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WASTE MANAGEMENT IN BASTAR (Case Study)

BRIDGING RURAL AND URBAN LANDSCAPES

Rural & Urban Landscape Free of Dry & Plastic Waste

January 2025

SHRISHTI WASTE MANAGEMENT SERVICES
Committed to Zero Garbage Free City

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CEE
Centre for Environment Education

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(Case Study)

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Rural & Urban Landscape Free of Dry & Plastic Waste

January 2025

Special Mention: Padma Shri Kartikeya Vikram Sarabhai, Mr. Ritesh Sinha, Ms. Jahnavi Ganguly, Ms. Ananya Kumar

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Shri Vijay Dayaram K IAS; District Collector, Bastar, Chhattisgarh

This initiative of establishing Swachh Centre Material Recovery Facility (MRF) and Material Recycling Centre (MRC) at Bastar has proved to be more of a learning for different stakeholders in the areas; and a paradigm shift towards **Swachhata.** Over time, it will emerge as a good example - led through principles of sustainability.

I believe in and encourage people's participation at all levels. This is well envisioned by the Centre for Environment Education (CEE) in its process-driven, gender-sensitive, participatory approach. The process emphasizes is in building local control over different materials as a resource management and decision-making by the villages and panchayat leaderships.

I reiterate that it would only be sustainable and thriving when the incomes, capabilities, and skills of the women-led self-help groups get better, and they can take the entire management and operations upon themselves. CEE is ably supported by SBM-Grameen, Bastar; HDFC Bank (CSR)and Shrishti teams are facilitating this to happen, and we will extend all support from the state administration to CEE and SWMS to reach its goals.

This systems approach unfolds many aspects of Swachhta, e.g., improved inclusivity of Safai Mitras, digital analysis of waste typology, self-driven collection systems, optimization of expenditures apart from generating jobs with better incomes and integrating the informal sector into the formal workforce. I congratulate the SBM- Grameen Team Bastar, HDFC Bank, CEE team, Prabhjot Sodhi, and Akshay Bhoite, finally leading to not just **'Swasth Bastar,' Sabka Bastar and 'Swachh Bastar'.**

Shri Vijay Dayaram K IAS;
District Collector,
Bastar, Chhattisgarh

Shri Prakash Kumar Sarway; SAS CEO Zila Panchayat, Bastar

Today, we see Swachhta as a vision, a way of life, and not an initiative bounded by time, and guidelines; we need to further build upon the momentum achieved in these years and shift towards a more resource-efficient and circular economy approach.

The CEE team, with HDFC Bank support, has made efforts with state DRDA department, and Swachh Bharat Mission (SBM) Grameen is focussed on involving, inspire, motivate all stakeholders, young men, and women to at least adopt one low carbon lifestyle approach in their day-to-day lifestyles. All these small steps over time will pay rich dividends in promoting materials and resource efficiency.

The manner in which the CEE team has envisioned to involve, create, and strengthen the local leadership in villages, panchayats, and blocks is leading to greater ownership in segregation at source, followed by separate collection of different types of dry and plastic waste. Ensuring, pro-activeness in resource recovery has been the underlying principle behind this. I must appreciate SBM- Grameen Bastar, Prabhjot Sodhi ji, Rohit Maskara, Akshay Bhoite, HDFC Bank, CEE team, and Srigopal Jagtap for their tireless efforts in this direction.

Planning and managing of inbound and outbound plastic fractions both at the MRF and the MRC are a salient feature of the project, making it unique in its approach. I wish all engaged in the project the best, for we still have much more to do.

Shri Prakash Kumar Sarway;
SAS CEO Zila Panchayat,
Bastar

Shri Kartikeya Vikram Sarabhai; Director, Centre for Environment Education

With millions of young Indians entering the workforce annually, a consistent shift from rural to urban areas and burgeoning middle class with expectations of quality lifestyles, healthcare and education the consumption of resources is on a rapid increase. An inevitable consequence of this development process is the generation of waste and the problem of waste management. But there is lot of hope as implementers (waste agencies, recyclers) and policymakers (Governments) work together to solve the problem. While the problems are complex and diverse in nature, we all need to work together for this common goal.

CEE in partnership with the Central, State and District Governments, HDFC Bank, Academic Institutions, and the waste ecosystem stakeholders has pioneered in setting up material recovery facilities (MRF) and material recycling facilities (MRC). These small steps are leading ways to minimise the negative impacts from solid and liquid waste to the environment and to human and animal health. With India pioneering to achieve a net zero position by 2070, such initiatives in tandem with private sector, governments, academics and the citizens of the country, are the need of the day. To ensure sustainable, vibrant and continuous growth we together have to minimize the growing landfills. For today they are mounting into small mountains releasing greenhouse gases and affecting the life of the millions of waste-pickers. This case study covers several aspects of a systems approach for sustainable urban plastic waste management and will help local bodies, and all stakeholders to develop efficient waste management plans for their cities, towns and panchayats based on their requirements and guidelines. I congratulate Sh Vijay Dayaram K; DC Bastar, Sh. Prakash Kumar Sarway, CEO Zila Panchayat; Bastar and HDFC Bank for their unconditional and timely support. Prabhjot Sodhi, Senior Programme Director, CEE and his team in the project to have developed the systems approach to dry and plastics waste management. This will serve as a useful tool to help India achieve its vision of Swachh Bharat.

Padma Shri Kartikeya Vikram Sarabhai;
Founder Director,
Centre for Environment Education

Shri Ritesh Sinha; Vice President (CSR), HDFC Bank Ltd.

HDFC Bank under its CSR umbrella 'Parivartan' is committed to making a positive impact on the communities holistically. To achieve this and in a focused manner, our interventions are across five thematic areas - Livelihoods Enhancement & Skill Development, Promotion of Education, Natural Resource Management, Health & Hygiene and Financial Literacy. Our endeavours under Parivartan are united in fostering ownership through community leadership among all stakeholders.

One of our key interventions is to bring innovative and sustainable waste management practices in urban and rural areas that has been a primary concern pan India. Our project with Centre for Environment Education (CEE) is a step in the right direction in setting up sustainable systems for better material resource efficiency. Under this, the established Material Recovery Facilities (MRFs) are not only going to effectively manage solid waste especially plastic waste but will also be catering as ‘enabling mechanisms,’ to ensure real-time data analysis across the waste value chain. Further, appropriate inventory tracking along with ease of communication between a range of stakeholders such as aggregators, bulk waste generators, recyclers, waste management agencies and producers, brand owners etc. is essential for better business decisions. This in turn is very important to ensure the sustainability of the project. The Safai Mitras (waste-pickers) are the one section of society that is the real contributor towards circular economy. Four million waste-pickers across all sectors along with street vendors together their contributions lead to a big boost to the economy Today we need to understand and pause to think that rising inflation and low rate of change in the economic conditions for such waste workers is putting greater stress and strain on the livelihoods of the poor, marginalized in the urban areas. The project's emphasis on these critical softer issues is much appreciated. This case study presents innovative, sustainable, and resource-efficient models of plastic waste management integrating inclusivity and collaboration. Such an ecosystem approach will set the project to new pathways and make Swachhta a reality. We appreciate CEE, our partner for this project. Their continuous efforts in implementing this and also in bringing all the stakeholders together have been integral in making things happen. I would also like to share my gratitude to the Government, Aggregators, Safai mitras and all other stakeholders for their contribution in the project's success.

Shri Ritesh Sinha;
Vice President (CSR),
HDFC Bank Ltd.

Shri Prabhjot Sodhi MBE; Sr. Program Director, Circular Economy, Centre for Environment Education

Establishment and operational efficiencies at the Material Recovery Facility (MRF) and Material Recycling Centre (MRC) will have manifold benefits across the ecosystem of waste, materials use, and consumption. It will not only reduce waste volumes but also result in cost savings, reduced burning of plastics, reduced carbon emissions, and increased incomes for waste-pickers, lastly, put the plastics and other materials into reuse, repair, and recycling, which will then result in reduced use of virgin materials and less extraction of materials.

Therefore, the case study aims to provide **practical, sustainable, and replicable solutions** to manage dry & plastic waste. Still, the industry is in its infancy, and the implementing partners every day find the best ways for better materials management, energy use, optimizing costs, and leadership growth. This is to maximize benefits to ensure MRF and MRC sustainability. The project's examples of management and operations will be understood, discussed, and explored by agencies, companies, self-help groups, and waste picker's cooperatives for scaling-up and replication. Based on actual real-time data, both quantitatively and qualitatively at the MRC and MRF on material use efficiency, recyclability will help and contribute to meeting carbon emissions targets nationally. This approach will also over time result in earning credits under the extended producer responsibility (EPR) for the municipalities/municipal corporations (MCs).

The case study reflects upon how the Office of the District Collector and the state &local administration have contributed to linking the rural and peri-urban areas into the collection systems. Today, this link is proving to have increased the collection of plastics and dry waste. The CEE team, including Shrishti waste management services (SWMS), to reach sustainability, will have to continue to work hard, do materials inventory analysis, carry costs, and lock in capital into materials - to collect the targeted 4-5 tonnes/day of materials. I wish the HDFC Bank, CEE, and SWMS, teams all the best, and many congratulations to all engaged with this project.

Shri Prabhjot Sodhi MBE;
Sr. Program Director, Circular Economy,
Centre for Environment Education

Contents

1. Bastar: A Snapshot

The district of Bastar in the Chhattisgarh state of India is famous for its rich culture, vibrant Dussehra festival, and beautiful environment, but it also faces plenty of challenges. Primary among them is improper and unregulated waste disposal and management; dry and plastic waste, which poses a threat to its pristine natural beauty and its environment.

The genesis of the project lies in a comprehensive analysis of the waste management landscape in Bastar. Recognizing the need for community-driven solutions. CEE embarked on a collaborative journey, partnering with local communities, governmental bodies, and entrepreneurs. The project's formulation considered the unique socio-cultural context of Bastar, ensuring that the interventions aligned with the aspirations and needs of the local population.

Figure 1 & Table 1 gives a snapshot of Bastar district in Chhattisgarh state, India.

Figure 1:*Map of District Bastar*

Table 1: *About Bastar (data 2011 Census)*	
Total Population: **834,375**	Area: **4029.98 Sq. Km**
Female: Male Ratio = **50.5: 49.5**	Forest Area: **24%** of the total land area
Rural Population: **86%**	Urban Population: **14%**
Literacy Rate: **53.15%**	**1017 females per 1000 males**

After an understanding of the societal dynamics, CEE, and its partner's Zila Parishad (ZP), Swachh Bharat Mission (SBM) II, Shrishti Waste Management Services Pvt. Ltd., Block Development Officers, and all related staff identified the potential for change through women's active involvement in waste management activities.

Bastar has many unique features and tourist spots: one ancient temple, and many picturesque waterfalls as can be seen in the few waterfall pictures attached. With tourism influx a need to have proper waste management systems was essential. The emphasis is to ensure tourists need to be made aware of the standards to be adopted for responsible tourism. **Figure 2&3** shows the waterfalls. Also, the efforts are to ensure to have a reduce, reduce, recycle circular approach for materials efficiency across the ecosystem.

Another feature is a multi-lingual society, with more than 6 different languages spoken in the state. Gondi (15%); Halbi (41%); Hindi (11%); Bhatri (27%); Dhurwa (3%) and Chhattisgarhi (3%).

Figure 2: *Tirathgarh Waterfall in Bastar*

Figure 3: *Chhitrakote Waterfall in Bastar also referred to as the "Niagara Falls of India"*

2. The Ecological Significance of Bastar

Bastar, located in southern Chhattisgarh, is blessed with rich natural treasures like waterfalls like Chhitrakote, and Tirathgarh, caves like Kutumbsar, rivers like Indravati, dense forests, and ecological diversity. As one delves into an in-depth exploration of Bastar's ecology, several key factors emerge, highlighting its critical role in biodiversity conservation, climate regulation, and sustainable living.1

a. Biodiversity

Bastar is recognized as a biodiversity hotspot, hosting vast biodiversity in the form of plant and animal species, many of which are endemic to the region. The lush forests of Bastar, comprising both tropical and subtropical elements, provide a habitat for an impressive variety of flora and fauna. From towering Sal trees to orchids and medicinal plants, the biodiversity in Bastar's forests is not just natural beauty but also a source of employment and livelihood for its rural population, which depends on minor forest produce for their living.

The region also hosts diverse fauna, such as leopards, tigers, bears, Pahadi Maina, and various deer species. Along with it, there are plenty of reptiles, amphibians, and insects that contribute to the intricate food webs, underscoring the holistic biodiversity that characterizes Bastar, Chhattisgarh State of India.

b. Bastar's Forests as Carbon Sinks

Bastar's extensive forest cover plays a crucial role as a carbon sink, absorbing and storing significant amounts of carbon dioxide from the atmosphere. This not only contributes to mitigating climate change on a local scale but also holds global importance. The vast expanse of greenery in Bastar acts as a natural

[1]National Library of Medicine Report: *Public Health Implication of Solid Waste (2021)*
International Trade Administration Website: https://www.trade.gov/market-intelligence/india-solid-waste-management

reservoir for carbon, helping to regulate the regional climate by influencing temperature and precipitation patterns.

The intricate relationship between the forests, soil, and atmosphere in Bastar highlights the symbiosis that exists within its ecosystems. Sustainable forest management practices have become imperative to maintain this delicate balance, ensuring that the region continues to serve as a bulwark against the impacts of climate change.

c. River Systems and Aquatic Ecosystems

Bastar's lifeline, the river Indravati, is an integral component of its ecological treasure. These rivers not only serve as lifelines for the communities residing in the region but also contribute significantly to the health of aquatic ecosystems. The flowing waters support diverse aquatic flora and fauna, fostering a dynamic ecosystem that extends beyond the riverbanks.

The rivers of Bastar are not only conduits for water but also contribute to nutrient cycling and sediment transport. Aquatic biodiversity, including various fish species, amphibians, and aquatic plants, thrives in these riverine habitats. Conservation of these water bodies is paramount, not only for the sustenance of aquatic life but also for the well-being of the entire ecosystem that depends on them. It is important to note that unregulated plastic waste generation and accumulation lead to plastics and micro-plastics2 finding their way into these rivers, harming them in the process and reducing their carrying capacity.

d. Traditional Ecological Knowledge

The native communities in Bastar have nurtured a deep and symbiotic relationship with their natural surroundings for centuries. Their traditional ecological knowledge passed down through generations, is a valuable resource for understanding and conserving the region's biodiversity. The native practices through oral, practical, and cultural methods have passed down the generations. Like that of sustainable agriculture, herbal medicine, rituals and ceremonies, traditional arts and symbols (rock paintings, carvings, beadwork, pottery and textiles) dances, sacred sites, landscapes (mountains, rivers, forests) and practices, that reinforce their beliefs and histories contribute to the resilience of Bastar's ecosystems.

