfills

**Waste** is an unavoidable by-product of most human activity. **According to the Basel Convention, waste refers to substances or objects that are disposed of, intended for disposal, or required to be discarded by law, often due to hazardous properties**. Waste includes items like household rubbish, manufacturing by-products, packaging, discarded electronics, and more, arising from daily activities. **Waste Management is defined as the collection, transportation, and disposal of waste, sewage, and other waste products.** The entire idea boils down to reusing waste as a valuable resource and given our current environmental climate, this process is extremely vital for all households and businesses.

***Per Capita Waste Generation Across States/ Union Territories***




***Landfilling of wastes across the states and union territories***

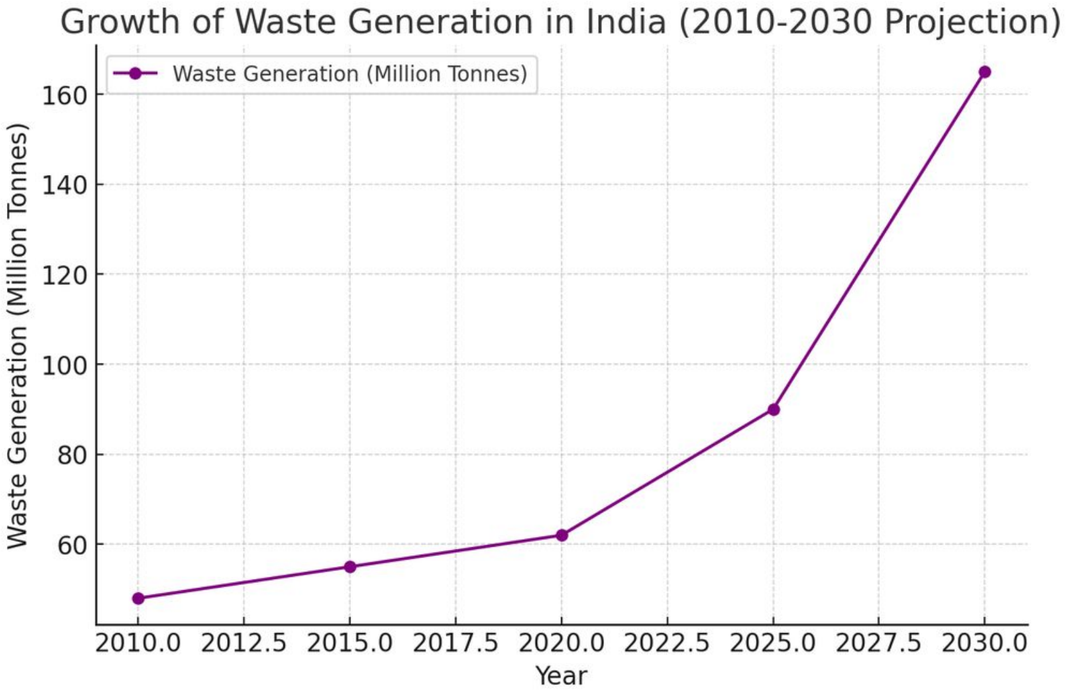



The graph shows that while India has improved its waste processing from 36.46% in 2017–18 to 54% in 2021–22, treatment rates vary widely across states—Lakshadweep, Chhattisgarh, and Meghalaya lead with over 90% treatment, while Arunachal Pradesh and Puducherry lag significantly behind.

