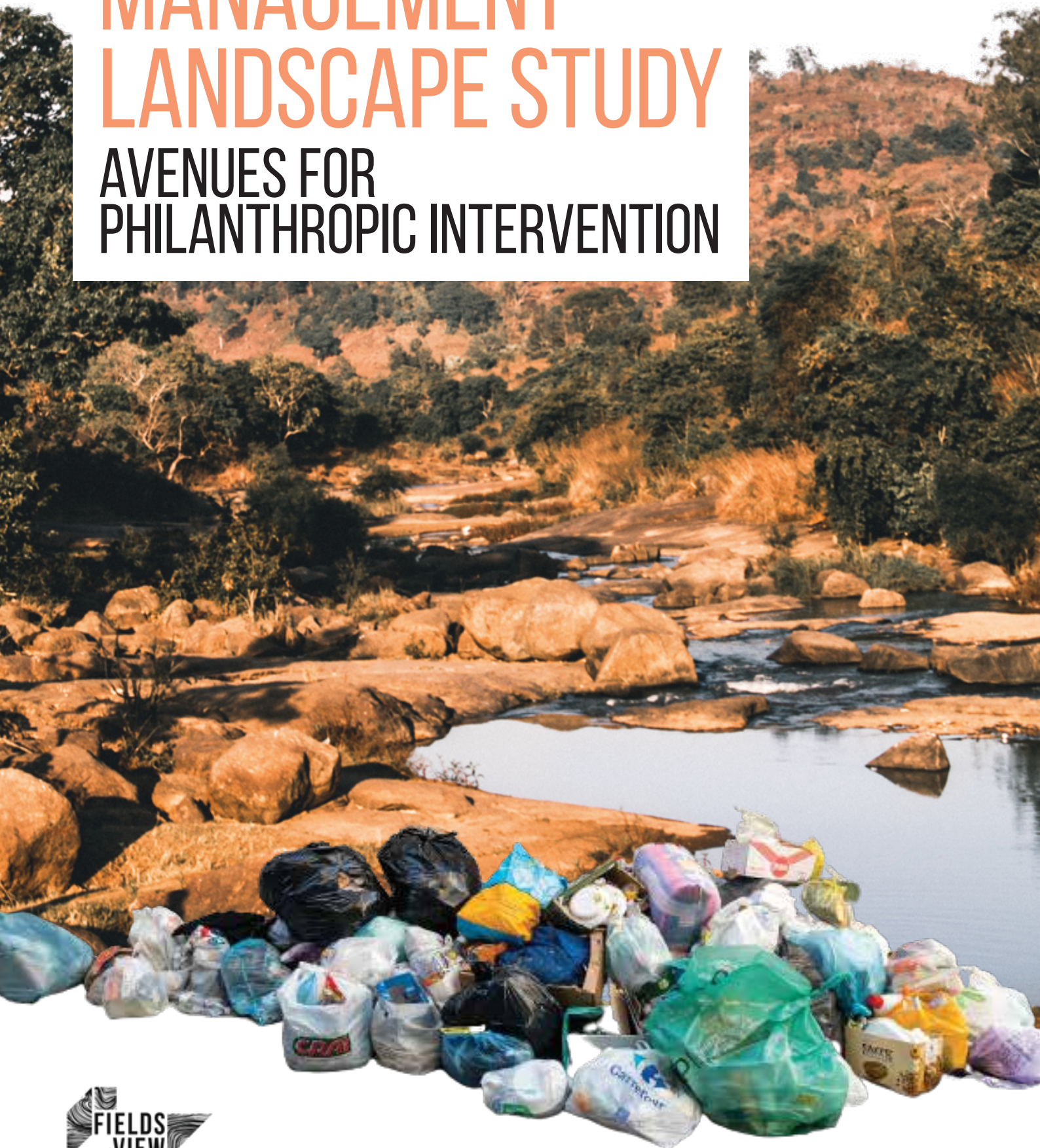


SOLID WASTE MANAGEMENT LANDSCAPE STUDY

AVENUES FOR PHILANTHROPIC INTERVENTION





Acknowledgements:

This report is a culmination of a series of workshops, interviews and discussions conducted to understand the various perspectives in solid waste and how philanthropic interventions could be more effectively used. The study was conducted between April of 2022 to December of 2022. The study attempts to expand the view of the solid waste landscape to bring to light the complex ecosystem and the various actors who influence the landscape and the support they need to continue or accelerate their work.

We would like to take this opportunity to thank all the people who have been extremely helpful to us during the process of research and writing of this report. Everyone at IIHS who ensured that the workshops happened without a glitch. We would also like to thank Sahana Jose from Rohini Nilekani Philanthropies to have supported us through this study.

Our entire team is extremely grateful to the 47 members from civil society organisations, Businesses, policy experts and government officials whose knowledge, understanding and generosity has this report has been made possible. The study documents the challenges and gaps, and therefore opportunities within the sector from a systems level view.

On behalf of our team,

Fields of View.

April 2023.

Table of Contents

Introduction	4
Methodology	5
Boundaries of waste	5
Conceptions of waste	6
Sources of data, and data collection	7
Framework for analysis	8
Findings from the Study	9
Landscape of issues	10
1. Civil society organisations:	10
2. Recyclers, waste processors, and industry:	12
3. Policy Makers:	14
Stakeholder network analysis:	16
Potential Pathways	19
The current state of philanthropic intervention:	19
Avenues for philanthropic intervention.	20
1. Formal institutional space	20
2. Social space	20
3. Technological/Infrastructure space	21
ANNEXURES	22
Annexure 1: Methods of the study:	23
The EQUITY WORKSHOP	23
Annexure 2: References used in the study:	30

Introduction

According to the Central Pollution Control Board (CPCB) report, that urban India generates between 1,30,000 to 1,50,000 tons of municipal solid waste every day – some 330-550 grams per urban inhabitant a day. At current rates, this will jump to some 125 million tons a year by 2031. It is estimated that around 800 million tons have been ‘disposed of’ in the 3,159 dumpsites across the country, without segregation or processing.

Bangalore has Mandur, Mavallipura, Lakshmipura, and Bingipura. Mumbai has Deonar, Mulund, and Kanjurmarg. Delhi has Ghazipur, Okhla and Bhalswa. Chennai has Perungudi, Kodungaiyur, and Tiruvottiyur. Indian cities cannot seem to exist without these dumping grounds for urban waste.