Preserving and integrating this traditional ecological knowledge has led into contemporary conservation efforts is crucial for maintaining the ecological balance of Bastar. Recognizing the values of language preservations carry deep meaning and concepts that are integral to traditional knowledge. Native legal systems, based on customs and traditions, ensure that traditional knowledge is respected protected and transmitted through communities and which leads to sustainable development strategies that harmonize with the region's natural dynamics.

e. Conservation Challenges and Opportunities

While Bastar's ecological significance is undeniable, it faces many challenges that threaten its delicate balance. Deforestation, habitat fragmentation, and unsustainable resource extraction pose immediate threats to the biodiversity of the region. Climate change-induced shifts in temperature and precipitation patterns further exacerbate these challenges. However, amidst these challenges lie opportunities for innovative conservation measures.

Community-based conservation initiatives, sustainable forestry practices, and the integration of traditional knowledge into conservation strategies can serve as effective tools for safeguarding Bastar's ecological integrity. Collaborative efforts involving local communities, government agencies, and environmental organizations are instrumental in addressing the complex conservation needs of the region.

f. Cultural and Economic Dependence

The ecological significance of Bastar is intricately woven into the cultural fabric of the native communities residing in the region. The primitive tribes, such as the Gond, Maria, and Muria, have developed unique cultural practices that revolve around their deep connection with nature. Rituals, festivals, and daily life are

[2]**Microplastics** are fragments of any type of plastic less than 5 mm (0.20 in) in length, according to the U.S. National Oceanic and Atmospheric Administration (NOAA) and the European Chemicals Agency.

inter-woven with nature-centric beliefs and practices, reflecting a deep sense of respect for the environment. The communities rely on the natural resources provided by the region, including minor forest products, non-timber forest products, agriculture, and traditional handicrafts. The sustainable use of these resources is not only an economic necessity but also a cultural imperative.

3. Introduction to Integrated Waste Management

Now a paradigm shift in waste management is felt. **Nearly 1.43 lakh ton per day (TPD) of municipal solid waste (MSW) is generated in India.** Of this, 1.11 lakh TPD (77.6 percent) is collected and the balance of 35,602 TPD (24.8 percent) is processed. In addition, according to the Central Pollution Control Board (CPCB), India generates close to **25,940 TPD of plastic waste, of which 15,342 TPD remains uncollected. The desired objective of zero waste is a challenge for all to achieve** with waste generation in urban India increasing by 5 percent every year because of a growing population, increased incomes, more choices, and lifestyles with higher packaging and consumption. It is estimated that 50% of the Indian population will be living in cities by 2050; the increase in the quantum of waste can be imagined.

All engaged in waste **(considered resource)** have a huge 'opportunity'. As per the Ministry of Environment, Forest, and Climate Change (MoEFCC), MSW generation will reach 4.5 lakh TPD by 2031 and 11.9 lakh TPD by 2050. Centre of Science and Environment (CSE) assessment of waste generated by cities, the biodegradable fraction varies from 40-70 % of the total. The non-biodegradable fraction (comprising both recyclables and non-recyclable dry waste) varies 40-20 % for different Indian cities in 2018 which will increase by 100% in 10 years. The problem is gigantic!

Centre for Environment Education (CEE), in partnership with HDFC Bank, Swachh Bharat Mission, Urban Local Bodies, Department of Rural Development & Panchayats, and State Pollution Control Boards, is implementing a project on *"Rural & Urban Landscape Free of Dry & Plastic Waste".* This initiative is envisioned to create partnerships across the ecosystem of waste flow in villages, panchayats, and blocks of the district Bastar, Chhattisgarh.

4. Project Vision

The project envisions rural and urban areas **free of plastic pollution**. To make this a reality, it is needed to spark a fundamental change in basic assumptions: **Reimagine the Way We Produce, Consume, and Dispose Plastics,** and improvise the ways we do our work and live our lives.

Through policy support, innovation, demonstrations of circularity approaches in minimization of waste, plastics reuse, reduce and recycle supported by materials use efficiency through segregation methods stands apart in the ecosystem. Added capacity development, advocacy, networking, partnerships, and financing, at CEE we are endeavoring to fit in with Government of India's **Swachh Bharat Mission I and Swachh Bharat Mission II priorities, integration and safe and scientific disposal of all biodegradables and non-biodegradables through small pilots in 10 rural and urban landscapes.**

The project endeavors to learn from best practices from other initiatives in-country and overseas ongoing successful approaches and models in India. This model is as urgent, complex, and multidimensional as the use of single-use plastics crisis; dialogues and platforms of actions are vital to strengthening engagement with diverse and divergent stakeholders. The project is learning from the pro-active approaches for institutional and program sustainability to promote a more circular economy approach.

The project believes in creating locals' ownership in urban-rural spaces through community leadership, implementing partners to policy formulation. Ensuring lessons from all stakeholders along the supply chain to recognize that plastic waste impacts health and the environment if not managed effectively. The project believes in the vertical integration of upstream and downstream solutions through the strengthening of 'entrepreneurs' called as service provider partners in its project.

The project encourages the adoption and implementation of a systems approach to plastic pollution through 'entrepreneurs', integrating actions at local levels. Also, across various sectors through the entire plastic value chain to move the world towards zero plastic pollution. Urge governments and stakeholders to support setting up adequate collection infrastructures, facilitating the establishment of related self-

sustaining funding mechanisms, and providing an enabling regulatory and policy landscape. Informal sector investments, integrating a focus on waste pickers (safai mitras), small aggregators, and informal recyclers for inclusivity, health, livelihoods, and their children's education & financial inclusion. More emphasis is given to areas like health insurance, Aadhar Card, etc. Also, consider how the project can support more brands, NGOs, and their partners to reach out to more Safai Sathis inclusivity.

5. Project Background

The project aims to link with **Stockholm's 50+ principles addressing Nature, Climate, and Pollution.** It makes the approach and processes effective by enhancing sustainable Non-Biodegradable (Dry) Waste Management practices through an **interdisciplinary** (different stakeholders), **integrated** (different processes), **multifaceted** (business approach), and **holistic model** (segregation, collection, optimizing transportation, processing, and sustainable recovery and recycling) and safe disposal with a clear emphasis on the different elements of circular economy approach - reduce, reuse, refuse, recycle, refurbishing and repair, recover and recycle.

Plastics seen as a resource, and the project is also sharing the importance of segregation of plastics to realize benefits. At the same time, project feels that some packaging and problematic items on the market needs to be eliminated to achieve a circular economy across the sector through redesign, innovation, and new delivery models in the project.

The project initiatives synergize the policies, guidelines, and links with the Swachh Survekshan program of the Ministry of Housing and Urban Affairs (MOHUA) and Ministry of Environment, Forest, and Climate Change (MoEFCC) to minimize negative impacts and risks to the environment (stop littering), citizens' health, and the better quality of life in urban and rural spaces in India. This be made effective by **enhancing sustainable business models at all levels - segregation, collection, optimizing transportation, processing, and sustained recovery, recycling, refurbishing, repair, and reuse-circular economy approaches.**

It will strengthen systems to curb plastic pollution, which is already threatening the achievement of UN Sustainable Development Goals (SDGs). While none of the 17 Sustainable Development Goals (SDGs) has plastic pollution as a main theme, plastic pollution affects SDGs 3, 6, 11, 12, 13, 14, and 15. Plastic pollution is a global challenge that requires international cooperation and global partnerships to collectively deal with (SDG 17).

The project conceived in 2021 through lessons from past experiences, collaborative efforts with local government authorities, and the active participation of communities of practice i.e., Citizens, Recyclers, and Safai Mitras. The project aligns with the Solid Waste Management Rules (SWM) of 2016 and the Plastics Waste Rules of 2016 and 2018, and various amendments, thereafter, including single-use plastics. In the project, the inclusivity of small aggregators, informal recyclers, and waste pickers (Safai Mitras) institutionalized and within the respective governance mechanisms made to affect improved social conditions and a better quality of life. Wherever relevant, reuse business models explored as a preferred **'inner loop'**, reducing the need for single-use plastic packaging.

The project is focusing on collecting all types of plastics and dry waste from various sources and to maximize the collection, give more balanced returns to the informal sector. Have better material flow efficiency, and partner Municipal Corporations/Councils and Municipalities (ensuring the cities are clean) as in **Table 2.**

Sources	Typical waste generators	Types of solid waste
Residential	Single and multifamily dwellings; Multi storey apartments etc	Paper, cardboard, plastics - multi-layered, flexible and rigid, textiles, glass, metals, electronics and later given to authorized persons and other dry waste
Commercial	Stores, hotels, restaurants, markets, office buildings, godowns etc.	Paper, cardboard, plastics, - multi-layered, flexible and rigid, cloth, glass, metals, and other dry wastes, electronics and later given to authorized persons

Institutional	Schools, government centres, hospitals, business enterprises, prisons.	Paper, cardboard, plastics - multi-layered, flexible and rigid, glass, metals, and other dry wastes, electronics and later given to authorized persons
Municipal Services	Street cleaning, landscaping, parks, beaches, recreational areas.	Paper, cardboard, plastics - multi-layered, flexible and rigid, cloth, glass, metals, and other dry wastes, electronics and later given to authorized persons

Table 2: *Sources and Types of Dry waste collected by the project*

In recycling (materials generally undergo a mechanical transformation) the emphasis is based on the circular economy principles of reducing, reusing, refurbishing, recovering, recycling, realigning and reparability of the materials in the most effective ways to prevent the generation of waste, residues, emissions and affluents.

The project's concept is to encourage all stakeholders in the waste ecosystem, promote processes for improving material use efficiency, and create a sustainable & safe environment across all forms of dry and plastic waste fractions. The concept aptly explained in the **six different project process stages** – Materials; People; Skilling; Systems-Processes; for greater sustainability amplified through information (knowledge) products as shown below mentioned **Figure 4.**

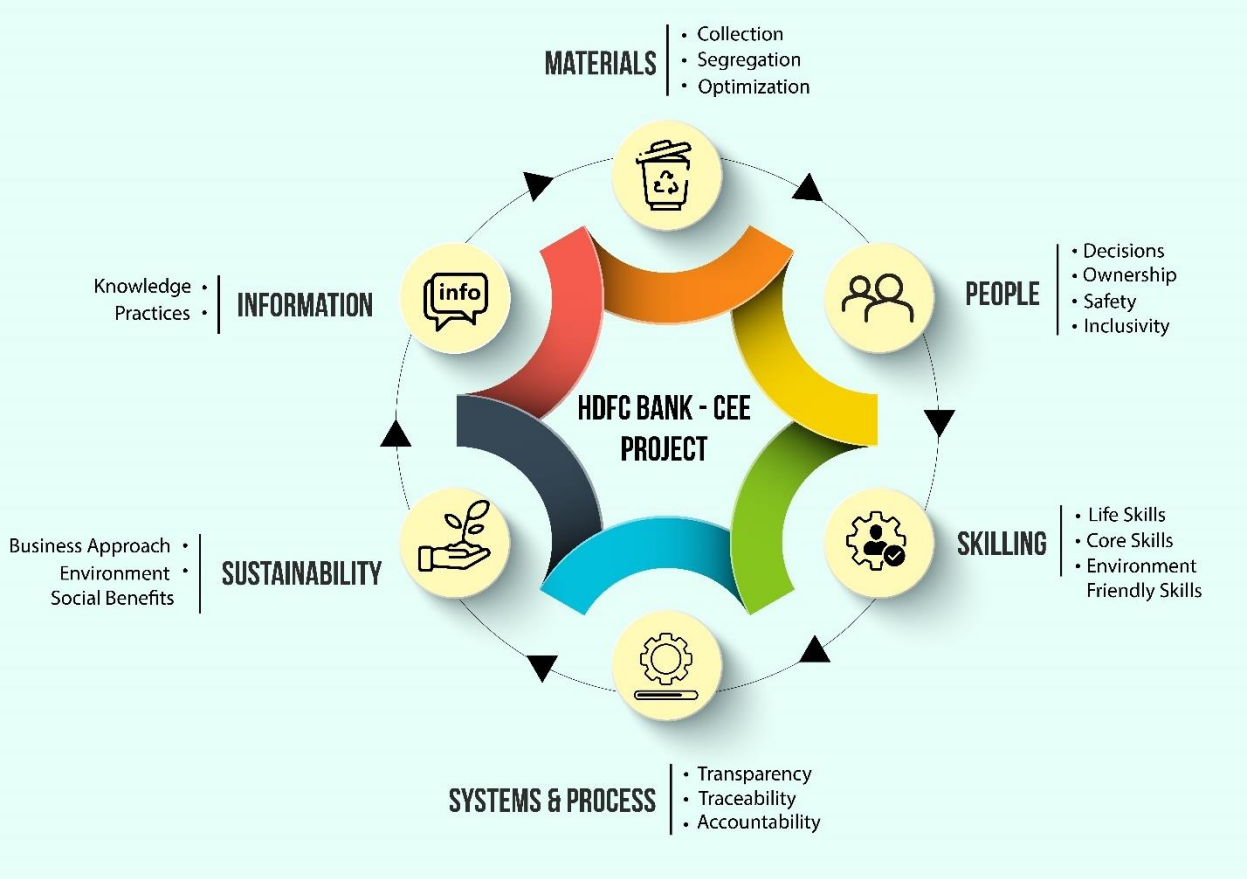


Figure 4*: The different process stages of the project – Circular Approach*[3]

During implementation, the project and its partners continue to raise citizens' consciousness about using plastic responsibly. The project, through focused discussions and implementation strategies, is mainstreaming the inclusion of informal sector performers (Safai Mitra's, small aggregators, and informal recyclers), ensuring a sustainable path ahead. Having, partnerships with the different plastic manufacturing and recycling associations, i.e., the Material Recycling Association of India (MRAI), All India Plastic Manufacturers Association (AIPMA), etc has strengthened the effectiveness of the partnerships. The project, in dialogue with practitioners and policymakers, is addressing to minimize the use of some of the problematic or unnecessary plastic packaging; and being represented through redesign and innovation as a priority with stakeholders in the plastic fraternity.

[3]The reference is from the article by Prabhjot Sodhi, Sr Program Director (circular Economy), CEE. Rights reserved.

The project has introduced innovative management techniques such as collection and drop points in markets and cities, (Plastic Lao-Thaila Pao), promoting reverse logistics, and efficient digital vending machines {collecting bottles and thin multi-layered plastics (MLPs)}. This has added with robust, easy-to-understand monitoring systems at all levels in the project only to ensure and to maintain traceability and transparency in operations.

Shri Amit Bhatiya; CEO Janpath Panchayat; Jagdalpur

"Panchayat acts as a Catalyst for Change & serves the pivotal role in spearheading waste management initiatives. The active involvement of local leaders and their ability to mobilize community support emerged as a driving force behind successful waste reduction efforts. By working closely with the community, we are educating and raising awareness about the importance of waste management.

This collaborative approach has been led by Swachhata Didis and has resulted in a significant decrease in waste generation and improved cleanliness in the area by establishing village-level linkages & proper waste transportation systems. I congratulate SBM- Grameen Bastar, HDFC Bank, CEE & SWMS team for their contribution towards this sector which has contributed towards a more sustainable and environmentally friendly community. Their dedication and hard work have set a positive example for other regions to follow, proving that with the right leadership and community involvement, waste management can be effectively tackled."