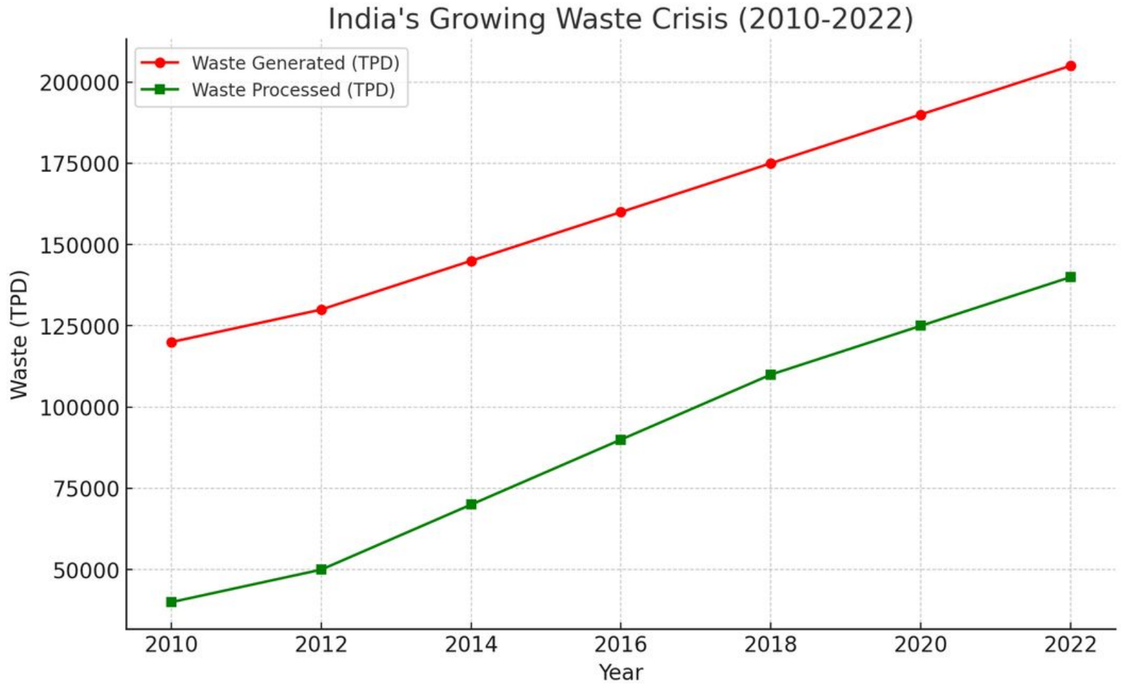
Out of the **62 million tons** of waste generated annually in India, **50% of it is dumped in landfills**.

*Source: https://cpcb.nic.in/uploads/MSW/MSW_AnnualReport_2021-22.pdf-*
*Time period of data points- 2021-22*

# And significant challenges remain as the magnitude of problem continues to grow




This graph highlights the exponential rise in waste generation in India, projected to reach ***160+ million tonnes by 2030***. The increasing waste burden is driven by urbanization, industrial growth, and rising consumption patterns. Without urgent interventions in waste reduction, recycling, and processing, the pressure on landfills and ecosystems will become unsustainable.




This graph compares total waste generated (red line) vs. waste processed (green line) over the last decade. While waste processing capacity has improved, the gap between waste generation and treatment remains large. Despite an increase in ***processing rates (from ~36% in 2017-18 to 54% in 2021-22)***, a significant portion of waste remains untreated, leading to environmental and health hazards.



Source: World Bank: What a Waste 2.0- Country data set (https://datacatalog.worldbank.org/search/dataset/0039597) and https://cpcb.nic.in/uploads/MSW/MSW_AnnualReport_2021-22.pdf

# To address the challenge, waste needs to be defined as a systemic issue and structured along its interconnectedness

Waste management in India must be defined as a **systemic issue**, structured around interconnectedness rather than isolated points of origin. A fragmented approach fails to address the lifecycle complexities of everyday objects like a mop, which involve multiple materials (metal, plastic, cloth, cardboard) and demand coordinated action across collection, segregation, transportation, and disposal.

## Key Pain Points

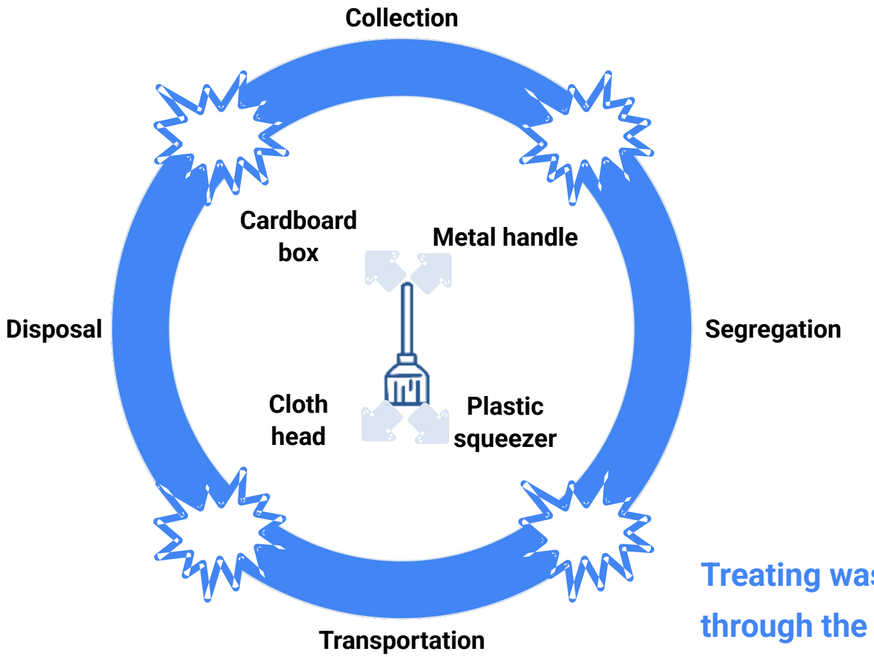
### Where the system breaks

A mop's creation and disposal implicate four materials, each with distinct waste pathways:

| Waste Component | Mop's Material Journey | Systemic Failure Example |
|---|---|---|
| **Collection** | Mixed waste bins gather mop parts with other trash. | Metal handle lost to landfills due to inefficient pickup. |
| **Segregation** | Plastic/cardboard must be separated for recycling. | Unsegregated cloth heads clog incinerators or compost sites. |
| **Transportation** | Requires separate routes for recyclables vs. organics. | Contaminated cardboard shipped to wrong facilities. |
| **Disposal** | Metal/plastic to recyclers; cloth to compost/downcycling. | Toxic ash from burning mixed plastic in informal sectors. |

When discarded as mixed waste, these materials contaminate ecosystems—microplastics from the cloth, toxic leachates from metal rust. A flaw in segregation disrupts transportation—non-recyclables sent to recycling plants—and disposal—landfills overflow with recoverable materials.

Requires **interconnected management** to recover value—recycling metal/plastic, composting organic cloth fibers, repulping cardboard.




## Solutions

### Interconnected fixes

**Policy**: EPR laws for producers
**Infrastructure**: Material-specific hubs
**Behaviour**: Segregation guides
**Technology**: AI waste tracking

A simple product like a mop demonstrates how waste is woven into every stage of its lifecycle—from manufacturing to packaging to disposal—highlighting the systemic nature of the problem and demanding a holistic approach.

Only by structuring waste management as a closed-loop system—collection, segregation, transportation, and disposal are cohesively designed—can India mitigate pollution, reclaim resources, and align with circular economy principles.

**Treating waste as a systemic issue ensures no material falls through the cracks, transforming linear disposal into regenerative cycles.**

# The complexity of India's waste management challenges requires examining waste as a systemic issue through three interconnected lenses

This primer introduces a **framework to explore Solid Waste Management in India,** the largest waste category, by addressing critical gaps in collection and processing. It examines challenges within a fragmented ecosystem through an **intersectional lens,** considering the interconnected impacts on **people, planet, and resources.**

## PLANET

Poor waste management harms climate, ecosystems, and health—driving emissions, pollution, and biodiversity loss. Sustainable practices and a shift to a circular economy are essential to reduce this impact..

## PEOPLE

Waste management relies on informal workers who often face unsafe, unfair conditions, while marginalized communities bear its worst impacts. A just, sustainable system must prioritize equity, inclusion, and worker protection.

## RESOURCE

Efficient waste management can unlock economic and environmental value. A circular economy turns waste into resources, cutting raw material use. Realizing this needs innovation, infrastructure, and public-private collaboration.

# These lenses enable sustainable and equitable outcomes through integrated solutions spanning environmental, social, and resource aspects of waste

**Planet: Environmental Impact**

- Climate Change: Methane emissions from decomposing organic waste in landfills are 86 times more potent than $CO_2$ over a 20-year period, makes waste management a critical target for climate mitigation. Open dumps and uncontrolled burning of waste release harmful pollutants, contributing to global warming, respiratory diseases, and smog.
- Environmental Degradation : Poor waste disposal practices contaminate water sources, harm ecosystems, and contribute to marine debris, particularly plastic waste, which threatens coastal economies and biodiversity.
- Sustainable waste management practices, such as composting, biogas generation, and waste-to-energy projects, are needed to reduce environmental harm and promote circular economy principles.

**People: The Social Dimension**

- Impact on Livelihoods: The informal waste sector plays a critical role in waste collection and recycling, with workers collecting over 10,000 tons of reusable waste daily. However, these workers often lack legal recognition, protective equipment, and fair compensation, exposing them to health risks and economic vulnerability.
- Social Inequity: Marginalized communities, particularly those living near landfill sites, bear the brunt of inefficient waste management. They face disproportionate health risks, environmental degradation, and reduced quality of life due to exposure to pollutants, methane emissions, and contaminated water sources.
- Sustainable practices must integrate social equity, dignity, and economic inclusion for these workers while addressing the health risks they face

**Resources: Circular Economy Potential**

- Resource Efficiency: Waste should be reimagined as a valuable resource. By reusing, recycling, and upcycling waste materials, we can minimize the extraction of new resources, reduce environmental damage, and create economic value.
- Waste-to-Energy Potential: India currently utilizes only 556 MW of its 5,690 MW potential capacity for generating electricity from municipal solid waste. Expanding this sector can reduce landfill dependency, create jobs, and contribute to a circular economy.
- Innovation is needed in waste processing technologies, support research and development, and foster public-private partnerships to unlock the full potential of waste as a resource.