The issue of solid waste, one of the most visible issues we face, is a contentious ‘wicked problem’¹ involving multiple stakeholders with differing perspectives on what the challenges are, and how we can address these challenges. In the following report, we unpack this complex issue of solid waste² by providing a multi-stakeholder view of the landscape of issues, and avenues for action and change.

In this report, we analyse the various actors and their work in the space, and looked at the challenges faced by them and their means of addressing these issues to come up with areas of interventions that philanthropies could support, or other actors could use as a way of better understanding the ecosystem. The report also looks at the current landscape and where philanthropic investments have been used.

¹ (Rittel, Horst WJ, and Melvin M. Webber. "2.3 Planning Problems are Wicked." Polity 4 (1973): 155-69.)

² The wicked problem of waste management: An attention-based analysis of stakeholder behaviours
Giuseppe Salvia, Nici Zimmermann, Catherine Willan, Joanna Hale, Hellen Gitau, Kanyiva Muindi, Evans Gichana, Mike Davies

Methodology

In this section, we provide an overview of the methodology followed to unpack this complex issue of solid waste, the findings, and a synthesis of the primary and secondary data that lead to what the potential opportunities in the space are.

Boundaries of waste

For the purposes of this effort, the focus is on municipal solid waste. While the bounds of waste are difficult to limit since a lot of waste work involves dealing with mixed compositions, we have limited the scope of the study to inorganic, non-biodegradable dry waste, which includes plastics, paper, glass, metal, textile, and wood. Therefore, in the report, whenever we refer to solid or dry waste, it is these kinds of waste we are referring to. We have not included e-waste, biodegradable waste, bio-medical waste, and construction waste in the study directly.

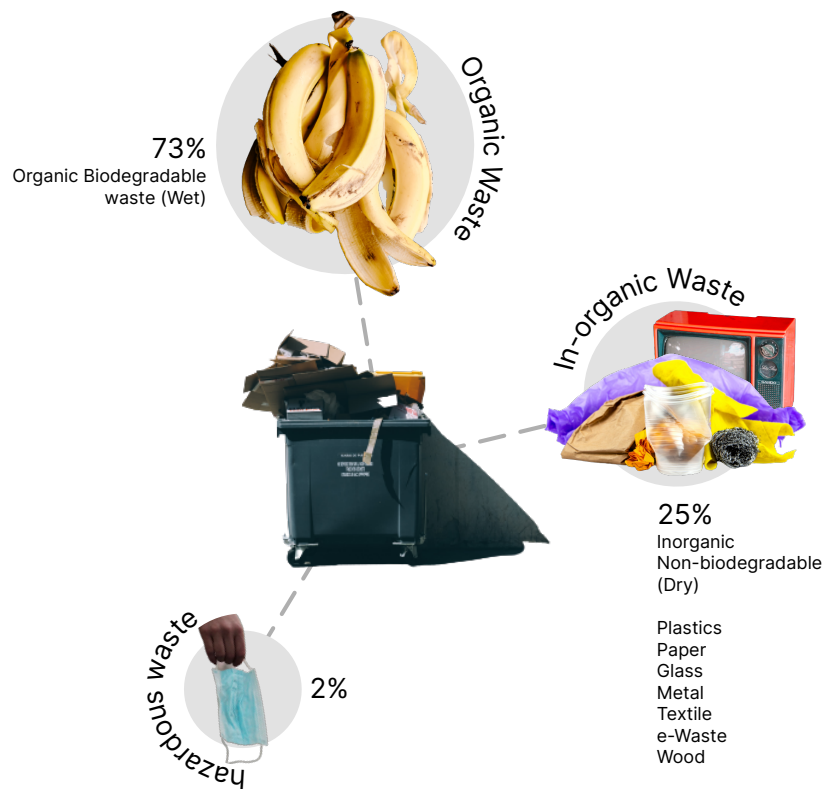


Figure 1 Types of waste³

³ WASTE-WISE CITIES Best practices in municipal solid waste management (Niti Ayog 2021 CSE)

Conceptions of waste

'Waste' is often framed as what ensues after a product is no longer useful and is discarded⁴. Such a framing of what waste is obfuscates the production and design process that created the product in a certain way, which has critical implications for how much waste is created and when. This framing takes a very limited 'post-consumption' view of the material without accounting for the broader choices that led to this kind of wastage.

In order to widen the perspective of the conception of post-consumer waste, we reframed the focus to the entire supply chain, so 'waste' can be viewed as a systemic problem beyond its points of origin. To demonstrate how waste can be seen as a systemic problem, let us take the example of a mop, which includes metal, plastic, cloth, and cardboard for packaging. Various actors influence the flow of the product across the material cycle, and there are different challenges that affect the material cycle. If waste was perceived as only what results after the consumer has discarded post-use, then the rest of the materials that enabled the mop to be delivered and used remain unaddressed, and the view of the ecosystem seems to be restricted to where the consumer is the point of origin of waste.