Srigopal Jagtap; CEO & Founder, Shrishti Waste Management Services Pvt. Ltd., Indore

"*Our Material Recovery Facility Center (MRF) in Bastar stands as an example of innovation and technologies that facilitate the efficient sorting and recovery from valuable recyclable materials. Beyond its technological advancements, the facility has become a facilitator for positive change in the livelihood of underprivileged, kabadiwala, recycler and local community by generating numerous job opportunities, thereby contributing to regional economic development."*

6. Project Strategy

In each of the cities in the project, like Bastar; the following are the **key components** of the project strategy **(Figure 5)**

a. Create baselines in the city:

The project at the start develops a broad baseline in the city to understand dry and plastic waste management operations, management, stakeholder participation, and disposal systems in a city, peri-urban or rural areas.

b. Encourage, and connect sustainable decentralized waste collection centers (DWCCs):

The project promotes to decentralized waste collection centers (DWCCs) in the allocated wards in the city on a pilot basis, locally managed by the self-help groups (SHGs), cooperatives, or by the MCs (differently in different cities). The project focused on promoting systemic approaches how to mainstream small aggregators, waste pickers, informal recyclers, and women's SHGs. Link the Material Recovery Facilities (MRF) and Material Recycling Centre (MRC) management and operations at the city level through implementing partners as **entrepreneurs**. The project since start has put emphasis that in 3-3.5 years' time, they (CEE) would withdraw leaving **sustainability plans in actions** in the rural and urban landscapes with the municipal corporations or Zilla Parishads, and Panchayats.

c. Establish SWACHH Centres (MRFs & MRCs):

Integrated Material Recovery Facilities (MRFs) and Material Recycling Centres (MRCs) were established under the project in partnership with the respective institutional arrangements in the rural-urban spaces to highlight a sustainable circular economy approach. This enables traceability and transparency systems for better applicability in extended producer responsibility (EPRs) for producers, importers, and owners.

d. Inclusion of the Informal Sector:

Ensure and empower Safai Mitras (SM), recyclers, and aggregators (Kabadiwalas) for inclusive growth and social security measures adopted for vulnerable, stressed communities in pilot areas.

e. Create Technology & Digital Applications:

Fit in stakeholders along the waste value chain and combine material flow efficiencies through digital app-based models, setting up monitoring systems, internal reporting, and capacity-building for better traceability at all levels.

In every city, town, or rural and urban area, the project enters into agreements with the Municipal Corporation/Municipality or CEO Zila Parishad. The agreement clearly defines the roles and responsibilities between CEE and the Government Institutional agency. Thereafter the project endeavors to hire the services of a service providers (entrepreneurs) who enacts all programs in the city or town. Clear roles and responsibilities defined between CEE and the Service Providers are more performance based. This similarly done in the case of Bastar.

The project strategy involves the collection of waste from **waste generators** - including consumers, institutions, organizations, schools and colleges, municipalities, communities, industries, hotels, restaurants, households, commercial places, etc., as explained in **Figure 5** the waste in the sourced from urban and peri-urban areas both through the **formal** (municipal vehicles, SLRM[4] centers) **and informal** (waste-pickers, aggregators, etc.) manner. *The project's belief that all stakeholders needs to benefit in the ecosystem – the collected waste sources is* ***purchased with a compensation value/price at all levels.***

Since formalized waste collection system is not prevalent in rural areas as it is dependent on a cycle-driven *kabadiwalas* who only takes market driven plastics and dry waste. The project used a complementary model approach in which women from SHGs in rural areas could collect waste and be compensated along with the *ongoing kabadiwalas*. Project also impressed upon the convergence of collection of waste from both peri-urban and rural areas by the entrepreneurs, kabadiwalas, individual safai mitras, and designated SHG groups to the Material Recovery Facility (MRF). The *process of zero waste is being encouraged at the project level, where no waste is preferred to be sent to landfills or dumping sites.*

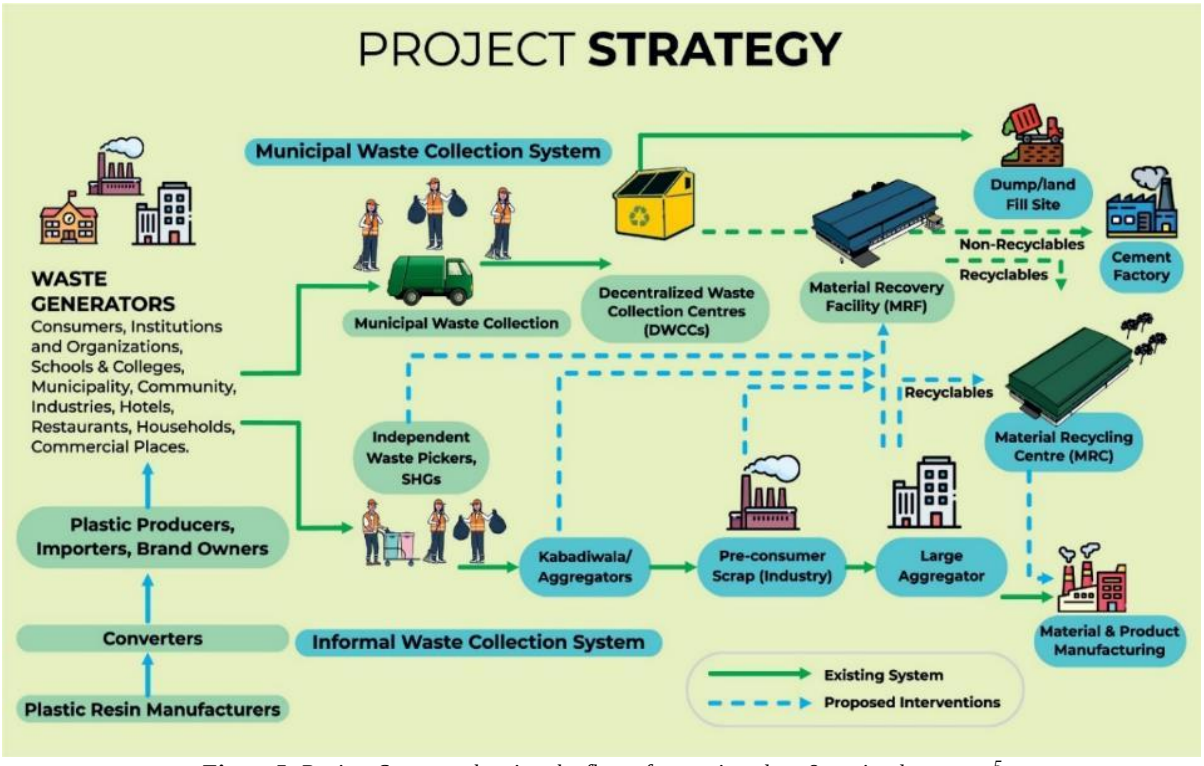


Figure 5: *Project Strategy showing the flow of waste in urban & peri-urban areas*[5]

[4]The project in case of Bastar purchases all types of waste at reasonable agreed prices. These are also revised as per the requirements.

[5] Rights reserved by Prabhjot Sodhi, article published as Head (CE), UNDP. New Delhi.

A. The Problem of Dry and Plastic Waste in Bastar

The access to dry and plastic waste in rural areas like Bastar poses multifaceted challenges, significantly impacting the environment and the well-being of the communities dwelling in these regions.

One of the implications are the visual degradation of the pristine rural landscapes, traditionally nurtured with natural beauty. The accumulation of plastic waste in open spaces, along water bodies, drinking water sources, and within agricultural fields creates an eyesore, and plastics burnt in an unsafe manner, sometimes even used as fuel for cooking.

The presence of plastic waste in water ecosystems also poses threats to aquatic life, disrupting the delicate balance of local ecosystems and affecting fisheries that may be vital for the sustenance of rural communities. Considering the environmental aspect, the release of pollutants through unrestricted waste dumping may lead to the generation of not just visual displeasure but also the emissions of greenhouse gases, contamination of water bodies and resources, the risk to both human-animal health, threat to soil health & contamination of arable land[6] poor land productivity and breakdown of plastics into microplastics[7].

The social and economic dimensions of the issue are equally significant. Rural areas, characterized by close-knit communities, experience a breakdown in social cohesion when plastic waste becomes a pervasive problem. Shared areas, once citizens spaces for gatherings and cultural events, became dumping grounds, contributing to a sense of neglect and despair among community members. Additionally, the economic impact is palpable, as the degradation of agricultural land and water sources directly affects the income and food security of rural households.

The health implications of unmanaged dry and plastic waste in rural settings are emerging fast. Open dumping of waste becomes a breeding ground for disease leading to increased risks of waterborne and vector-borne diseases.

The gender dimension of waste management in rural areas is noteworthy. Women, and children who frequently bear responsibility for household chores, including waste disposal, are affected by the consequences of mismanaged waste. Exposure to harmful substances during waste handling, coupled with the social stigma associated with waste management, exacerbates gender inequalities and limits the economic opportunities available to women.

In terms of education, environmental degradation caused by the presence of dry and plastic waste can have long-term implications for the younger generation in rural areas. Children growing up in environments marred by waste may experience a diminished quality of life and restricted access to outdoor spaces, limiting their exposure to nature and hindering their overall development.

Collaborative efforts between government bodies, non-profit organizations, and the private sector are vital for implementing sustainable waste management systems that cater to the unique needs of rural settings. The rural landscapes require not only environmental interventions but also the empowerment of communities to reclaim their spaces and create a sustainable future that harmonizes with nature.

Figure 6 below shows the plastics and dry waste littered by communities in and around open spaces.

[6] Leachates from the Landfills entering soils.

[7] A report by PAI Associate International suggests that communicable diseases might be transmitted by flies resting on dumpsites and places where waste accumulates. These include ailments such as typhoid, dysentery, cholera, sandfly fever, conjunctivitis, tuberculosis, pneumonia, tetanus, whooping cough, and numerous others.


Figure 6: *The Dry & Plastic waste in the open areas.*

B. Process of Waste Collection Systems in Bastar

The **project in the rural and urban areas** has a firsthand approach involving communities and a more systems approach as explained below.

a. **Collection of the dry waste to the village, panchayat storage:** Dry & plastic waste is collected (every 7-8 days) from the households (collection of user charges for the services from HHs and others under SBM-G guidelines is a challenge and the project is finding ways to address it) in villages, panchayats via hand-carts, E-rickshaws to the storage points by the women SHGs. Women SHGs are duly onboarded by the panchayat in the project. All modalities are agreed upon in the village, panchayat, and decision-making meetings, and properly documented – using social mapping diagrams drawn in villages and panchayats. A more systems approach followed and much of waste purchased on the prevailing rates in the region to function as an incentive for collection.

b. **Support and strengthen the processing of waste at storage points:** The collected waste segregated and sold by women SHGs to the collectors – Kabadiwalas, implementing partners. This segregated into biodegradable (wet) and non-biodegradable (dry) waste; followed by processing of wet waste into compost. The segregated dry & plastic waste is then ready for transportation to the MRF. Proper records maintained at the storage points and all weighing is done for every dispatch made.

c. **Transportation of waste from village, panchayat to block:** The dry and plastic waste weighed, transported (hand scale), and duly and jointly recorded in the registers. This then transported to the block on the agreed date and time. Proper receipts kept at the centre and one copy is given to the MRF person and waste collector. The purchase rates, and payment terms agreed from time-time.

d. **No Burning and Littering of Waste at the storage points:** Efforts made by the SHG members to ensure there is no littering and burning of waste at the storage points. Timely and regular IEC activities done within the Swachhta Guidelines at the village, panchayat, and entire ecosystem. Various knowledge products distributed to SHGs through regular meetings & discussions.

e. **Agreements with recyclers for recycling, end-of-life disposal:** The segregated waste then processed (bailed and shredded) and sold to the concerned recyclers, road making or for co-processing for granules making through a proper weighment at the weigh bridge; slips and invoices with GST as applicable. Non-recyclables sent for co-processing to cement plants and the minimal sent to dumping/landfill sites.

The waste flow from the rural villages, panchayats and blocks and including peri-urban areas to the MRF shown in **Figure 7** below.

Figure7: *Waste flow from the rural villages, panchayats, and blocks to the MRF*

In the **urban areas** waste is encouraged to be segregated at the source in households and their proper collection, storage, and transport to their primary segregation at the Solid liquid Resource Management (SLRM) centers or decentralized waste collection centers (DWCCs). Independent waste collectors and women from the SHGs in the peri-urban and rural areas, are also encouraged to sell their waste at the Swachh Centre – MRF.

The waste at the MRF segregated into more than 15-20 fractions. The non-recyclables or the Refuse Derived Fuel (RDF) separately bundled to be sent to the cement plants for co-processing. Efforts made to clean and properly pack the RDF separately. Other wastes like paper, cardboard, paper, glass, scrap, rubber, tires, shoes etc are sent to the recyclers separately.

A most important aspect is that one must do the inventory management effectively to get the correct pricing for all the products; the materials are usually dispatched in 05 tons or 10 tons capacity to optimize costs. Real-time data maintained at the MRF. The three types of plastics, the rigid HDPE, the flexibles, thin and multilayered plastics (MLP), recycled at the MRC which is established adjacent to the MRF. This entire

cycle involves responsible communities and necessitates the involvement of all stakeholders to responsibly recycle waste. Contiguous MRF and MRC sheds saves lot of transportation, loading and unloading costs thus maximizing the saving of wasteful expenditures otherwise.

The thin LDPE and MLP plastics shredded into 2-4 mm pieces as per the Central Road Research Institute (CRRI) guidelines for road making. The project is enabling use of a semi-automatic approach. It is important to note that in Bastar, there is abundant labor that is willing to undertake manual work.

C. Role of Informal Sector Workers in Bastar

The surge in population and rapid urbanization in India has led to a significant increase in municipal solid waste (MSW) generation, posing environmental and health challenges. With urban India producing 0.15 million metric tons per day of MSW, the existing policies and management strategies are projected to fall short, resulting in a staggering 436 million metric tons by 2050. The responsibility for sound and economical solid waste management (SWM) falls on urban local bodies (ULBs), but inefficiencies persist due to various factors.

Inefficiencies in Formal Waste Management:
Formal waste management enterprises need more funds, legal guidance, and sectoral development. This has resulted in the informal waste sector playing a crucial role in recovering materials from municipal waste. In India, only 19% of the total waste generated is treated, with more than 80% disposed of unsustainably. Lack of social awareness, political hindrances, and inadequate infrastructure contribute to lower recycling rates, emphasizing the importance of the informal sector.

A. Integration of the Informal Sector in Solid Waste Management:

The informal sector in SWM includes waste pickers, itinerant waste buyers, small junkshop dealers, and waste godowns owners. While not officially recognized, these stakeholders significantly contribute to waste recycling practices. In India, informal workers recover millions of tons of newspaper, cardboard, glass, metal, and other recyclable materials annually, pivotal in achieving recycling rates that meet or exceed international standards.