# Sustainable waste management is a key driver for taking India closer to achieving its Sustainable Development Goals by 2030


## Target 11.6: Sustainable Cities & Communities

Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste management


## SDG 3 A Target: Good Health and Well-being

Proper waste management reduces exposure to harmful pollutants and minimizes health risks, thereby contributing to better public health outcomes.


## Target 12.4: Responsible Consumption & Production

Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment


## SDG 6 Target: Clean Water and Sanitation

Effective waste disposal prevents contamination of water bodies, ensuring access to clean water and improved sanitation for communities.


## SDG 13 Target: Climate Action

Proper waste management helps mitigate climate change by reducing greenhouse gas emissions from landfills and promoting waste-to-energy solutions.


## SDG 14 Target: Life Below Water

Preventing waste—especially plastics—from entering water bodies protects marine ecosystems and preserves biodiversity in our oceans.

# To achieve the SDGs, behavior nudges that promote waste segregation can have a transformative impact on effective waste management and the circular economy

**Waste, when segregated at source, becomes a valuable resource—fueling recycling, composting, and waste-to-energy pathways. It intersects with the three lenses as follows, and has immense benefits for catalysing change in the waste management process.**

- Planet: Reduces landfill burden, cuts methane emissions (34x more potent than $CO_2$), and curbs pollution.
- Resource: Makes recycled materials cost-effective, reduces treatment costs, and boosts green livelihoods.
- People: Protects informal waste workers and supports safer, decentralized waste systems (e.g., community composting).

## Streamlines processing

Reduces the need for complex secondary segregation, making collection and treatment more efficient.

## Improves material quality

Clean, source-separated waste avoids contamination, improving outcomes for recycling and composting.

## Reduces transportation load

Enables decentralized systems like composting at source, lowering transportation costs and emissions.

## Supports compliance

Facilitates implementation of India's waste management rules, including MSW, plastic, and C&D regulations.

## Drives behavioural change:

Clean, source-separated waste avoids contamination, improving outcomes for recycling and composting.

## Builds market value:

Segregated waste is more valuable for recyclers, encouraging private sector participation and innovation in the circular economy.



Source: NITI AYOG Policy Guidelines Promoting Behaviour Change for Strengthening Waste Segregation (2021)

# To achieve its sustainable waste management, India needs to focus on integrating circular economy principles

## WHY

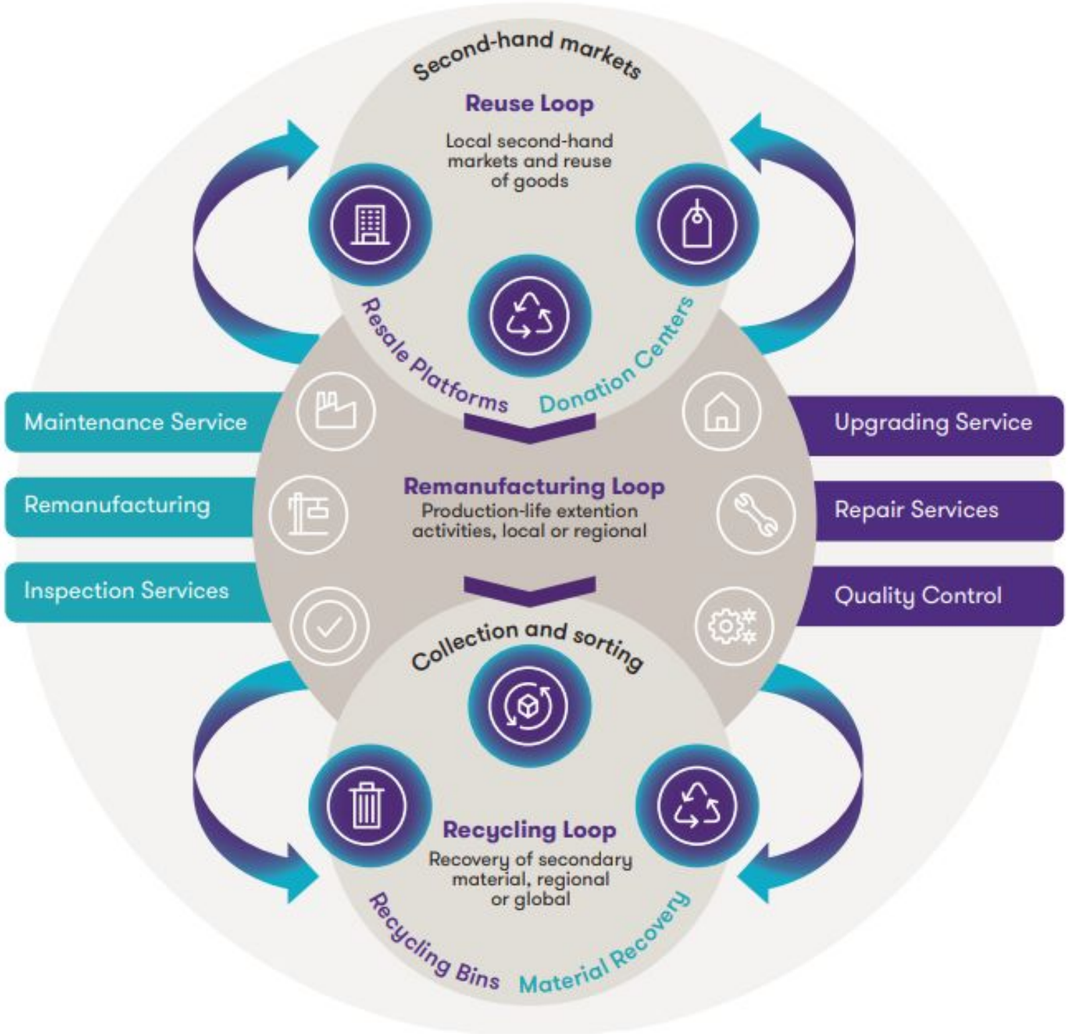
The prevalent traditional linear economy — marked by a 'take-make-dispose' approach — has led to significant resource depletion, environmental degradation, and unprecedented waste generation.