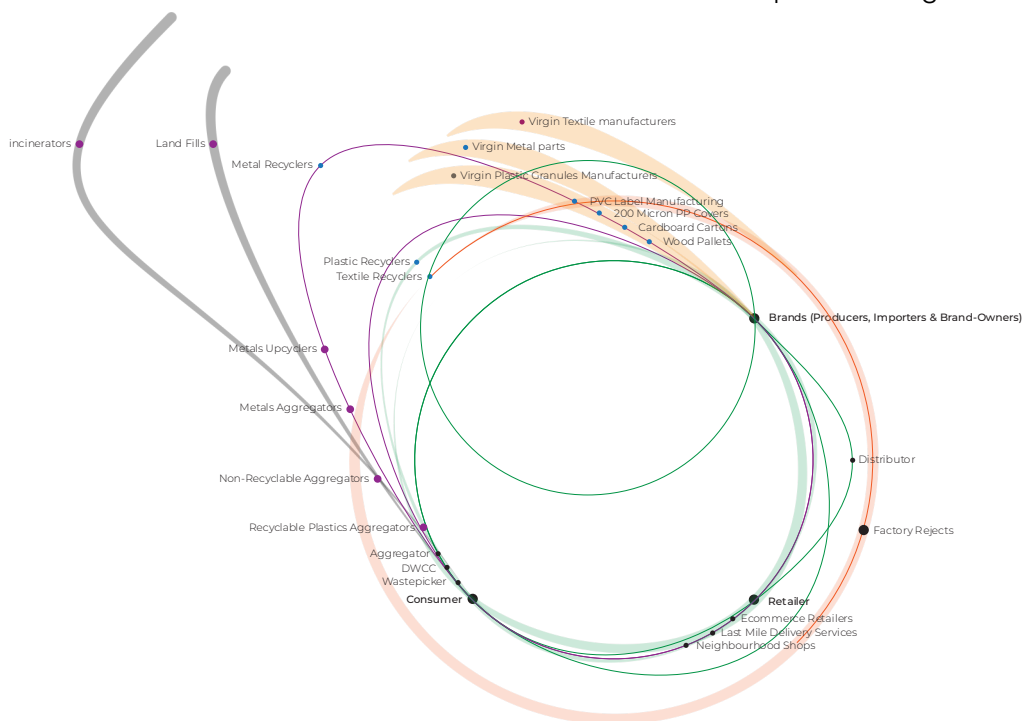


Figure 2: The lifecycle of a product, from producer to end of life.

⁴ [Un department of solid waste](#)

The Mop in question, was purchased from the IKEA website (ikea.in) while IKEA has a store in Bangalore (where the study was being conducted), the mop was shipped from their Mumbai store, and delivered in a cardboard box, wrapped in cling wrap made from Polypropylene, with assembly instructions on paper. Everything except the mop shall be discarded within hours of delivery of the mop, without contamination, and the mop shall be discarded only after it has fulfilled its use in a few months/years. Depending on the city we live in, these discarded mops will be taken by a waste picker, a waste collection agency or an employee of the city.

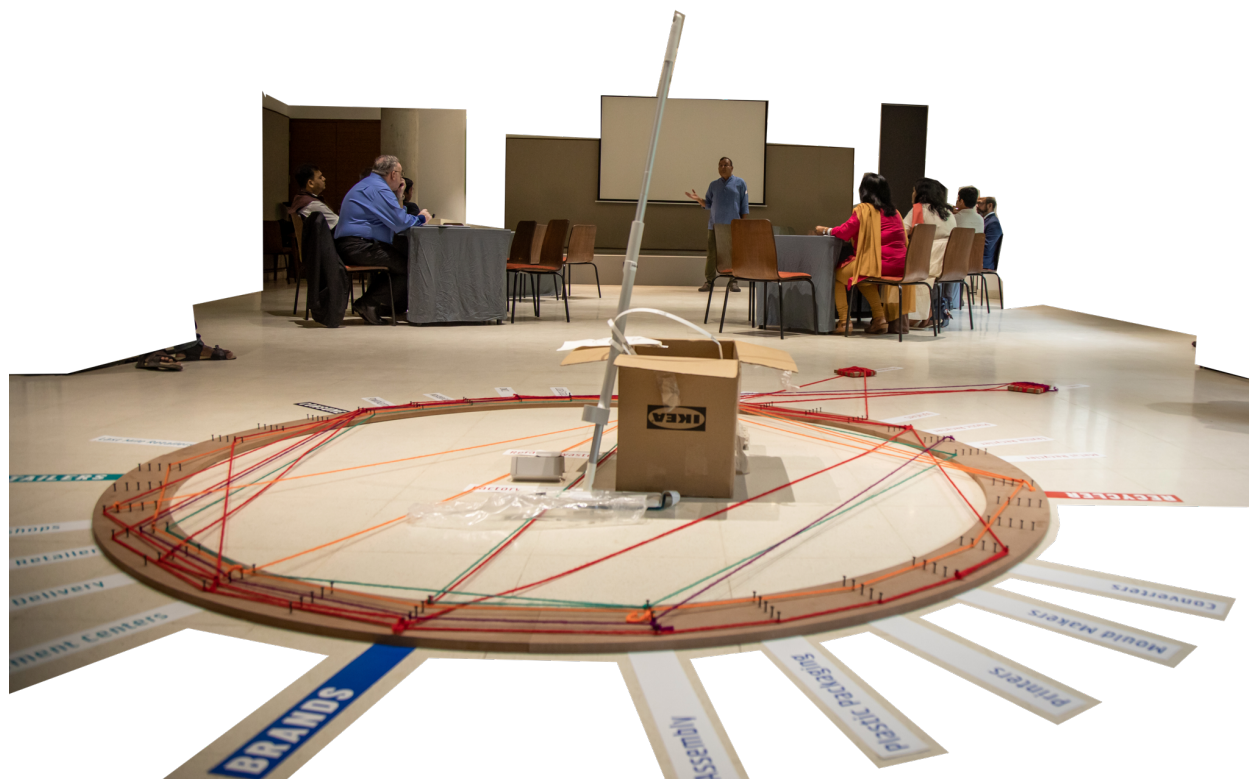


Figure 3: Workshop installation. Lifecycle as an artefact.

Sources of data, and data collection

As shown in the material cycle, there are different actors involved in different stages of production, whose perspectives on what are the key challenges affecting the system and how to address them differ. To examine the landscape of issues from the perspective of different stakeholders and to understand what pathways are prioritised, activity-based workshops and one-on-one interviews were conducted to elicit data. We consulted 22 civil society leaders, 17 industry experts, 3 public policy influencers through the process. (The Appendix 2 has details of the design of the activity-based workshops.) The data from the stakeholder consultations was supplemented with secondary research and interviews. (The Appendix 3 has details of the references used for the secondary research.)

Framework for analysis

From the stakeholder workshops and interviews, and secondary research, we collated data on what the problem landscape was and what the stakeholders deemed as critical areas of intervention. As the goal of our analysis is to examine what interventions hold promise for action and change, we needed to unpack these interventions from a systemic perspective. To do so, we used an analytical framework adapted from Douglass North's framework⁵, which is used to analyse technological interventions in the development space. Both issues and pathways were therefore examined in terms of how they affect or transform the following spaces:

- **Institutional space:** The institutional space deals with formal institutions, such as government, policymaking, and international agreements and policies.
- **Social space:** The social space deals with people and their capabilities.
- **Technological/Infrastructural space:** The technological and infrastructural space deals with tools, process, and infrastructure.

We have divided the findings from our workshops and interviews under these three categories. The recommendations will all be framed in the same division.