B. Quantifying the Informal Sector's Contribution:

Despite challenges in estimating the number of informal workers, reports suggest that approximately 2.7 million urban poor engage in collecting 15–20% of MSW generated in India. Waste pickers alone account for 0.1% of India's urban workforce. Reliable statistics underscore the significance of the informal sector, which is likely underestimated due to the involvement of informally working companies and reprocessing units.

C. Classification of the Informal Sector:

The informal waste sector can be classified into **four groups based on function**: **(Figure 8)**

- **Stage 1 Waste pickers & Buyers** (collectors from dustbins and landfills),
- **Stage 2 Small Junk shops** (aggregate materials with minimal processing),
- **Stage 3 Big Scrap Dealers** (require large storage capacities and specialize in single-source categories), and
- **Waste Processors** (convert post-consumer scrap into secondary raw materials).

In rural areas like Bastar, where formal waste management faces challenges, the informal sector emerges as a vital force in solid waste management. The dedication of waste pickers, wandering waste buyers, and other informal workers contributes significantly to recycling rates, resource recovery, and the overall sustainability of waste management practices. Recognizing and integrating the informal sector into formal waste management strategies is imperative for achieving environmentally sound and economically viable solutions in rural and urban landscapes.

1) **Level 1 Waste Pickers & Buyers:** informal sector workers who may or may not have means of transportation and incur zero or minimal input costs. These stakeholders primarily collect *from roadside dustbins, landfills, and, sometimes, households and are referred to as Tina-Loha-Plastic*

Walas in Bastar. They sell the collected waste in small waste shops practically on a daily basis at basic low prices as they need funds on daily basis for livelihoods.

2) **Level 2 Small Junk Shops:** These stakeholders are informal sector workers *with little storage space and aggregate material from level 1 waste pickers and buyers.* They do minimal or no processing of waste materials collected by them. Sell them at a small margin and have links to three to five zero-waste pickers to the big scrap dealers – large Kabadiwalas. They sell on a weekly basis largely

3) **Level 2 Big Scrap Dealers:** The persons in this category of the informal sector are largely Kabadiwalas (aggregators) who have *large storage capacities to keep materials and supply them according to market demand.* They have storage spaces that are many times larger than those of level 1 recyclers, and they aggregate materials directly from both level 1 & and other commercial sources in bulk. Typically, they specialize **in a single-source category of materials** and get their supply of reusable waste in bulk from small Kabadiwalas. In some cases, they might keep it to produce secondary raw materials in an informal manner.

4) **Waste processors:** Persons or entities who buy specific grades of post-consumer scrap material from Level 1 and 2 and convert them into secondary raw materials for the manufacturing industry. Many times, they function without registration with the state pollution control boards. Some have **legal registrations** for **doing recycling**. (i.e. that they have filed *Consent to Operate (CTO)* and *Consent to Execute (CTE),* which ensures the persons follow pollution norms and file returns).

The Project is putting efforts to bring the informal to formal recycling operational entities.

Figure 8: *The Informal Sector Workers Pyramid Scheme*

7. Implementation: Rural-Urban Linkages

Recognizing the need to work holistically with focused attention on various angles, both in rural and urban areas, it was recognized that working in a single direction or a single dimension will not be sufficient. Hence, the approach strategized to work on multiple fronts and accepted the need to adopt a multidimensional approach.

Figure 9 Innovative & Integrated Waste Collection & Management shows how the flow of waste occurs in rural and urban areas in Bastar.

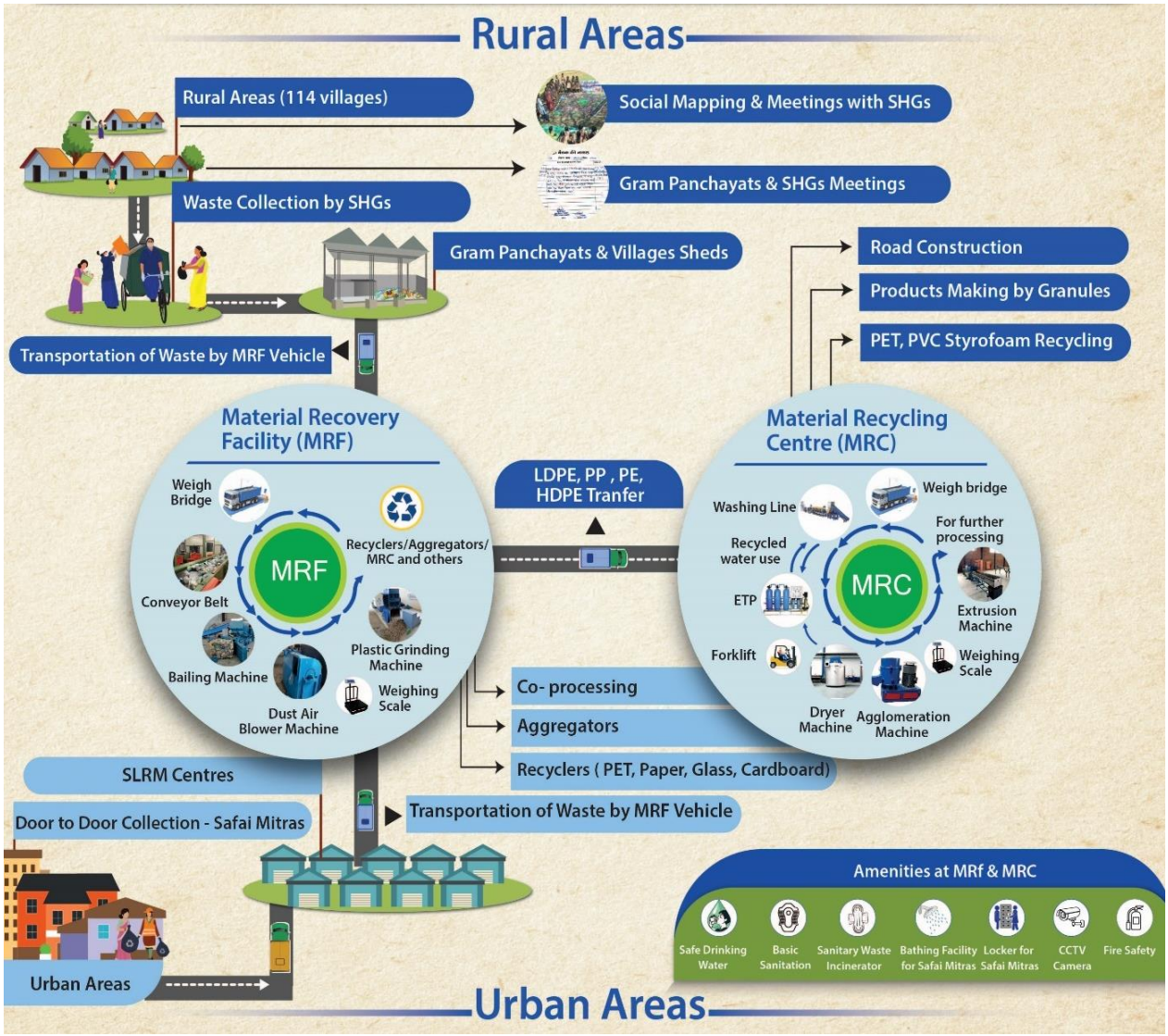


Figure 9: *Innovative & Integrated Waste Collection & Management*

After PRAs are conducted, the task of awareness generation in the villages by the coordinators who visit these villages and undertake various IEC activities relating to Swachhta begins. This helps gain the trust, and common understanding (of what and how to do actions) in villagers and panchayats. Understanding and analyzing the project systems for waste collection and also the payment systems for the collected waste to the SHG members

Message from Smt. Jayanti Kashyap, Sarpanch, Adawal Gram Panchayat

"To achieve a clean Panchayat, all the villages should focus on practicing waste segregation. Swachhata Didis focuses on village-level waste management through awareness meetings, educating the community on non-biodegradable waste with different segments of people/groups in the village like households, tea stalls, shopkeepers, and school children to achieve sustainable behavior. I acknowledge efforts made by Zila Panchayat; Bastar, HDFC Bank, CEE & SWMS towards Swachhata."

8. Institution Building through Participatory Rural Appraisal

Before formally onboarding any village into the waste management project, *a participatory rural appraisal (PRA) system is systematically tracked*. This inclusive approach involves engaging with the local community to understand their needs, perceptions, and challenges. This information is seen in the context of waste management practices. PRA sessions involve asking the rural communities to prepare maps that facilitate collaborative decision-making, ensuring that the project aligns with the specific needs and

dynamics of each village. In the rural areas of Bastar, *social mapping exercises* are undertaken with the support of *SWMS – CEE service provider partner* facilitated by CEE teams[8]. *These exercises have been done at 63 locations before onboarding those villages into the project.*

A typical Participatory Rural Appraisals (PRA) session involves listening to and understanding the socio-cultural context on the village/panchayat from the panchyat heads-sarpanches, Ward Panch, Sachiv, SHG Groups, Anganwadi workers, and other important village stakeholders. Basic information about the village includes its demography (population, number of households, wards, institutions, and location of institutions like schools and temples), as well as the location of ponds, wells, canals, and similar. With the information, the social map of the village is prepared to understand the **inter-relationships between communities and the social power structures, decision-making processes, and leadership roles.** The mapping is done over 3-4 hours, it defines[9] the distribution of households, and different people to understand how they interact and connect with resources access and use. In the PRA undertaken, information is also collected about the source and places where waste is accumulated to identify focus areas where more work needs to be done **(Figures 10 & 11).** Through this process, a map is prepared to identify priority areas. Taking this as a base, further activity is undertaken, like sensitizing the villagers about Swachhta and its merits. **This entire exercise culminates in the preparation and launching of the collection of waste in the villages and panchyats. How the movement and all other decisions are taken in such meetings. Minutes are minuted.**

***Figure 10**: Social Mapping being undertaken in Niyanar Village, Bastar*

***Figure 11**: Social mapping being undertaken in Gram Panchayat, Adawal, Bastar*

[8]Akshay Bhoite, trained in conduct of the social mapping exercises leads the team. CEE has developed standard operating procedures at ll levels to have the systems approach.

[9] Paper Mr Sodhi has developed proper PRA Guidelines and Strategy.

After PRAs are conducted, the task of awareness generation in the villages by the coordinators who visit these villages and undertake various IEC activities relating to Swachhta begins. This helps gain the trust and common understanding (of what and how to do actions) in villagers and panchayats. Understanding and analyzing the project systems for waste collection and also the payment systems for the collected waste to the SHG members.

A. Rural Areas

After this sequencing of social mapping **(Figure 12)**, awareness generation activity, and general consent in working in the villages and panchayats are **gained with the support of Gram Sabha**[10]. The meeting includes all the important stakeholders in the village. Formal agreements are made with the villages and, panchayats by the project - CEE and the service partner, Shrishti Waste Management Services (as a service provider in Bastar). SHGs are chosen to undertake the waste collection work.

Agreements are later listed as minutes in the panchayat meeting registers. A letter is thereafter given by panchayats detailing the following at:

VILLAGE LEVEL:

- Who will be the SHG and its members collecting the waste?
- Place agreed for storage in villages.
- Wages how need to be made to the members of the SHGs.
- Who will provide the collection carts, vehicles, their repair, maintenance, etc?
- The weight of waste provided to the project and its slip, etc
- How and who will maintain records at the storage point in a village or panchayat?
- CEE team to guide all these norms and systems.
- Swachhagrahi Samuh collection, segregation, and other record registers.
- Digitized weigh scale slips register, dispatch details register–date/ quantity, or segregated into fractions.
- Payments were received for the waste and also for the incentives.
- Incoming segregated waste register village-wise; dispatch
- Digitized weighing scale slip register: date, quantity, or segregated into fractions.
- Payments were received for the waste and also for the incentives.

For all the waste collections are to be made by the SHG members in the villages, panchayats, the E-Rickshaws have been provided by the District Administration, SBM- Grameen to the SHGs. These are state-of-the-art rickshaws, and the design is effectively put in place to segregate dry and wet waste.

Figure 12: *Social Mapping & Community engagement in villages agreeing on modalities for waste management*

[10] CEE has proper SOPs on onboarding the rural and urban bodies for waste collection.

Block Level:

- Incoming segregated waste registers panchayat-wise. Digitized Weighing Slip/Weighbridge Register: - date, quantity, or segregated into tractions.
- Daily waste sorting and processing register.
- Sales/dispatch register. Proper billing and invoicing are to be done.
- App based on real-time monitoring.
- Payments were received for the waste and also for the incentives.

Villages are then covered in phases, depending on the proximity and quantity of waste generated by a specific village. So far**, 82 villages have been onboarded in Bastar**. **The list of onboarded villages is as follows (Figure 13):**

Phase 1: **30 Villages**
Aadawal, Kurandi, Babu Semra, Nagarnar, Dhanpunji, Burundwada Semra, Billaouri, Bamhani, Markel, Upanpal, Bhejapadar, Kasturi, Madpal, Kurandi, Halba Kachora, Kumhli, Markel 02,Khamhar Gaon, Karnapur, Garavandkhurd (Morthpal), Kalcha, Khutpadar, Amaguda, Dhuraguda, Nakti Semra, Upanpal (Bijaput), Garavandkhurd (Negiguda), Kalcha, Khutpadar (Kopaguda), Garavandkhurd

Phase 02: 33 villages
Balikonta, Kalipur, Parpa, Titirgaon, Biringpal, Jatam, Sargipal, Niyanar, Sadgud, Dhaniyalur, Kavalikala, Nangur, Ulanar, Turenar, Garavandkala, Ghatpadmoor, Kumharavand, Pandaripani 01, Seedamud, Hatpadmoor, Amaguda (Manganpur), Biranpal, Bade Murma, Jamavda 01, Jamavda 02, Manjiguda, Tondapal, Upanpal, Netanar, Kaikacherbahar, Alanar, Karnapur (Rampal), Babu Semra (Atpahari Semra, Teli Semra).

Phase 03: 19 villages -
Plans in place and will be shortly implemented in the remaining villages.