## WHAT

A restorative and regenerative approach by design, CE aims to keep products and materials at their highest utility and value through continuous cycles that preserve and enhance natural capital, optimize resource yields, and minimize system risks through renewable flows.

## HOW

Focuses on maintaining the value of products and materials through reusing, and recycling to reduce waste, and conserve resources. By focusing on longevity, durability, and the ability to repurpose materials, CE presents a viable pathway to achieving long-term sustainability






Source: Grant Thorton:Envisioning Future of Circular Economy in India

# Towards this, policy is oriented towards pushing India to embrace the Circular Economy approach

India is on a path of significant economic growth, with rising per capita income. However, t**his growth comes with resource depletion, degradation, and security challenges,** further compounded by the looming threat of climate change. To address these issues, **India has embraced the Circular Economy (CE) approach to decouple economic growth from material consumption and waste generation. This approach aims to make India more resource-secure, competitive, and future-ready.**

## Pioneering Resource Efficiency

Established the Indian Resources Panel (2015) and NITI Aayog's action plan with EU collaboration (2017-2019).

## Waste Management Rules

Comprehensive rules for plastics, e-waste, hazardous waste, batteries, and construction waste to boost recycling and reuse.

## Extended Producer Responsibility (EPR)

EPR frameworks for e-waste, plastics, batteries, and tyres, with IT-enabled reverse logistics.

## Conservation and Recycling

Policies promoting water reuse, wastewater recycling, and market mechanisms like plastic credits.

> *"In nature, nothing is wasted. Everything is recycled."*
>
> **- David Suzuki**

# Ecosystem of Waste Management in India

**Key Takeaways:**

- **Collaborative Effort** – Waste management in India relies on government, private sector, CSOs, research, and philanthropy.
- **Government's Role** – Policies, enforcement, and initiatives like Swachh Bharat Mission drive improvements.
- **Private Sector & Innovation** – Companies and startups provide infrastructure, recycling, and tech-driven solutions.
- **Research & Advocacy** – Institutions develop technologies, while CSOs and foundations mobilize communities and fund interventions.

# The multi-level and multi-stakeholder collaboration is driving waste management in India for a sustainable future

## Key Stakeholders in the Ecosystem


### Research Institutions & Academia

Contribute by developing innovative technologies and conducting studies to improve waste management systems
E.g. TERI (The Energy and Resources Institute), Indian Institutes of Technology (IITs).

### Social Enterprises and Startups

Drive innovation by introducing scalable and sustainable waste management solutions
E.g. Recykal, Waste Ventures India

### Philanthropic Foundations

Provide crucial funding and strategic support to scale interventions and fill critical gaps
E.g. Tata Trusts, Marico Innovation Foundation

### Government Bodies

tasked with creating policies, enforcing regulations, and implementing programs to ensure sustainable practices
E.g. Central Government (MoEFCC), Urban Local Bodies (ULBs), Central Pollution Control Board (CPCB)

### Civil Society Organisations

pivotal in mobilizing communities and advocating for sustainable practices
E.g. Waste warriors, Goonj, Hasiru Dala

### Private Sector

play a significant role in providing services, infrastructure, and innovation in the sector
E.g. Ramky Enviro Engineers, Antony Waste Handling Cell .