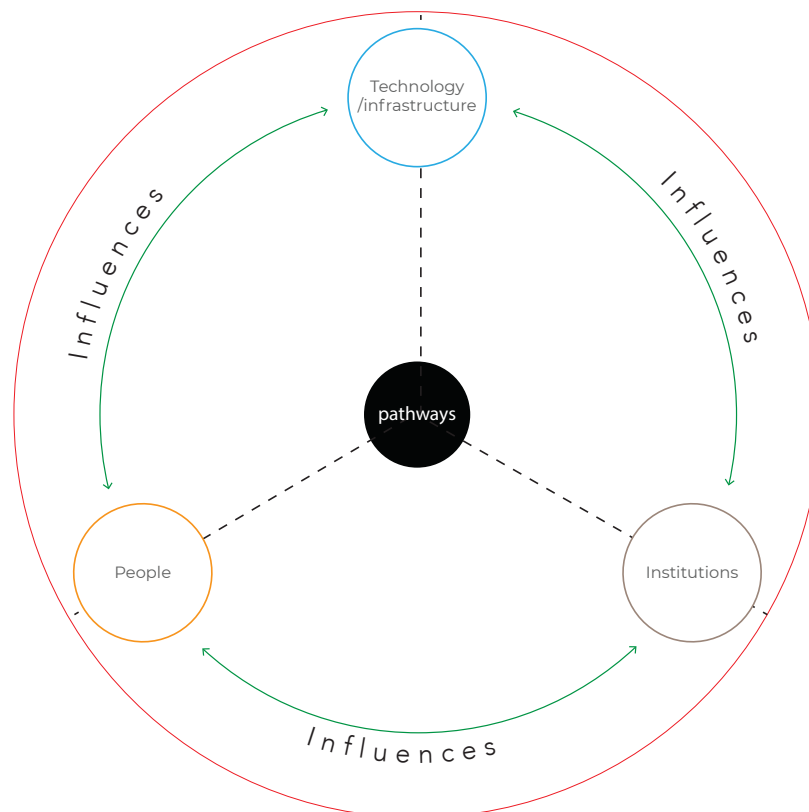


Figure 4: Douglass North, *Theory of Institutional Change*

⁵ North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge University Press.

Findings from the Study

How 'waste' is framed

Based on the data collected, it emerged that there are three ways in which 'waste' is framed by various stakeholders. Frames⁶, as proposed by cognitive linguist George Lakoff, are a web of associations, and operating within a frame implies invoking these associations. Thus, the framing of waste drives both the efforts undertaken and what kind of policy framework the stakeholders advocate for.

The three framings of waste are as follows:

1. **Waste as valueless excess for disposal:** In this conception of waste, it is seen as something that does not hold any value, and the only action that can be taken with respect to waste is that of disposal. Therefore, the focus of the actions is on effective and sanitary disposal.
2. **Waste as a resource to be mined:** In this conception of waste, it is seen as a resource that provides monetary value. Therefore, the focus of the actions is on how to acquire waste, and how to extract value from it.
3. **Waste as a social problem:** In this conception of waste, it is seen as being intimately linked to people; as a means of livelihood for people, and as a means of social mobility. Therefore, the focus of the actions is on how to achieve mobility for those who are engaged in working with waste.

In the following section, we present how different stakeholders adopt different kind of framing, and their perspectives on what are the key issues that affect the system, and what pathways hold promise. First, we will present the landscape of issues as identified by different stakeholders, followed by the pathways to address these issues.

⁶ Lakoff, G. (2004). Don't Think of an Elephant! Know your values and frame the debate. The essential guide for progressives.

Landscape of issues

As with the framing of the problem, we split the actors into three groups, civil society organisations; businesses in the material cycle, (producers, recyclers, waste handlers); and policy influencers at various, city, state, and national levels.

1. Civil society organisations:

The civil society organisations view waste as a social problem. They situate the issues related to waste in a broader context framed by capitalism and neoliberalism, which fuel a consumerist culture. In addition, caste and gender were identified as systemic markers that affect the issue of solid waste management.

The issues identified by civil society organisations in the formal institutional space, dealing with government and policy, were higher compared to the issues they identified in the other two spaces. This shows how much influence regulatory and governing bodies and policies have on the sector, especially when viewed from the perspective of vulnerable groups, such as waste workers.

In the formal institutional space

Failure of the outsourcing model

In the waste management eco-system in many cities across India, the contractors and concessioners hold disproportionate influence. There is limited or no accountability on where the waste is sent, or what happens to it. It also disincentivises any segregation activities that any of the citizen groups or civil society organisation might want to undertake and bulk transfer of waste.

Standards and conformity

The Extended Producer Responsibility laws are not consistent, which makes it difficult for CSOs to participate in the process meaningfully. The current Pollution Control Board platform for reporting only looks at transactions between recyclers and brands without including the source of waste as a category. This makes any inclusion of the informal sector a purely voluntary exercise, without it trickling down to the points of collection.

Lack of transparency

Given that many of the implementation systems and governmental processes are opaque, it does not provide avenues for CSOs to participate and influence these processes meaningfully.

In the social space

Behaviour change issue:

Segregation of waste at the source or segregation of waste by end-consumers is a critical issue for the rest of the supply chain of waste. If segregation of waste is not followed, then many of the existing processes end up becoming redundant. Bringing about behaviour change among citizens and other producers of waste to follow segregation of source is a critical challenge.

Inequity:

In both imagining and implementing policies and efforts in waste management, the roles and rights of waste pickers are not recognised. In addition, despite the waste pickers providing critical services to support the waste eco-system, the compensation for recovery is not adequately passed down to them.

In the technological space

the civil society organisations looked at the landscape in two ways, technology for processing of waste, and technology for accountability and transparency. Both these were looked at as barriers for waste pickers and workers in the informal waste economy to participate in any meaningful dialogue around their participation and inclusion in the system. The key issues identified were:

Lack of inclusion in transparency tools:

Technology for transparency products, like online marketplaces, traceability services, or even the Pollution control Board's own platform are inaccessible to large part of the informal collection and recycling space, either by way of the policies (like EPR not requiring mode of collection, or having a minimum price passed down to waste pickers for collection) or by way of exclusionary design (taking into account literacies, proficiency in technology, the undefined material composition that makes reporting difficult).

Infrastructure exclusion:

The cost of setting up recycling plants, and material recovery facilities is prohibitive for the waste pickers to invest in, and large corporations end up setting up these units in a way that the waste collection layer is pushed to lower their income from collection.