Aasna, Chokawada, Aasna (Tamakoni), Chokawada (Machkot), Billori 02, Pandaripani 02, Pushpal, Tusel, Kulgaon, Kakarwada, Tusel (Korpal), Chotekawali, BadeBodal, Kumhrawand (Palli), Balikonta (Kondawal), Kaikagad, Halbakachora(Mangdukachora), Kolawada, Aadaval (Kusumpal)

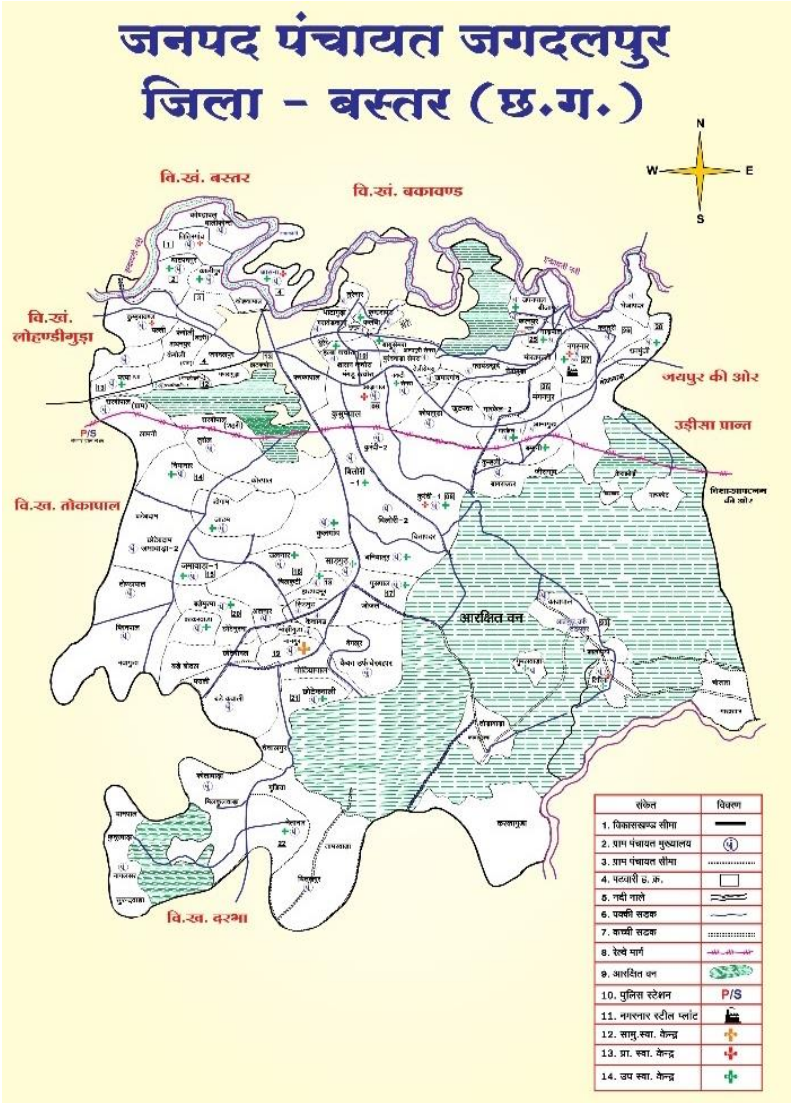


Figure 13:*Janpad Panchayat Jagdalpur Map*

Distribution of E-Rickshaws:

E-rickshaws were distributed in villages to facilitate the collection of waste. This not only improved the efficiency of waste collection; but also created sustainable livelihood opportunities for the community. The Safai Mitras are provided practical on-the-job training in driving and waste collection to ensure safe and effective operation.

For the project, **83 E-Rickshaws have been distributed with the support of District Administration Bastar to SHG Women**, who have been instrumental in shaping their lives and generating livelihoods and skills. These women are all first-time drivers **(Figure 14).**

Figure14: *E-Rickshaws to Safai Mitras given by District Administration Bastar*

B. Urban Areas

Similarly, Agreements are also made with schools and colleges for the collection of waste. In the urban areas, the agreements are taken up with the SLRM centres; proper terms and conditions are defined between the partners, i.e., CEE/SWMS and SLRM centres.

The basic ideation of PRAs is local ownerships in the decision-making processes; first steps for sustainability is to create faith and local capacities at all levels. This includes the SWMS ownerships so that in the project exit strategy within 3-4 years, the local partner is institutionalized, and arrangement exists to execute the program.

Waste collection and storage are more formal in urban areas due to the Nagar Nigam's direct door-to-door waste collection. Waste from homes, businesses, and other establishments, is collected by Safai Mitras and transported to SLRM centres (Solid Liquid Resource Management). Initially, six SLRM centres were on board by CEE/Service Provider:

– Lal Bagh, Bodhghat, LIC Chowk, Praveer Ward, Tetarkuti, and Tiranga Chowk. As of August 16th, waste is also being sourced by the SWMS –CEE Team from three more SLRM Centres- Dongri, Chowki and Fire Brigade Centre, where the waste is stored and initial level segregation of waste is undertaken. (**Figure 15**)

Each SLRM centre has been assigned specific wards from where dry and wet waste, is brought, stored, and segregated. The MRF center has exclusive contracts with these SLRM Centres for bringing waste from these centers to the MRF plant for further processing.

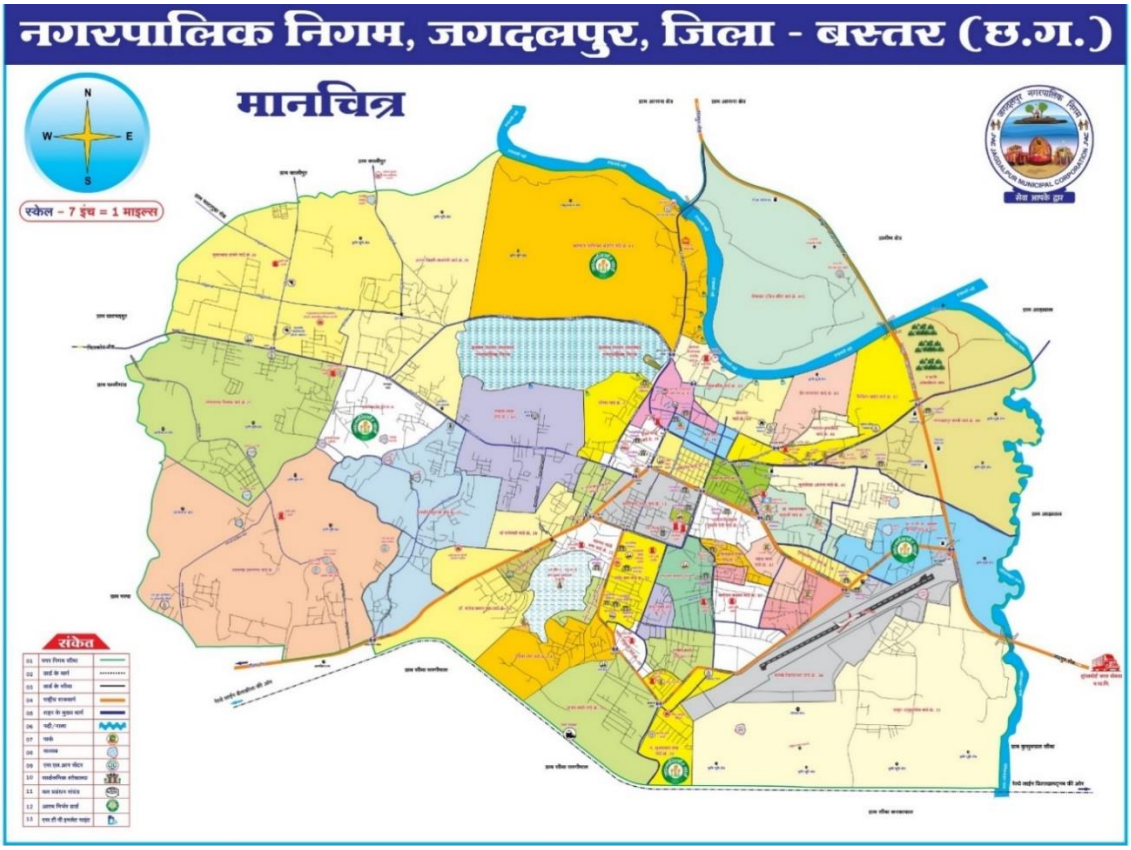


Figure15: *Map of Nagar Palik Nigam, Jagdalpur*

Efforts are that in every agreement, the roles and responsibilities of the stakeholders are amply defined and mutually agreed to and signed. **As in Table 3,** clear terms are agreed between the stakeholders.

Table 3: An Agreement between CEE-SWMS and Bodhghat SLRM Centre	
Mutual Agreement Between CEE/SWMS & RWA/Bodhghat SLRM Centre	
The agreement is between Shrishti Waste Management Services & Bodhghat SLRM Centre situated at Jagdalpur on 2 June 2023 to source the dry waste materials for effective execution of Material Recovery Facility (MRF) on following roles & responsibilities:	
Roles & Responsibilities of RWA/Village Administration	**Roles & Responsibilities of CEE & SWMS**
Administrative will provide a support to make sure that residents are segregating their dry waste at source	CEE/SWMS will assign a person and vehicle for dry waste collection-Two times a week. CEE/Partner will only collect dry waste paper cardboard plastic, metal, etc.).
Administrative will give support to organize the behaviour change activities at the RWA/Village.	CEE/SWMS will keep records of waste materials being received from the village/RWA and provide a financial or non-financial rewards & the waste quantity received from Village/RWA more tham 10 MT per quarter.
Administrative may form a green volunteers to support and monitor the waste management related activities in the RWA/V4lage and report the same to the partner	CEE/SWMS will give a green certificate to Village/RWA for the contribution to make cleaner a greener environment.
Administrative can request additional days/trips for waste collection, if the Quantity of waste is significantly high	CEE/SWMS will invite the residents to the annual award ceremony to honour those who have supported the most to improve the waste management in the RWA/Village
	CEE/SWMS will organize behaviour chang activities in Vilage/RWA on waste management
This agreement may be reframed on mutual consent every months	
Signed by RWA/Village Administration SPOC	Signed by CEE/ SWMS SPOC

For the effective functioning of the MRF, contracts have also been signed with bulk waste generators, aggregators, and SLRM centres to ensure a steady supply of dry waste into the MRF. The advantage of signing such contracts is that they ensure regularity in the supply chain, better clarity of roles and responsibilities and act as an additional source of dry plastic waste collection. The clear roles and responsibilities agreed as can be seen in **Table 3 & 4**. The project sources different recyclers for different types of waste in different cities; proper negotiations are undertaken between the players to determine the best mix of pricing for the MRF centre by the service partner (SWMS). Efforts are that there is a part of profits across the stakeholders in the ecosystem and should be reasonably earned to sustain the whole operations and meet the costs of the centre. The NGOs as operational with CEE are guided to register companies and register them under start-ups, and MSME and get the GST registration to do the operations.

This is encouraged in the project to have a better business model for both the MRF and the MRC.A proper systems approach to the incoming and outgoing materials ensures a net plus approach for sustainability.[11] Different types of machinery are installed for various operations at the MRF. Movable weighing bridge, Dust air blower machine for air pressure; shredders; grinders and dry waste sorters (conveyor belts); and bailing machines. The materials are then purchased from the women SHG cooperative/waste management agency at the MRF by the SWMS, the CEE service provider. A range of machines Agglomeration & Extrusion machines; washing lines, inject blowers and moulders at the MRC are put up. A state-of-the-art effluent treatment plant to be established as per the Pollution Control Board norms. MRF and MRC machinery gets installed tailor-made depending upon the dry waste matter. Stringent safety precautions are observed during the setup of the facility. Proper safeguards are maintained, and fire & safety norms are ensured at both centres with insurances for plant and machinery, people working in the MRF and MRC and also for the goods in stock. This ensures safety against any emergency. Regular trainings of the team are done on fire & safety, accounts and book-keeping, monitoring and regulating the flow of the waste[12]

Table 4: An Agreement between CEE/SWMS and Recycler

Mutual Agreement Between CEE/SWMS & (Sajid Khan Kabadiwala)	
This agreement is between Shrishti Waste Management Services and Sajid Khan Kabadiwala situated at Jagdalpur on 23 March day of 2023 to source the dry waste materials for effective execution of Material Recovery Facility (MRF)on a following roles and responsibilities:	
Roles & Responsibilities of BWG & Kabadiwala	**Roles & Responsibilities of CEE & SWMS**
Sajid Khan Kabadiwala will create a system and consider the segregation of all dry waste.	CEE/SWMS will assign a person and vehicle for dry waste collection evening at 4pm times a week. Partner will only collect dry waste (paper, cardboard, plastic, metal, glass etc.)
Sajid Khan Kabadiwala will consider the pricing of various waste items in a way that benefits both parties.	CEE/SWMS will make an agreement for the rate of different waste items. This rates will renew every month as per market rates.
Sayed Khan Kabadiwala can request additional days/trips for waste collection, if the quantity of waste is significantly high.	CEE/ SWMS will keep records of waste materials being received from the Sajid Khan Kabadiwala and provide a financial or non-financial rewards if the waste quantity received from Sajid Kabadiwalla is more than 10 MT per quarter.
	CEE/SWMS will give a green certificate to Sajid Khan Kabadiwala for the contribution to make cleaner and greener environment
This agreement may be reframed on mutual consent every months	
Signed by Sajid Khan Kabadiwala	Signed by SPOC

[11] Project has all the economics on the management and operations of the MRF and MRC as SOPs.

[12] The Project has developed the SOPs on the monitoring systems and also on the safety, etc at the MRF and MRC.

9. Interventions for Better Awareness Programs

A. Plastic Lao Thaila Pao

The project initiated unique awareness campaigns - "Plastic Lao Thaila Pao," encouraging citizens to bring plastic waste to designated collection points in exchange for incentives or rewards. This not only raised awareness but also incentivized participation, promoting responsible waste disposal.

Two Plastic Lao Thaila/Mask Pao (PLTP/MP) stalls inaugurated, one at Tirathgarh and the other at Sanjay Market. (Figure 16)

Till August 15th 2023, at PLTP/MP, 9,119 individuals sensitized; 7,920 individuals visited the stand; 5,828 cloth bags were distributed; 369 masks were distributed; and 4090.02 kgs of plastic waste was collected.

***Figure 16**: Plastic Lao Thela Pao Kiosk Setup in Bastar*

B. Reverse Vending Machines (RVM)

RVMs strategically installed at **three key locations**: one in front of Dalpat Sagar, at the heart of Jagdalpur city; one in Chitrakoot, the most visited tourist spot in Jagdalpur; and one at Lohndiguda, providing a convenient and automated way for the community to deposit plastic waste. These innovations were an attraction to the city citizens.

The machines not only facilitated better collection but also served as visible symbols of the project's commitment to technological use in waste management.

At these machines, people deposited used PET bottles, mineral water bottles, and MLP packets in exchange for a reward coupon. At all the RVMs, a total of 10,576 PET bottles and 1668 plastic bags collected until the making of this report **(Figure 17). A new shift was seen from routine.**

***Figure 17**: RVM installed in Bastar*

C. Village-Level Awareness Activities

Teams from CEE, Officials from Nagar Nigam, Zilla Parishad, Bastar academics, Swachh Bharat Mission Grameen, Communities and SWMS teams engaged in extensive awareness campaigns in the schools, colleges of the city, at the panchayat and village levels. These activities included community meetings, door-to-door awareness drives, and interactive sessions to educate residents about the significance of waste segregation, responsible plastic use, right way of opening/cutting LDPE/MLP packaging. This small actions in fact picked the eye of all citizens. A simple observation adopted by many. As shown below shares the reduction of micro-plastics through day-to-day actions by citizens. Regular talks and discussions have led many a men and women to adopt into their day-to-day life. **(Figure 18)** Proper records and impacts are maintained at every level.