# Key Ecosystem Players: Shaping the Future of Waste Management in India

1. ***Central Government***
   - **Ministry of Environment, Forest and Climate Change (MoEFCC):** Oversees the formulation of waste management policies, including the Solid Waste Management Rules (2016) and E-Waste (Management) Rules (2016). It promotes sustainable practices and enforces waste regulations through various arms like the Central Pollution Control Board (CPCB).
   - **Ministry of Housing and Urban Affairs (MoHUA):** Implements flagship programs like the Swachh Bharat Mission (Urban and Rural) focusing on waste collection, segregation, and disposal infrastructure.
2. ***Central Pollution Control Board (CPCB)***
   - Monitors compliance with waste management rules across the country.
   - Issues guidelines for scientific landfill operations, waste segregation, and extended producer responsibility (EPR) under the E-Waste Rules.
   - Supports capacity-building initiatives for Urban Local Bodies (ULBs).
3. ***Urban Local Bodies (ULBs)***
   - Responsible for waste collection, segregation, transportation, and processing at the local level.
   - Play a vital role in achieving targets under Swachh Bharat Mission Urban 2.0, such as the 3-star garbage-free city certification.
   - Often face challenges like infrastructure gaps, capacity-building needs, and financial constraints.
4. ***State Pollution Control Boards (SPCBs)***
   - Act as the implementation arm of CPCB at the state level, ensuring adherence to waste management policies.
   - Facilitate industries in adopting cleaner production practices and waste minimization techniques.

सत्यमेव जयते

Ministry of Environment, Forest & Climate Change

Nature Protects if She is Protected

पर्यावरण के लिए प्रतिबद्ध

IN PURSUIT OF CLEAN ENVIRONMENT

CPCB

# Key Ecosystem Policies: Shaping the Future of Waste Management in India

### *Solid Waste Management Rules, 2016*

These rules mandate segregation of waste at the source into biodegradable, non-biodegradable, and hazardous categories. They promote decentralized waste processing, scientific landfill management, and encourage ULBs to establish effective collection and disposal systems.

### *E-Waste (Management) Rules, 2016*

Focused on tackling electronic waste, these rules introduce Extended Producer Responsibility (EPR), requiring manufacturers to manage the lifecycle of their products, and emphasize authorized recycling and safe disposal practices.

### *Plastic Waste Management Rules, 2016 (Amended 2021)*

These rules aim to reduce plastic pollution by phasing out single-use plastics and strengthening EPR for manufacturers and producers to ensure collection and recycling of plastic waste.

### *Swachh Bharat Mission (SBM)*

Launched to eliminate open defecation and improve waste management in urban and rural areas. An extension of SBM, SBM-U 2.0 envisions "Garbage-Free Cities" by implementing door-to-door collection, source segregation, and scientific waste processing, targeting certification of ULBs under the Garbage-Free City Star Rating Protocol.

> *"The greatest threat to our planet is the belief that someone else will save it."*
>
> **– Robert Swan**

# Key Identified Issues

**Key Takeaways:**

- Effective waste management is critical for environmental sustainability, social equity, and resource efficiency, yet challenges persist across disposal practices, worker livelihoods, and circular economy implementation.
- **Environmental Impact** – Toxic waste, overburdened landfills, and improper disposal pollute land, air, and water, worsening climate change.
- **Social Impact** – Waste workers lack fair wages, security, and recognition, while poor public awareness and NIMBY attitudes hinder waste management.
- **Resource Challenges** – Most waste isn't designed for recycling, weak infrastructure limits recovery, and poor EPR enforcement fails to hold industries accountable.

# Evolving waste patterns, overloaded landfills, and inadequate disposal practices are exacerbating environmental damage and adversely affecting our planet.

## Changing Waste Composition

- Toxicity in modern waste, especially multi layer plastics and e-waste, poses significant environmental risks during disposal and recycling processes.
- The breakdown of plastic waste into microplastics has become a pervasive environmental threat, contaminating soil, water bodies, and entering the food chain.

## Landfills at Capacity

- With over 800 million tons of untreated waste occupying existing dumpsites, many landfills are overflowing, leading to environmental hazards such as soil and groundwater contamination.
- Landfills exceeding designed heights damages containment systems, accelerating both leachate leakage and GHGs like methane emissions.

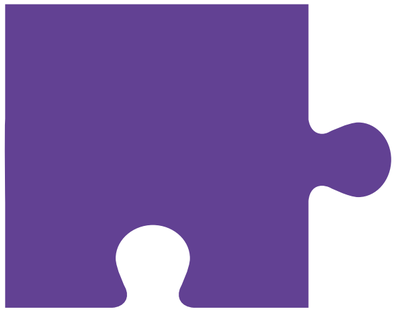
## Low Value Waste

- Approximately 60% of waste generated is of low value, making it less likely to be recycled and more prone to landfilling or incineration.
- The cherry picking problem: Early extraction of high-value recyclables by informal waste collectors disrupts the value chain and leaves recycling facilities with predominantly low-value materials, making operations financially unviable.