2. Recyclers, waste processors, and industry:

The industry actors, such as the recyclers, waste processors frame the issue of waste as a resource to be mined. Within such a framing, inclusion of waste workers and other informal workers is deemed an expensive and inefficient exercise. Since the industry actors benefit from recovery of recyclables or by support from government mechanisms or through fees from users and polluters for handling non-recyclables, direct access to waste is their biggest challenge. In addition, as SWM is not treated as an 'industry', the industry actors identified this issue as a major hurdle in terms of how policies are framed, and support is provided by the government. Recyclers also look at the lack of a stable policy framework as one of the big issues that make it hard for them to scale.

The industry leaders look at policy issues from the perspective of what directly affects them. The key issues they identified in:

formal institutional space:

A lack of a consistent policy framework.

The changing rules of plastic waste management makes it tough for industry actors to report waste collection and participate in EPR in a meaningful way. This issue was identified across actors from collectors to aggregators to recyclers.

The lack of a well-rounded policy around use of recycled materials

Owing to a lack of a robust post-recycling materials use policy lowers the demand for recycled materials. BIS (Bureau of Indian Standards), and FSSAI standards for using recycled materials in production will greatly enable integration of recycled materials into product design considerations. These policies are still in development, but the PCB in 2022 has announced the need for using recycled materials in packaging, without the standards being set for what can and cannot be used.

End of life policies

For materials and their composites that cannot be recovered or recycled, due to contamination, composition, or other factors, are infrastructure heavy and with inadequate infrastructure available for recovery or safe disposal of materials⁷. Typically, most materials end up with either a managed landfill or in incineration facilities like cement and waste to energy ⁸power plants, but the efficacy of doing these at scale is still being questioned.

⁷ [Annex IX, Base convention, list of waste](#)

⁸ [Why waste-to-energy plants aren't the ideal solution for managing our trash](#) | Tol, August 2021

Social Space:

Informal sector as competition

While all industry and recyclers want more active citizen participation for better segregation at source so that uncontaminated waste can be procured, they look at inclusion as an additional expense that increases their costs of recycling. Since participation in circular economy does not require them to have social inclusion as a part of their work, the industry leans towards more efficient, less inclusive modes of operation.

Informality as competitive advantage

The recyclers feel they compete with the informal sector for access to materials. And the recyclers prefer to maintain a degree of informality themselves to withstand shocks to the system.

Technological/Infrastructure space:

To the recyclers, the lack of efficient technology to handle mixed waste, or waste with high moisture content makes it difficult for them to use post-consumer waste.

Contamination of all forms in waste leads to inefficiency

Food packaging, (PET and blends) also colloquially known as bio-plastics (not to be confused with bio-degradable plastic, which also ends up stressing recycling mechanisms through contamination), don't have a full-fledged independent recycling process and end up either contaminating the recyclable materials supply chain. This is seen as a stressor for the recycling industry.

Mono-materials vs mixed waste

While formal large-scale recyclers handle mono-materials, the informal recyclers use a mix of plastics to make products (mugs, buckets, toys, containers, and other such items), which ostensibly appear to have the same characteristics (shine, appeal) as mono-material products, but have a shorter shelf life. With large volume recycling available for only certain types of mono-materials, the informal sector plays an important role in circularity of materials, but also is harder to disrupt through innovation.

3. Policy Makers:

The policy landscape that affects the solid waste space is complex and enmeshed. The policy apparatus does not operate with a unified frame; rather, depending on the leaning of the State/Urban Local Bodies (ULBs), the ministry and the department that the material falls under, the conception of waste and the nature of the industries being governed, waste is framed in one of the three ways described earlier. For example, in Indore, Madhya Pradesh, the conception of waste is that of resource, where the ULB favours large, centralised waste processing facilities that are supplied waste directly without involving the informal sector, to maximise their income from it, versus Pune, or Bangalore, that view waste as a social problem that needs to be addressed through inclusion. When ULBs focus on large Waste-to-Energy plants the conception leans towards waste as an excess that needs to be discarded. This also happens at other levels of policy, where the Ministry of Mines's recycling framework treats waste as a resource, while the vehicle scrappage policy treats all non-metal components as excess that need to be disposed.

Below, we describe the implications of the policy framing adhering to each of these frames.