***Figure 18:** IEC for awareness on correct way of pouches cutting*

D. Swachhta Campaigns

Swachhta campaigns were organized at the village level, involving local leaders, sarpanchs, and sachivs. These campaigns aimed to create a sense of ownership among the community, encouraging them to actively participate in maintaining cleanliness and adopting sustainable waste management practices.

E. Capacity-Building Programs

Comprehensive capacity-building programs were conducted to upskill all stakeholders involved in the project. A special focus was given to the 500+ women provided employment opportunities, ensuring they were trained in waste segregation, collection, and other relevant skills. Sarpanchs and Sachivs were also included in capacity-building initiatives to enhance their understanding of waste management. **(Table 5)**

S. No.	IEC Activity Name	Number of Activities	Number of Individuals Sensitized
1	Badlaav Campaign	01	22000+
2	Awareness Campaigns	119	62400+
3	Capacity-building workshops	09	392
4	Training	68	636
5	Master Trainer training organized by the National Skill Development Corporation	01	02
6	Health Camp	06	1215
7	Exposure visits by government officials to Bhubaneshwar	01	10
8	Exposure visits to MRF Bastar	46	799

***Table 5**: List of IEC Activities Undertaken*

10. Swachh Centres

Swachh Centres (SCs) are a combination of the Material Recovery Facility (MRF) and the Material Recycling Centre (MRC) for recovering all types of dry and plastic waste materials. All collected dry and plastic are sourced to MRF from city municipal corporations (CMCs), waste pickers, implementation partners (IPs), and other stakeholders in every city.

A. About Material Recovery Facility (MRF)

The MRF has enabled the facilities to segregation *of all types of dry waste, including plastic, adding value to the waste supply chain.* PET, PE, HDPE, LDPE, PVC, PS, and PP wastes are mechanically bailed, shredded, etc., and supplied to recyclers (to produce pallets or other materials or products), cement kilns (co-processing, alternate fuels), road construction, etc **(Figure 19).** All processes follow Solid Waste Management Rules 2016 and 2018 ensuring compliance with environmental regulations and sustainable waste-handling practices.

The MRF plays an instrumental role in transforming the waste management landscape in Bastar through its comprehensive approach to segregating all types of dry waste, with a particular emphasis on plastics. This facility is designed to enhance the value of the waste supply chain by meticulously segregating and processing materials like PET, PE, HDPE, LDPE, PVC, PS, and PP. These materials undergo mechanical bailing, shredding, and other processes before being supplied to recyclers to produce pallets or other materials or product **(Figure 20).** Additionally, the MRF facilitates the responsible disposal of waste through alternative means such as co-processing in cement kilns, utilization as alternate fuels, and incorporation into road construction projects.

To achieve its ambitious goals, the MRFs have been equipped with a diverse range of machinery tailored for various operations. Among these are a movable weighing bridge for accurate measurement, an air blower machine or Fatka machine to streamline sorting processes, a shredding machine, dry waste sorters employing conveyor belts for precise segregation, and bailing machines to compact materials for easy transportation. Each piece of machinery is strategically chosen to optimize the waste management process, promoting efficiency, sustainability, and adherence to environmental guidelines. The implementation of the MRF not only addresses the critical issue of waste segregation but also contributes to resource recovery, supports circular economy principles, and fosters a more responsible and eco-friendly waste management system.

Figure 19*: MRF Plant at Burundwada Semra, Jagdalpur*

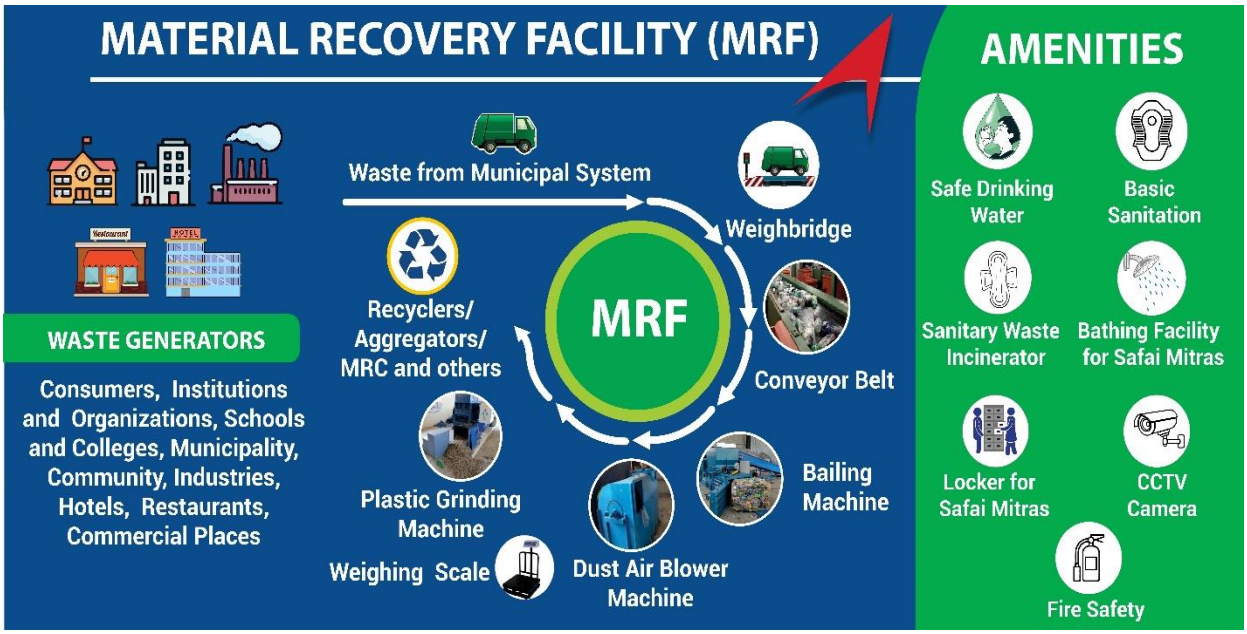


***Figure 20**: Machines flow of a typical project MRF*

B. About Material Recycling Centre (MRC)

MRC at Bastar first of its kind operational with the local bodies has incline conveyer belt feeding into the grinder, washing lines, dryers, cyclone, mixers (rigid plastics), Agglomerator (thin flexibles), and an Effluent Treatment Plant (ETP). These are supplemented with extrusion machine to make different types of granules from PP, HDPE & LDPE and Gatta/ Gulla Lumps of MLP. **(Figure 21 & 22).** These granules have a higher value and serve as an instrumental factor in making the project more sustainable and giving the project stakeholders greater returns.

Overall, MRC's operationalization helps improve the sustainability of the project. In addition to the essential facilities such as washing lines, dryers, and an Effluent Treatment Plant (ETP), the Material Recycling Centre (MRC) has been equipped with advanced extrusion machines **(Table 6 & Figure 23)**.

The incorporation of extrusion technology not only enhances the efficiency of the recycling process but also elevates the value of the resulting granules. These upgraded granules not only contribute to environmental sustainability by diverting waste from landfills but also offer a more lucrative solution for project stakeholders, ensuring a more economically viable and environmentally responsible outcome.

The operationalization of the MRC[13] marks a significant step toward the overarching goal of sustainable circularity approach in waste management. By incorporating state-of-the-art technology and processing capabilities, the centre becomes a pivotal player in the recycling ecosystem. The holistic approach of the MRCs not only addresses immediate environmental concerns but also aligns with global initiatives for circular economies.

Through the creation of high-value granules, the project not only fosters economic growth but also promotes a more sustainable and circular approach to resource utilization. In essence, the MRC stands as a beacon for innovative waste management practices, showcasing the potential for environmental conservation and economic prosperity through responsible resource recovery.

[13] The project has developed proper SOPs in the management and operations of the MRF and MRC with proper economics

Figure 21: *MRC process flow*

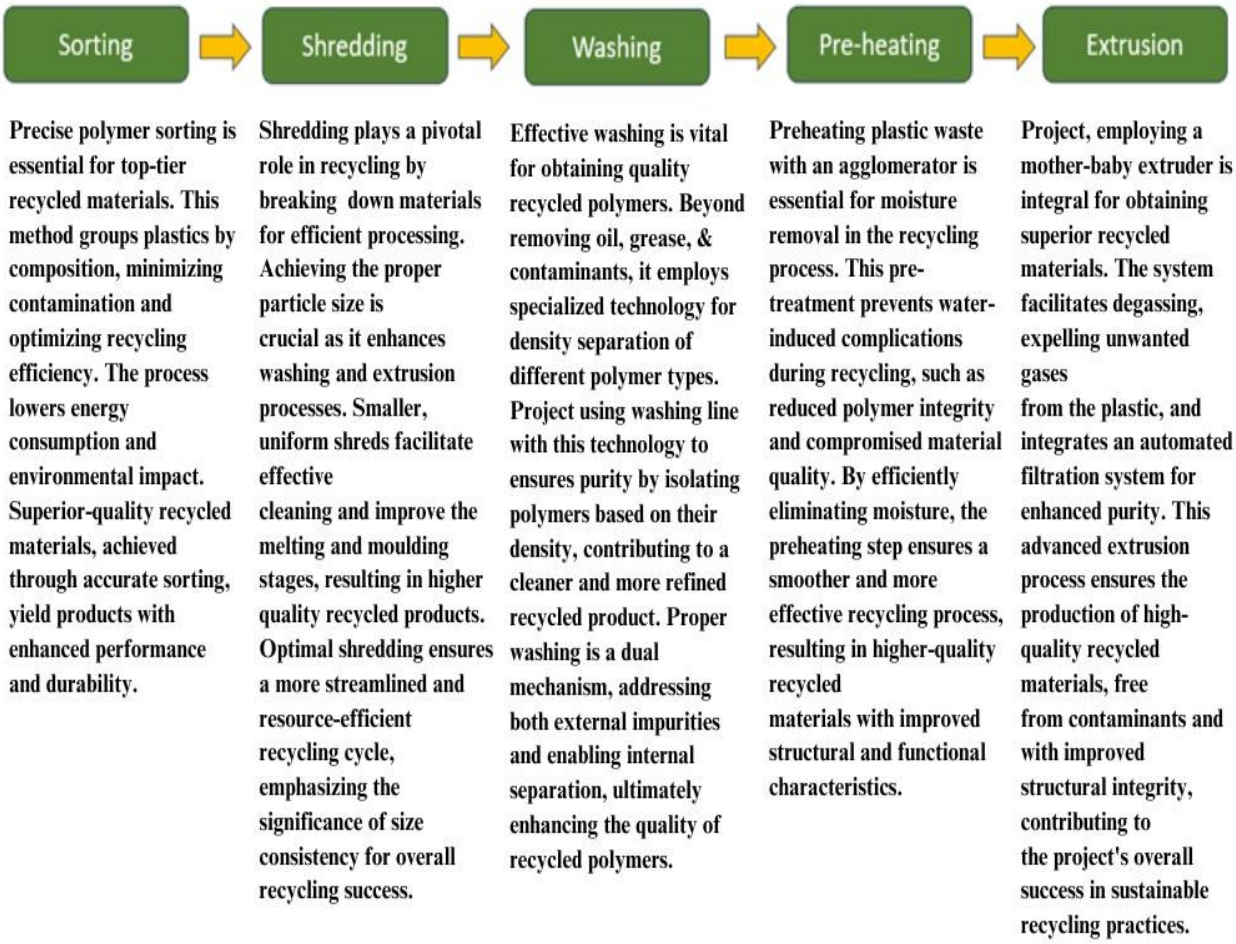


Figure 22*: Stepwise Process for Recycling*

Machines	Unit	Output/day
Grinder	1	20 Metric tons
Washing line with dryer	1	6 Metric tons
High speed mixer	1	6 Metric tons
Agglomerator	1	4 Metric tons
Extruder with Pelletiser (Cutter) and Water tank	1	6 Metric tons
ETP	1	25KLD

Table 6: *Capacity of machines in MRC*

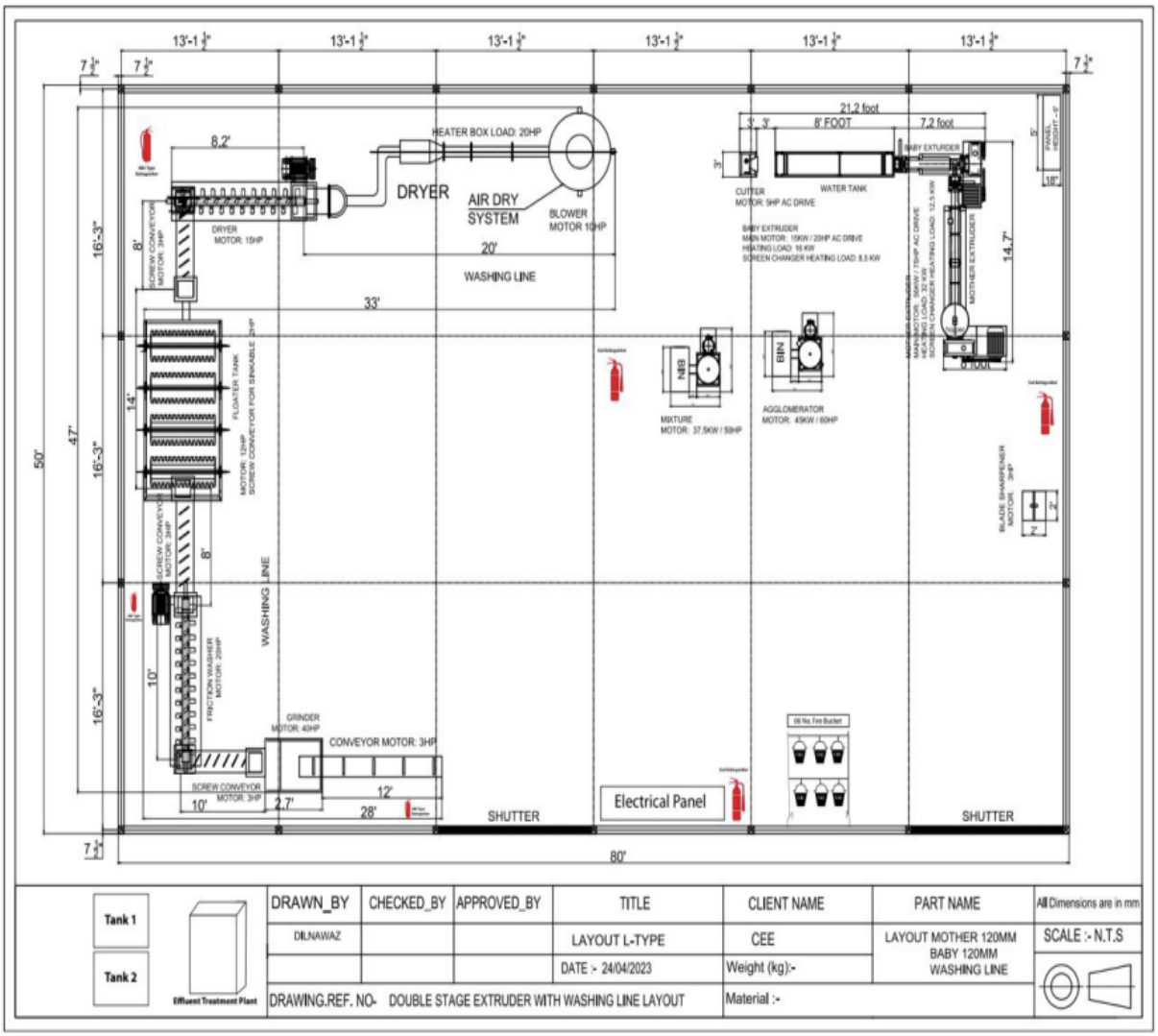


Figure 23: *Locations of machines at MRC*

Both the MRF and MRC in the cities are *provided with basic amenities* to ensure better hygiene, safety, and improved health and well-being of the Safai Mitras at the Swachh Centres. These facilities include safe drinking water, basic sanitation, a sanitary waste incinerator, a bathing facility, and a locker for Safai Mitras. (**Figure 24**)