## Improper Disposal Methods

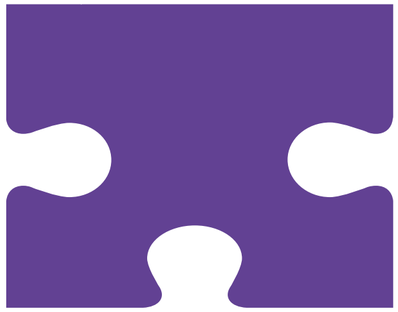
- Open dumping and burning of waste, especially in rural and urban outskirts, release harmful pollutants, contributing to air pollution and climate change.
- Protests from communities near dumping grounds hinder proper waste disposal, as they fear becoming waste repositories for larger urban areas.
- Approximately 8 million tons of plastic waste enters oceans annually.

# Inadequate waste management is driving health risks, livelihood struggles, and behavioral gaps, deepening social inequities



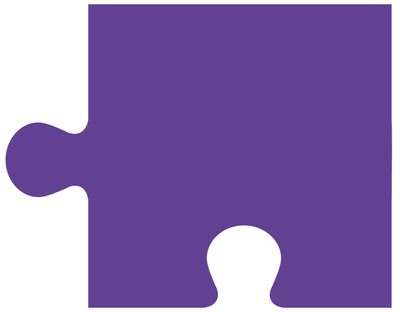
## Health Risks

- Poor waste management practices, such as exposure to toxic materials, disproportionately affect low-income and marginalised communities.
- Women waste workers face additional discrimination, sexual harassment, and often earn less than their male counterparts.
- Manual scavengers and septic tank cleaners face lethal exposure to toxic gases, asphyxiation in confined spaces, and chronic diseases from handling untreated solid and liquid waste in the form of sewage, with hundreds dying annually from hazardous working conditions.



## Livelihood Challenges

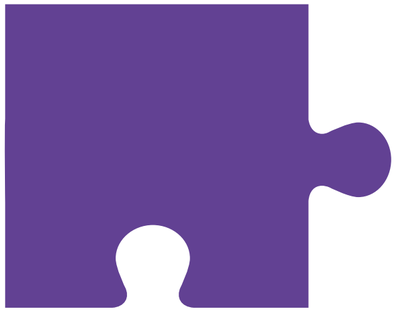
- The informal sector handles up to 90% of waste in some regions but receives minimal recognition or social security benefits. Their knowledge of local waste streams and recycling practices is often undervalued in formal systems.
- Integrating informal workers into formal systems remains complex, with barriers to recognizing their contributions and providing fair compensation.
- Waste workers often face difficulty renting homes due to their occupation, forcing them to live in informal settlements.



## Behavioural Gaps

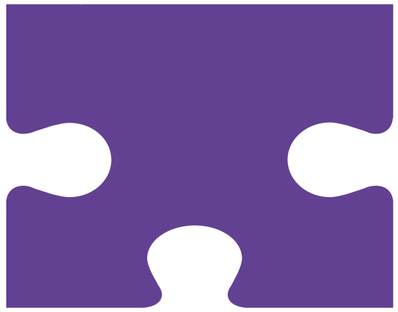
- A lack of public awareness about waste segregation and recycling perpetuates improper disposal practices.
- Insufficient Information, Education, and Communication (IEC) activities, coupled with inconsistent waste segregation messaging across localities, results in poor household compliance and contamination of recyclable waste streams.
- Not in my backyard (NIMBY) attitude: Local opposition to waste facilities, despite acknowledging their necessity, blocks critical infrastructure development.

# Circular economy challenges, limited resource recovery, and weak EPR frameworks are hindering true value creation from waste.



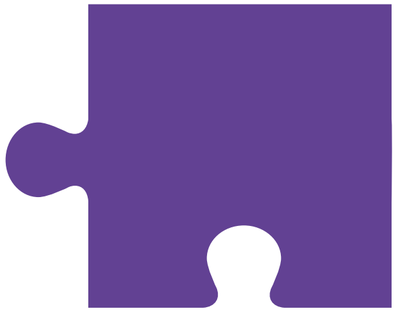
## Circular Economy Challenges

- Misaligned narratives like "waste to wealth" often overlook the reality that consumer products are not designed for reuse or recycling due to complex material compositions.
- While circular economy policies promote this “waste to wealth” narrative, limited processing technology and unstable market demand prevent closed-loop material recovery.
- Recycled materials often fail to meet industry quality standards for reuse in manufacturing, forcing downcycling rather than true circularity.