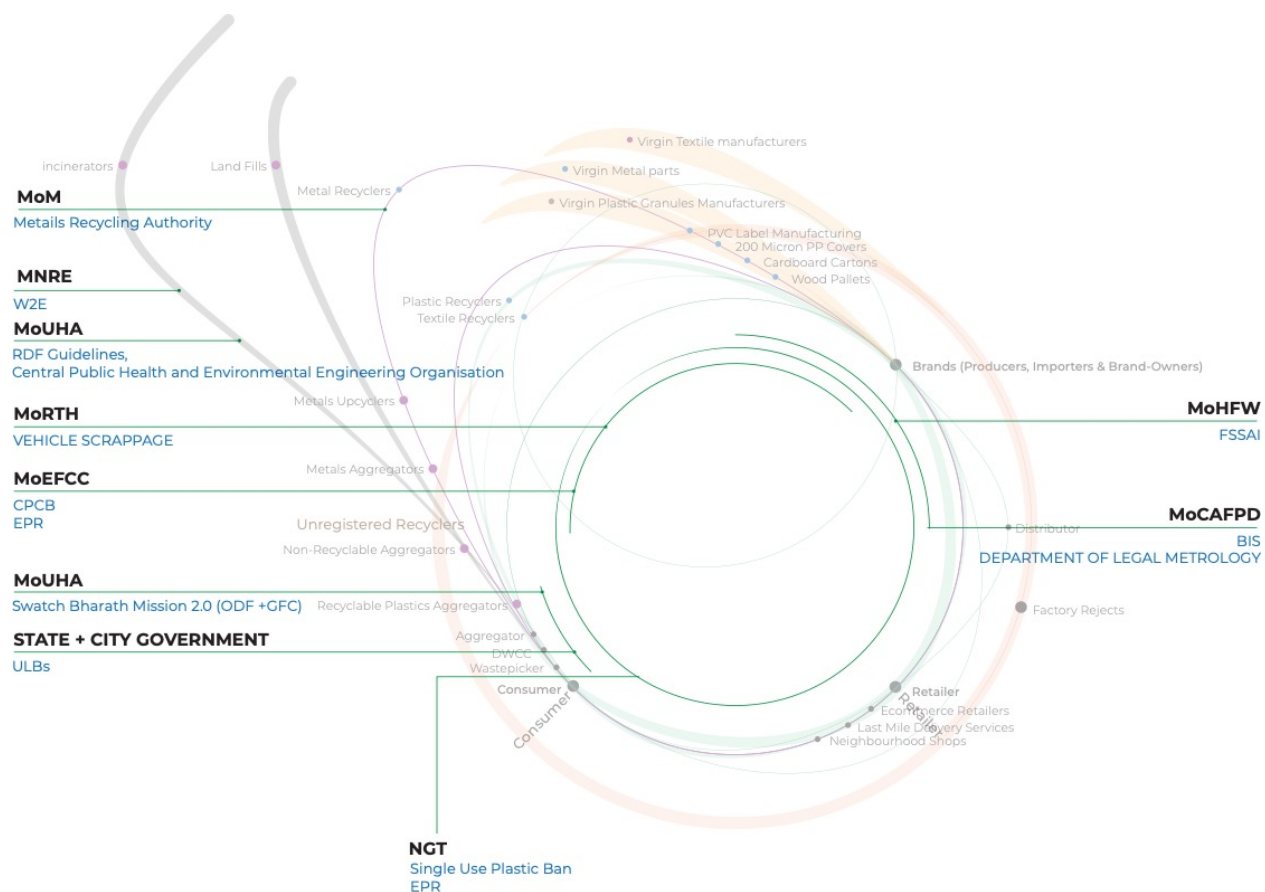


Figure 5: Policies that govern the solid waste landscape

Policies framed viewing waste as valueless excess for disposal:

If the policy operates framing waste as something to be discarded, the focus is on building large, centralised facilities with typically resource intensive processes like chemical recycling or waste to energy plants. Source segregation programs are not particularly encouraged. Contractors and concessionaires are given a tipping fee for waste collected and shipped to the processing facilities.

The setting up of large waste to energy campuses; decentralised facilities being shut down and turned into transfer stations all reflect the framing. The model draws from the waste as a resource model, which also focuses on creating centralised facilities instead of . Under this model, given the increasing quantities of unsegregated waste, it is difficult to shut down landfills or turn them into scientifically managed landfills. Legacy waste management companies, that benefit from the tipping-fee system, become high in demand in this model.

Policies framed viewing waste as a resource to be mined:

If the policy leans towards waste as a resource, you see a lot of the centralisation efforts, like the previous model, but with the additional spending on citizen participation in source segregation to ensure that the value from waste can be maximised. A user fee over a tipping fee model is preferred but since recyclers become central to these policies, inclusion of the informal sector becomes a challenge. The informal sector's work is viewed as pilferage which needs to be curbed. Such a framing is followed in areas with large-scale recycling infrastructure.

Under this model, the idea of inclusion of informal workers is diluted and interpreted as employing waste pickers in minimum wage jobs, with reduced opportunities for poverty alleviation, and does not consider the lived experience of the workers. The legal framework for setting up recycling facilities also becomes harder for non-compliant industries to exist.

Policies framed viewing waste as a social problem:

If policy model leans towards treating waste as a social problem, the policy framework is built keeping the inclusion of informal waste workers at its core. The 2016 Solid Waste Management Rules had inclusion at its core before the framing for transparency changed from waste collection to waste as the framing shifted from waste as a social problem to waste as a resource. Transparency and traceability prove to be a challenge under such a framing since a lot of granular information needs to be collected for accountability. At an Urban Local Body (ULB) level Bangalore, Pune, and Kerala all follow this framing for their waste management plan. This framing also makes Extended Producer Responsibility (EPR) fees to be more cognisant of the true cost of recovery of material from multiple geographies to centralised recycling facilities. This framing also encourages to take the full ecosystem into account as against just at the point at which material becomes waste is more complex

in this leaning, but from a policy perspective the chances of more considered approaches increase.

Stakeholder network analysis:

Given multiple stakeholders, and the interconnections between them, we analysed the nature and strength of the interconnections to examine what the network reveals about the extent of influence and lack of influence of different actors. The data was collected through a series of workshops where civil society organisations and businesses in the ecosystem were asked to illustrate the actors they influence, and the actors influenced by them. This exercise resulted in a network map of the ecosystem, with a comprehensive list of actors and the influence they have on others.