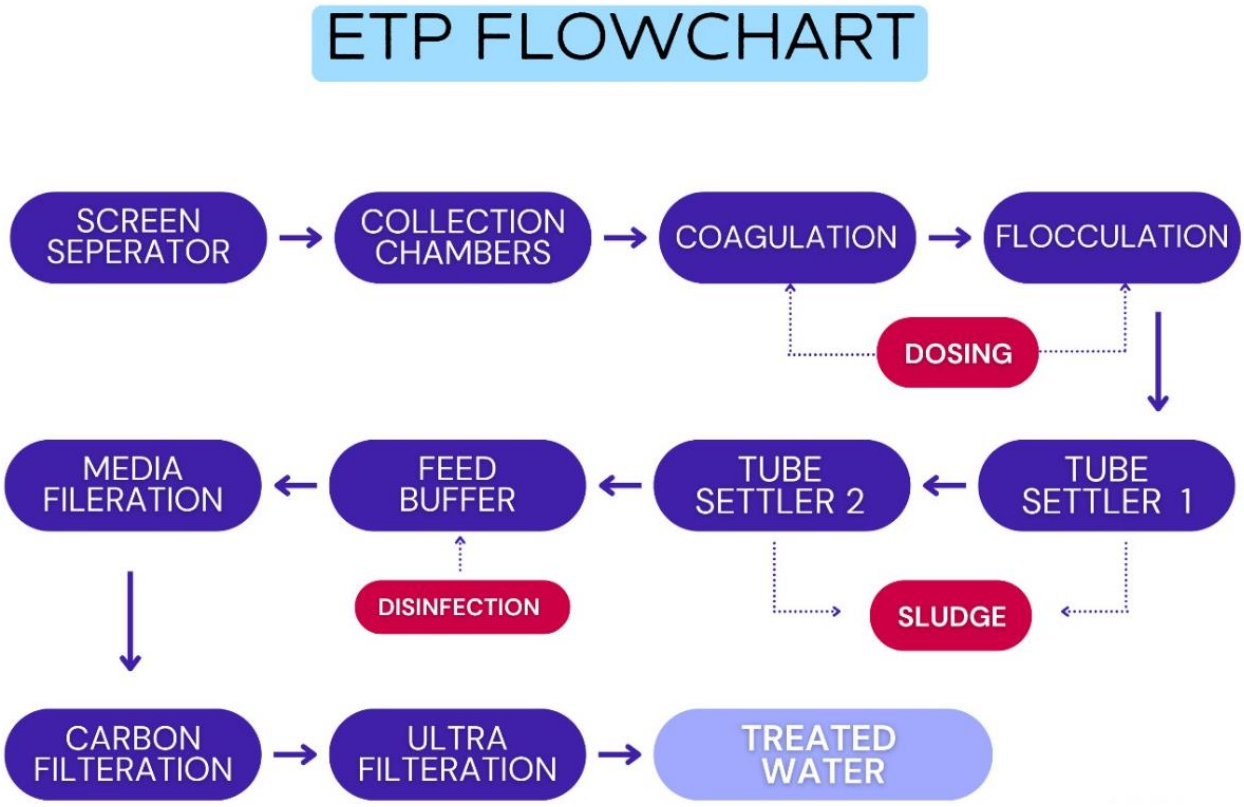


Figure 24: *Effluent Treatment Plants – Low to Zero Discharge Model*

11. Monitoring Systems-Online Dashboards

To ensure traceability and transparency in the project's operations, an online dashboard is maintained, which is regularly updated and meticulously followed. The maintenance and upkeep of this dashboard are seen as instrumental in ensuring reliable data collection and usage for the stakeholders involved in the project. **(Figure 25)**

The inputs made into the dashboard include data relating to inward waste, the rates of different types of waste in separate heads, and outward waste to recyclers. All data is collected, edited, and put into the system daily.

This helps in monitoring and reporting the project since everyday data is collected and records are stored and updated which can be compiled

- daily
- weekly
- monthly
- quarterly,
- half-yearly
- yearly
- and could be used for record-keeping or its analysis for course correction.

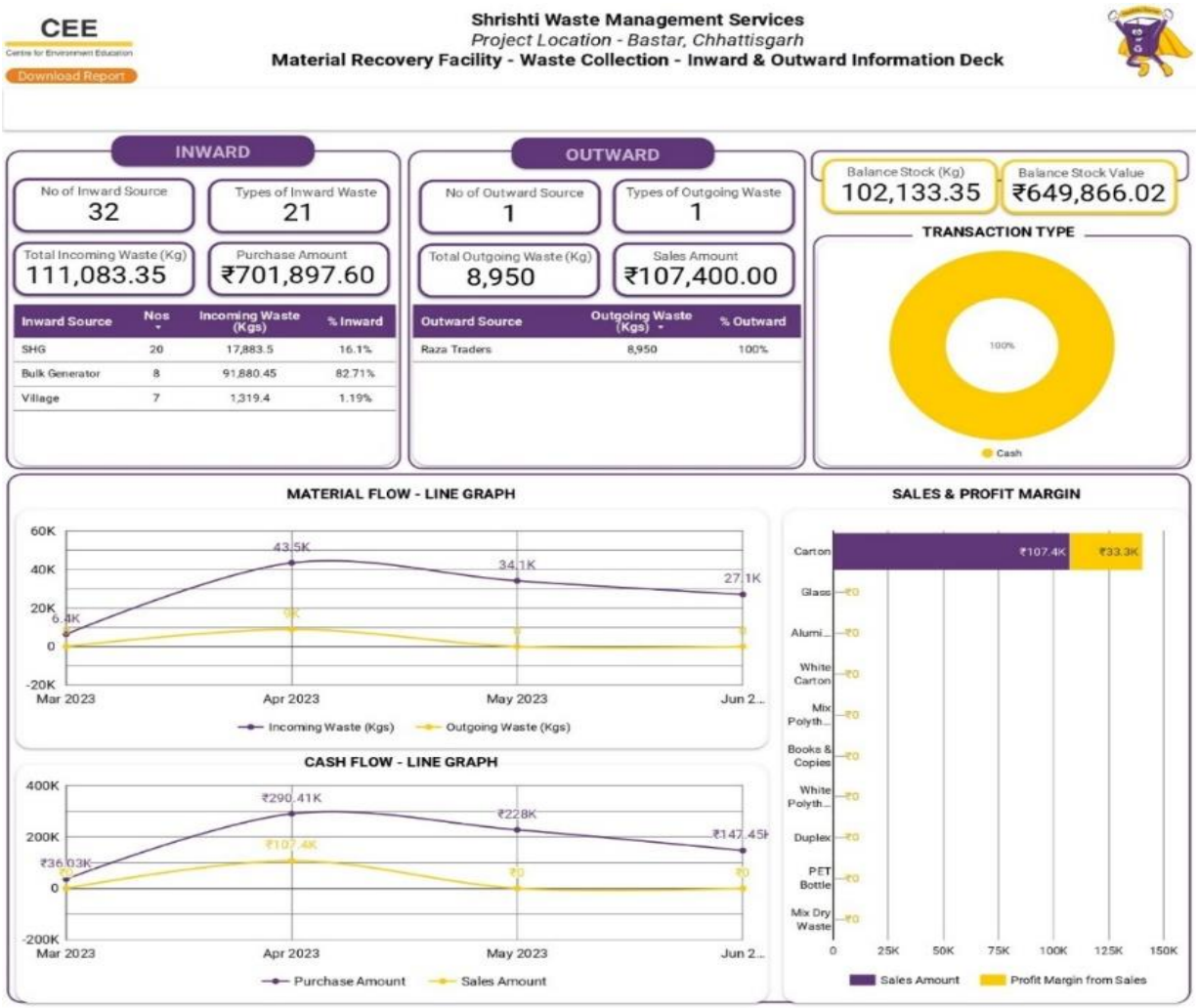


Figure 25: *Glimpse of Online Dashboard Updated Regularly for Effectuating Transparency*

12. District Administration's Support

The project has **been a model developed, because of the Bastar District Administration embraced this project** with open arms, understanding that support, encouragement and equally critically looking from time-to-time (fortnightly basis) into the operations, management and economics of the technology use and efficiency. There have been regular discussions on every aspect on the project. This has been extended beyond monetary contributions.

The support of Zila Panchayat, in particular, is noteworthy in encouraging the Women SHGs by supporting and promoting the outreach of the project with active support and personal attention given by the Collector and CEO Zila Panchayat and CEO Janpad Panchayat, SBM-Grameen, state SBM and DRDA & Panchayats whose regular visits and interactions with the stakeholders played an important role in encouraging the CEE and SWMS teams, women SHGs, the Safai Mitras, who form the backbone of the project, to work despite the numerous challenges faced by them in implementation.

Significant contributions of the administration came in the form of provisions for space where the project was to be implemented and land for MRF & MRC, which is significant in itself and the basic requirements of the project for its sustainability. This enabled the project to setup infrastructure support, shed construction of MRF and MRC, whose costs could add well up to Rs 5.0 Crores, providing utilities, like electricity and water connections, for Rs 45 lakhs, Providing sustainable transportation methods, district administration played a pivotal role here by providing 83 e-rickshaws for collection of waste in the rural areas by women of SHG, the cost of which could well add up to Rs 3.2 crores, providing office space within their premises, etc. which have remarkable contributions of over Rs 8 crores.**(Table 7)**

The project interventions were all possible because of the unconditional **support from the HDFC Bank officials at all the district, state, and national levels.** Their vision, regular interactions, and monitoring of the various aspects in all the cities and towns in India, including Bastar.

The Bastar District, Chhattisgarh State, SBM Administration, and HDFC Bank involvement in the project embodies the spirit of partnership and local ownership. It showcases the impact that can be achieved when a dedicated team works and support from the CEE administration, and leadership towards a shared goal. It is a key lesson that when manpower and resources are dedicated towards a shared goal, change is inevitable.

S. No.	Particulars (Information about the co-financing)	No.	Purpose	Value
1.	Establishment of Material Recovery Centre	1	Plastic Waste Management	1 crore
2.	Tata Yodha	2	Collection of plastic waste	26 Lakh
3.	E-rickshaw	83	Collection of dry waste	1.89 crores
4.	Office space	1	Project management	3.80 Lakh
5.	MRC	1	Plastic waste management	5 crores
6.	Land area	2.5	Establishment of MRF & MRC	3 Lakh per month rent
7.	Fifteen finances to all 47 SHG group	63 villages	Waste collection	180 Rs. Per person per day

Table 7: *Contribution of the District Administration, Bastar*

13. Project Impacts

The project, in its short span, has created several impacts:

a. **Plastic waste collection system established** in 68 panchayats and 85 villages with the involvement, decision-making by the women SHGs, Village Sarpanchs, Ward Panchs and support from the local DC office, PD DRDA, SBM-G, and HDFC Bank office.

b. **Village Communities, more so women gained confidence** and have started segregating their waste, and 100% of the segregated waste is collected from the households in the panchayats& villages. First-time women are driving the E- Rickshaws – local empowerment and women being respected for their leadership and drive.

c. **Continued and extensive IEC activities** happening in partnership with Panchayats, by the project team. Contracts directly at Chitrakoot given to SHGs/Panchayats to put collection centres for plastics. This is assuming new perspectives to collect plastics at public places, roads, and streets are being seen visibly litter-free.

d. **SHG members alternate &sustainable source of livelihood**. Members are earning nearly Rs. 400-500 per day, more than double to the earlier sums of Rs 250-300 per day earned by them from segregating, cleaning, and selling dry waste.

e. **From March 2023 until January 2025, nearly 997 tons of dry waste have been collected** from SRLM, panchayats, and bulk waste generators, which have been sent to recycling centers for further processing. This is resulting into saving 3114 liters of oil per ton plastic recycled. Valued at nearly Rs 3 lakhs foreign exchange savings (per ton plastic recycled). Project out of 997 tons has done 500+ tons of plastics recycled; valuing (500x3114xRs 100 per liter) is **Rs 15.57 crores savings.**

f. **Informal safai-mitras** have been linked with the SLRM & MRF and they are earning more than **Rs. 100- 150**/day from the sale of the segregated dry waste. The project is making no deductions by weight to the materials. This is encouraging more collections. The project has purchased till January waste worth 47 lacs and the *safaii didis* have earned nearly more than Rs 12 lakhs.

g. **More than 22 Kabadiwalas, bulk waste generators, and recyclers** have been linked through the project, earning improved wages, better insurance, and health check-ups. plastic/ polythene bags are being collected and recycled, purchased, or sold for recycling to the recyclers or manufacturers, which directly impacts their livelihoods by providing them with a better livelihood.

h. **The process of women SHG institution-building has started. The project has empowered about 14 SHG members** who are dedicatedly involved in waste sorting and cleaning and the sale and purchase of recyclables at the MRF & MRC.

i. **Community involvement in development process is creating greater trust and relationships** through regular meetings, discussions, planning and implementing strategies and joint decision-making with the project teams.

j. **Timely and regular interactions**, guidance, reviews, and encouragement by the State and District officials and the Donor Officials have equally been a strength in the project.

14. Special Mentions

❖ **Jagdalpur Municipal Corporation received an award under the category "Excellence in managing Municipal Solid Waste by ULBs and MCs in 2022**." The award was conferred by the Confederation of Indian Industry (CII). The Mayor (Jagdalpur) and Commissioner (JMC) were thankful

for the support of HDFC Bank-CEE partnerships on initiatives such as PLTP, RVM, and Swachh Centre which promote cleanliness and waste management in their location.

- **Baster Administrative received the 1st prize for MRF Set Up and Operations in Convergence (Urban and Rural) at the Plastic Recycling Conference Asia 2023**.

- **Zila Panchayat Bastar won 1st prize in "Local Body Champion 2023" Category at the 4th Plastic Recycling Conference Asia 2024**

15. Project Challenges

The project implementation has identified challenges across the plastics and dry waste ecosystem domain as shown in **Figure 26:**

***Figure 26**: Challenges*

Behavioural Change and Awareness

One of the primary challenges in waste management projects is nudging behavior change at the community level, especially in rural areas like Bastar, where illiteracy, migration, and remoteness to new technologies, skills make the task more complex. But the communities are very receptive to adopt new practices, such as source-level segregation and responsible waste disposal. Regular partnership approaches and community engagement leads to dispel fears.