## Resource Recovery Constraints

- Limited access to Material Recovery Facilities (MRFs) and advanced waste processing infrastructure impedes effective recycling.
- Securing funds for building recycling facilities and micro-enterprise initiatives remains a major hurdle.
- Fluctuating prices for recycled materials make it difficult to sustain recycling businesses and ensure stable income for waste workers.



## EPR (Extended Producer Responsibility)

- Current EPR rates are insufficient to incentivize industries to invest in sustainable recycling practices.
- Producer Responsibility Organizations (PROs) often create monopolistic markets, setting arbitrary recycling rates and limiting fair compensation to waste workers despite collecting fees from brands.
- Absence of transparent material tracking systems allows producers to claim recycling credits without verification, undermining EPR's effectiveness in driving actual waste reduction.

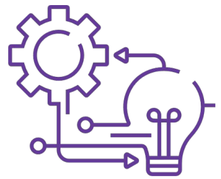
> *"There is no such thing as 'away'. When we throw anything away it must go somewhere."*
>
> *- **Annie Leonard***

# Key Interventions

**Key Takeaways:**

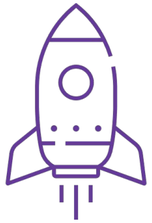
- Effective waste management demands strategic solutions which can be across three levers of change: **on-ground implementation, innovation, and policy advocacy.**
- **Philanthropic support** can reduce open dumping and improve segregation, drive decentralised waste solutions, and create safer working conditions for informal waste workers.
- **Innovations** and emerging technologies can help transform waste into valuable resources, scale circular economy models, and tackle legacy waste more efficiently.
- **Advocacy efforts** backed by philanthropic capital can encourage robust waste management policies, raise public awareness, and strengthen collaborations among governments, businesses, and communities.

# Addressing key issues requires strategic solutions across three levers of change



## 1 ON GROUND IMPLEMENTATION

- Strengthening capacity and infrastructure across the waste lifecycle (collection, segregation, processing, and disposal).
- Supporting waste workers through upskilling, safety measures, and formal integration.
- Establishing decentralized processing units to reduce landfill dependence



## 2 INNOVATION

- Developing and deploying technology for better waste segregation, processing, and circular economy solutions.
- Promoting waste-to-energy technologies and upcycling innovations for resource recovery.
- Tackling legacy waste through innovative methods

## 3 POLICY ADVOCACY

- Advocating for inclusive and sustainable waste management policies and practices.
- Promoting public awareness and behavioral change for better waste management.
- Driving research, knowledge sharing, and government partnerships to scale impact.

# Philanthropic support can be channeled to develop and implement context-relevant solutions that catalyses sustainable waste management

| Levers \ Lenses | Waste and Planet | Waste and People | Waste and Resources |
|---|---|---|---|
| **On-Ground Implementation** | • Reducing open dumping<br>• Improving segregation at the source to minimize environmental contamination.<br>• Establishing decentralized composting and recycling units to lower emissions and pollution.<br>• Investing in remediation of polluted dumpsites. | • Capacity building for informal waste workers, addressing vulnerabilities tied to caste, gender, and class.<br>• Providing health and safety equipment to waste-pickers and sanitation workers.<br>• Setting up safer landfills to minimize health risks for nearby communities. | • Creating infrastructure for waste-to-energy plants and composting facilities.<br>• Supporting the development of more MRF (material recovery facility) for effective disposal and treatment<br>• Enabling community-based circular economy solutions such as reuse and recycling centers. |
| **Innovation** | • Leveraging AI, IoT, and blockchain for real-time waste monitoring, segregation, and tracking environmental impacts.<br>• Supporting innovations like bioremediation to tackle legacy waste and mitigate pollution.<br>• Implement waste mapping systems for transparency and sustainable processing. | • Introducing tech tools (e.g., mobile apps) to empower waste workers and improve wages through better resource collection systems.<br>• Providing affordable, tech-driven waste segregation tools for households. | • Scaling technologies for upcycling waste into valuable products, such as plastic-to-fuel and bioenergy solutions.<br>• Encouraging circular systems through tech-enabled industrial recycling. |
| **Policy Advocacy** | • Advocate for better implementation of environmental policies around waste disposal, especially for hazardous and complex waste<br>• Sharing research on the environmental benefits of sustainable waste management practices. | • Build awareness campaigns that break down the sociological impact of waste<br>• Advocating for the formalization of informal waste workers/ better policies to secure fair wages and social security schemes<br>• Drive PPP models to professionalize informal networks. | • Driving policy-level adoption of circular economy principles, incentivizing recycling industries.<br>• Advocating for waste-to-energy plants, extended producer responsibility, and eco-friendly technologies. |