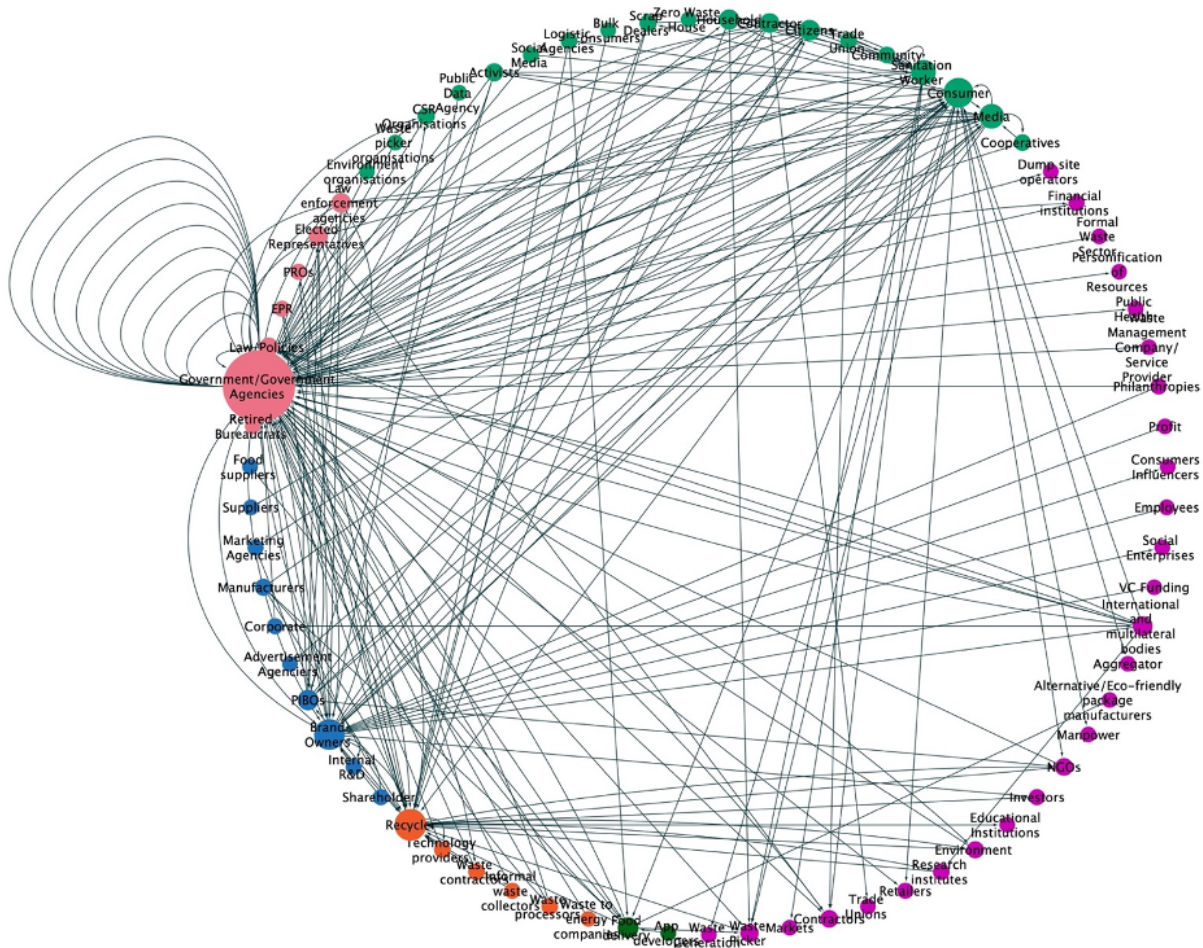


Figure 6: Network of actors (derived from the workshops)

In the post-consumer materials space, the producers (who produce the material that enters the system) have a heavily influential position, while recyclers are heavily influenced by

others, from source of waste to aggregators supplying them the quantities of waste. Both the producers and recyclers are sparsely connected in the network where the recyclers have little influence over the choice of materials the producers use. Given the recyclers presence in the cycle is to bridge the gap between linear and circular ecosystems of production, it is critical for them to be involved in the design at the production stage.

Owing to the fractured policy landscape, and the high impact on the overall cycle, the effect the policy space has on the ecosystem is uneven. While government policies, and agencies have a heavy influence on the ecosystem, due to a lack of cohesion between agencies and departments, we see a lot of unintended shifts in the landscape. For example, if the material use guidelines were more robust, the recycling industry could have a more stable market for their produce, or if the transparency and reporting for EPR included the ULBs, it would make inclusion conversations far easier.

Collection of waste is done by multiple actors, from waste pickers to contractors and concessioners, who are incentivised in multiple ways. Since the actors post the consumer have very little influence on how material choices or materials flows are designed, the consumers being central to the generation of waste, have a lot of influence on the quality of materials sent for processing. Without source segregation, all actors subsequent have their systems stressed with contaminated materials.

In regions where contractors are hired to carry waste from households to processing facilities, the contractors have disproportionate power over the informal sector (as they gatekeep access to waste, and prices), but limited influence on source segregation since their income depends on volumes of waste and not quality. For waste pickers – while they have low influence on the ecosystem, they are highly influenced by various actors. Policy, industry, climate shifts affect them disproportionately in comparison to the other actors, and in any ecosystem shift, their voices need to be represented owing to this phenomenon.

We compared how the various groups namely Producer, Retailer, Consumer, Recycler, Government and Others are connected in the overall network. We measure the density and degree of centrality by measuring the ratio between the current connection of the group in the network, and the number of in and out connections with other actors. Measuring density gives us a sense of the influence the actor holds over the system. The density of connection of different groups are shown in figure 7, We can see that Retailer, Recycler and Producer are least connected in the network.

Name of stakeholder	Influenced by	Influencing Actors	Influence ratio
Waste Picker	6	0	0.0
International and multilateral bodies	1	8	8.0
Household	11	10	.9
Consumer	26	24	0.9
Brand Owners	16	16	1.0
Recycler	22	11	0.5
Government/Government Agencies	72	64	0.89

Potential Pathways

As seen in the previous sections, various stakeholders, based on what framing of waste they adopt, have prioritised different pathways as critical for the system to improve. In this section, we synthesise various perspectives on what pathways are critical to examine which are potential avenues for philanthropic intervention.

The current state of philanthropic intervention:

According to a 2022 report by Dasra⁹, Since 2006, the private sector has invested about \$620 million, mostly towards Swachh Bharat schemes and behavioural change communication. While this money is necessary, but it is as critical to invest in infrastructure, inclusion, and innovation programs for the ecosystem to evolve.

In the formal institutional space, a large portion of philanthropic support is going towards setting up government programs as a subset of urban sanitation and health care. a substantial portion of the funds do end up in capacity building work and awareness campaigns, support for strengthening material considerations and safeguards that will help accelerate the uptake of circular economic systems is limited.

In the social space, there is support for inclusion and behaviour change work with some support on policy advocacy, but the sector also requires a lot of support to help organise the informal sector. Currently the landscape is supported through social inclusion and behaviour change programs, but funding for organising the informal sector, and funding for research in understanding the relationship of waste and informality and climate is limited.

On the technological/innovation front, investments are being made into low carbon materials and material recovery technology, and as much in reporting and transparency through marketplaces and credits, while these help the industry at large, we have ways to go before post-consumer waste has the access to recovery technology equivalent to that of pre-consumer waste.

⁹ [Total private philanthropic giving in India estimated to grow at about 12% annually](#) The Economic Times (indiatimes.com)

Avenues for philanthropic intervention.

1. Formal institutional space

Bottom-up policy framework

While systems like EPR (extended producer responsibility) have existed in the space for a while, and they do have some accountability mechanisms built into them, but as evident by the network analysis there is more that brands and government institutions could do to bring about change at scale. There is a huge gap in the policy space for frameworks of use of recycled materials back into products. The FSSAI and BIS both need to provide more material considered frameworks for encouraging use of these back into the material cycle. Support for new materials and products research, that have a more ecosystem approach to design would go a long way in bringing about circularity of materials.