Infrastructure and Logistics

The effective implementation of waste management projects demands robust infrastructure for waste collection, segregation, transportation, and processing. Several challenges being faced establishing and maintaining this infrastructure, especially in rural areas with limited resources. Ensuring the timely and efficient transport of waste from the source to processing facilities can be a logistical challenge.

Inclusivity of Informal Sector Workers

Integrating informal waste pickers, aggregators, and recyclers into the formal waste management system was challenging. These individuals play a crucial role in the waste management ecosystem, but issues related to social recognition, fair compensation, and especially formalization of their roles pose obstacles.

Technology Adoption:

The low literacy level of Bastar and the scarce skilled manpower trained in handling and managing solid waste management is at times a limitation. Incorporating technology for waste management, such as waste tracking systems or recycling facilities, faced resistance of fear and clarity adoption. Adequate training and support required to ensure efficient use of technology in project.

Community Participation and Ownership

Sustainable waste management relies on the active participation and ownership of the community. It is a time-consuming process approach. Concerted efforts required to engage with diverse and at times divergent stakeholders. Including local communities and the village head, to take ownership of the waste management exercises which is a critical aspect for long-term success.

Cultural Sensitivity

Implementing waste management initiatives requires an understanding of local cultures and practices. Challenge is that project strategies are aligned with cultural norms and are sensitive and respectful to the needs and preferences of the communities involved.

Monitoring and Evaluation

Establishing effective monitoring and evaluation mechanisms to track the progress of the project and measure its impact is time-consuming and therefore challenging. As it requires proper data collection and enumeration. Developing key performance indicators (KPIs) and ensuring consistent data collection and reporting may require ongoing refinement.

Scaling Up and Replicability

While the project may demonstrate success in specific locations, challenges may arise when scaling up the initiative to cover larger geographic areas or when attempting to replicate the model in different contexts. Local variations and contextual factors must be considered for a successful expansion.

Resistance and Opposition

Resistance from existing players and certain interest groups to new waste management practices or infrastructure development is often a challenge. Public awareness and effective communication strategies are crucial to addressing concerns and gaining community support.

16. Project Learnings

Significant lessons emerged throughout this project, emphasizing the pivotal role of the implementing partners/service providers as **enablers**:

a. **Nurturing a sense of ownership**:

Continuous interactions with SHG members to identify issues and concerns and ensure that efforts are made for their resolution have been critical for the success of this initiative. A modern ICT-based monitoring system (including attendance, CCTV cameras, and MIS for data collection) has also played a role. Unless there is a sense of ownership among the SHG members themselves, there is a slight possibility of the success of similar projects anywhere in India.

b. **Consciousness Building and Behavioral Change**:

The project's focus on raising citizens' consciousness about responsible plastic use and fostering discussions indicates a recognition of the importance of behavioral change. Successful implementation of such initiatives could lead to a shift in community attitudes towards responsible waste management.

c. **Inclusion of Informal Sector Workers**:

The project's emphasis on including informal sector performers, such as the Safai Mitras, small aggregators, and informal recyclers, highlights the recognition of their crucial role in waste management. Integrating

these workers into formal systems can enhance their livelihoods and contribute to more effective waste management.

d. Engagement with the Plastic Fraternity:

Collaborating with plastic manufacturing and recycling associations demonstrates a proactive approach to addressing challenges related to plastic packaging. Engaging with industry stakeholders is essential for driving innovations, implementing best practices, and fostering a collective commitment to sustainable solutions.

e. SWACHH CENTRES for Efficient Waste Management:

The establishment of SWACHH CENTRES reflects a commitment to creating centralized hubs for recovery, recycling, and product making. This approach aims to streamline waste management processes, ensuring cost-effectiveness, safety, and improved productivity.

f. Informal Worker's Livelihood Improvement:

The project's focus on providing greater livelihood opportunities to marginalized informal waste pickers and small aggregators through semi-automatic processes at SWACHH CENTRES is a positive step. This can contribute to poverty reduction and improved socio-economic conditions in the targeted areas.

17. Towards Circular Economy

The emphasis on circular economy principles, including the "refuse, reduce, reuse, recover, refurbish, and recycle" approach that the project aims to work on. It reflects an understanding of sustainable waste management practices. These principles contribute to minimizing the environmental impact of plastic waste. Also, waste has been seen as a resource – by putting a value to it **Figure 27.**

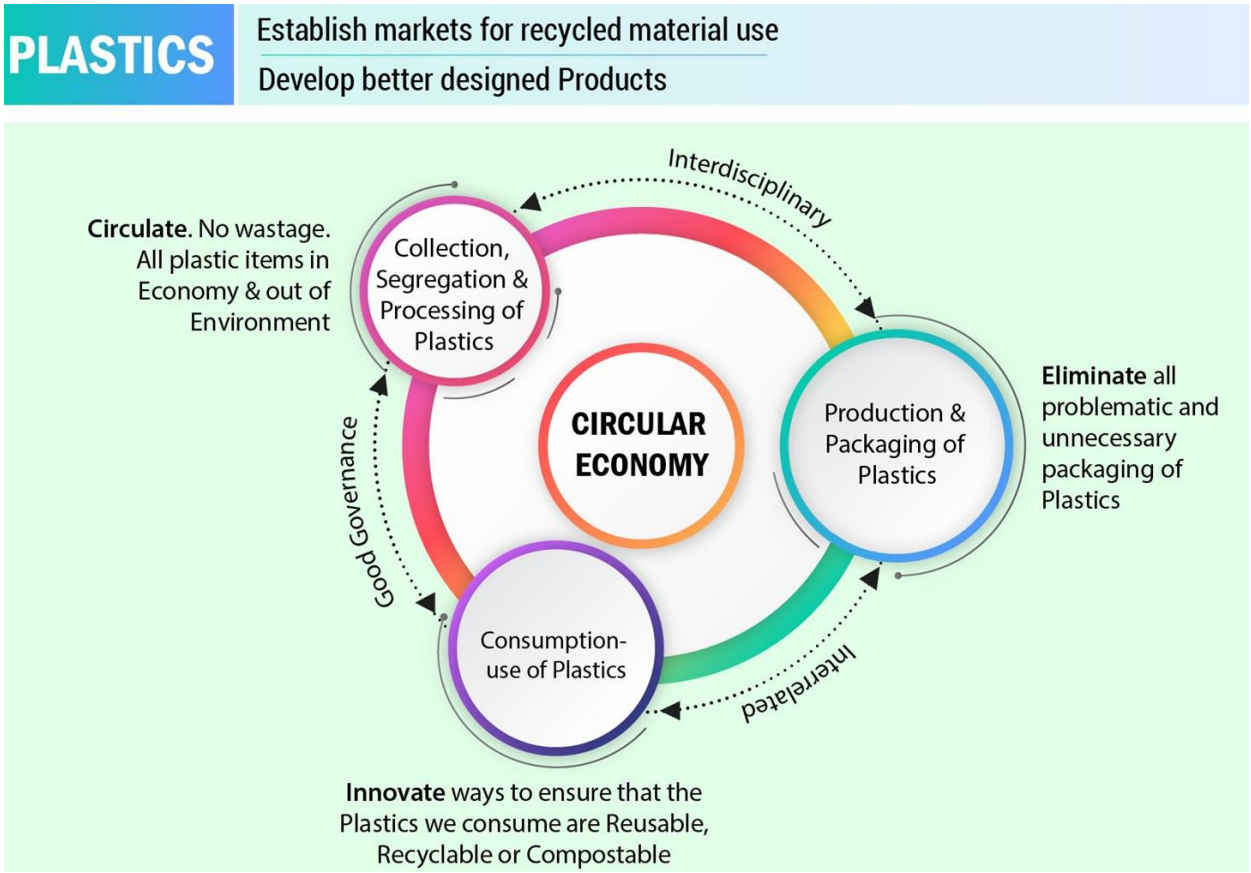


Figure 27: *Circular Economy*

Sustainability

To ensure the success of the project, a comprehensive sustainability plan is being developed by CEE, *encompassing*:

1. Ongoing community engagement, skills, knowledge practices and educational initiatives are needed to maintain community participation.

2. Regular capacity-building sessions for all the participants and stakeholders to keep them up-to-date and informed about the developments are essential.

3. Health-related sensitivity camps to take care of the health-related needs of the staff engaged in waste picking and sorting.

4. A strategy for securing long-term resource sustainability is being developed through the SWMS and the community SLRM Centres.

5. Exploring the scalability of the initiative to expand its reach and impact to other areas within Bastar district and the neighboring districts.

6. It's important to note that MRC's construction is still underway, and the project is likely to undergo a fillip after its operationalization. There is greater scope for sustainability as there will be greater scope for revenue generation. A proper recycling partner selection for the recycling plant management and operations.

The transparency, traceability in Materials flow & Financial Systems- **payments to** (collectors – including SLRM Centres, aggregators, waste pickers) and **receipts from** (all recyclers, including the MRC) will bring in the clarity on the profits and loss on monthly basis.

As shown below in **Figure 28.** Also, to add that the project will do the gap funding for two years to initially build the value chain robustness, volatility, and price-wars in all types of waste. This confidence building of the service providers have the interest developed to incur profits.

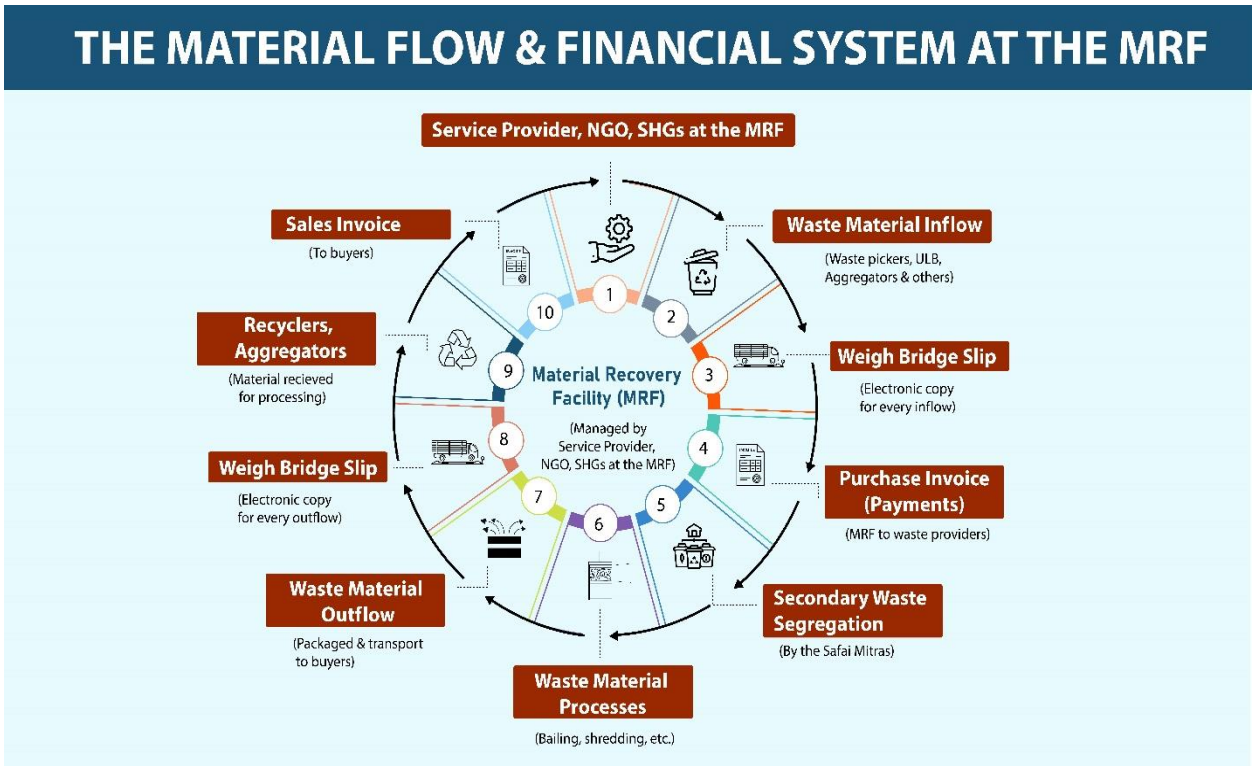


Figure 28: *Materials Flow & Financial Systems*[14]

[14] The project paper written by Prabhjot Sodhi, Tavishi Darbari and Rohit Maskara on the systems approach to sustainability.

18. Glimpses

In the last one year the projects process planning approach has led to a more robust model; which is now showing results. Some of these can be seen through these photographs. The major success has been through the support by the government officials from the state of Chhattisgarh. At every step there has been a support from the district administration and the state authorities in laying down the foundations of the programme.

Swachhta Didis collecting waste via E-Rickshaw

SLRM Centre; Bodhghat

Waste Collection Vehicle in MRF

Material Recovery Facility (MRF)

Safai Mitras segregating waste in the MRF

Safai Mitras operating the Conveyer Belt

Swachhta Didis using Bailing Machine at MRF

Collector Bastar Inaugurating Swachhta Rath

CEO Zila Panchayat; Bastar participating in SHS 2023

Safai Mitras in the MRF distributed Safety Kits

Community participating in Badlaav Campaign

Community members participating in the night chaupal

Swachhta Didis felicitation ceremony in Kurandi

Swachhata Rath during Swachhta Hi Sewa Campaign

Safai mitras are trained with fire safety training

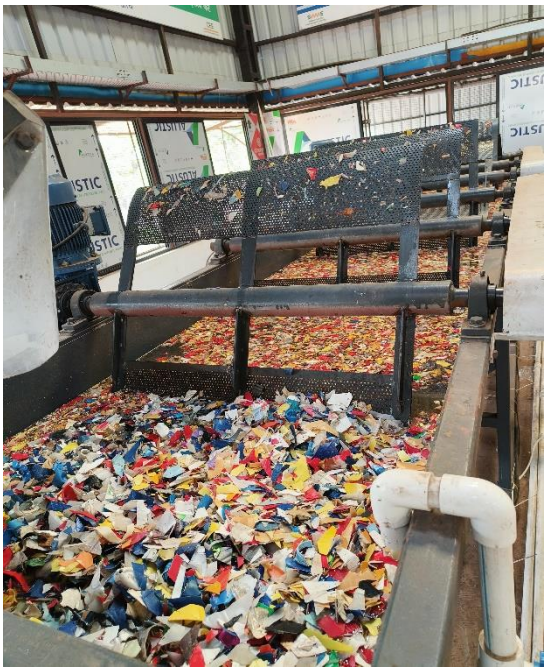
Community participated in awareness campaign and took Swachhta pledge

Material Recycling Centre (MRC) at Bastar, Chattisgarh

MRC Machines Inauguration by District officials

MRC Machine operations at MRC by operators

Effluent Treatment Plant (ETP) at MRC



Floating Tank at MRC

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KANGER VALLEY
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