Reimagination of plastic credits and other modes of financing

A reimagining of the funding and financing of the landscape is a big opportunity for new philanthropic interventions. An inclusive and transparent credits mechanism for participating in the recovery of waste that considers a true cost of recovery instead of a standard reporting fee would bring more accountability to the ecosystem. Investments in building measurement metrics for circular economies, and their long-term impacts can help mitigate some of the unintended consequences of rapid scaling of solutions.

2. Social space

In the last few years, as policies in reporting waste processed have become about the link between recyclers and brands without including ULBs, informal waste pickers or CSOs and enterprises working on aggregation/collection infrastructure, it has become difficult to hold brands accountable for their role in the ecosystem.

Advocacy Commons

There are a whole host of organisations working in their own capacity for inclusion of the waste picker and waste work into the product cycle, while the alliance of waste pickers does bring these organisations on the same platform and on a host of issues, there is still a gap in how knowledge commons is created for advocacy. The alliance has made strides into inclusion programs within the government, their voices remain under-represented with industry groups and national level policy conversations. The CSOs in the space also require support with more sustained long-term work rather than short term projects to bring about more sustainable change in the ecosystem.

From Just transitions to climate infrastructure.

The leaning for advocacy work by CSOs has been towards inclusion of workers relies heavily on just-transition in the larger fossil fuel transition framework instead of building their own independent movement. While strategically it makes sense to be included as a voice in a larger movement (to represent workers in waste), Building an independent movement specific to waste work beyond just a worker's movement, but also an inclusive climate movement that takes materials, people and, a more nuanced and considered roadmap for inclusion of waste pickers can be made.

3. Technological/Infrastructure space

Transparency and accountability

Technology for reporting help with bringing transparency and accountability in waste management, by facilitating access to waste-related data, promoting citizen engagement, and supporting regulatory compliance. This can help build trust and confidence in waste management systems, while also encouraging responsible waste behaviour among individuals and organisations. Current technology solutions for reporting and trade are mostly exclusionary where only aggregators, recyclers of a certain scale can report. For a fully tradable ecosystem in waste, technology solutions for reporting must permeate all the way to the collection systems, where waste pickers can independently report volumes and materials, for the recyclers to accept.

Post-consumer waste recycling framework

Recycling is far more efficient when done in large volumes, the aggregation greatly helps subsidise the cost of infrastructure and processing. Today's technological solutions are more geared towards post-production waste than with post-consumer waste. Post-consumer waste, because of the amount of work required to sort, grade, clean and finally process into usable materials, invariably ends up being handled by the informal sector that mixes materials to achieve desired properties at lower costs, and with lower potential for recovery in the future. Post-consumer waste processing requires a lot more research in material properties, usage, contamination, and deterioration to reduce the amount of virgin materials we produce. This is a relatively untapped area of investments until less than a decade ago.

Ecosystem led material considerations

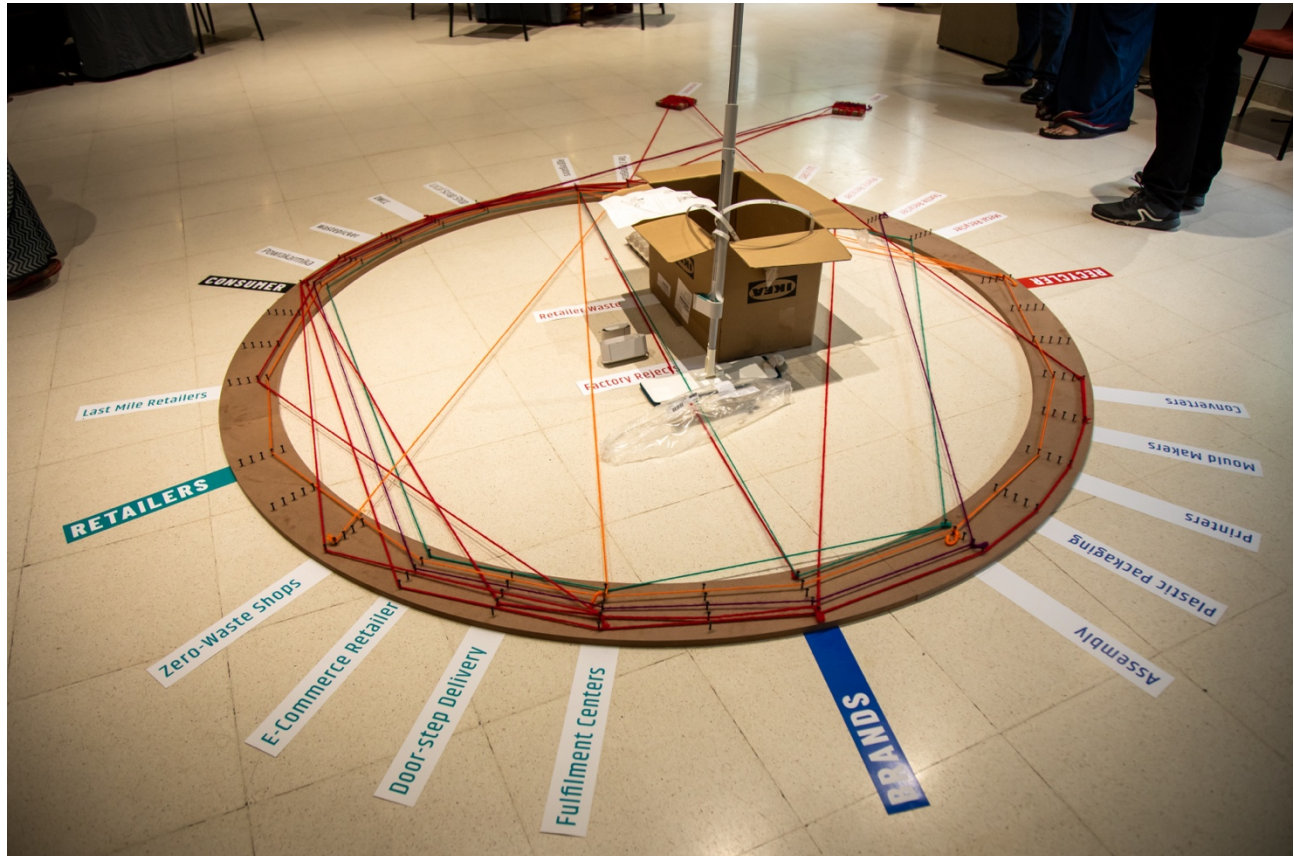
Innovation in new materials and product design, that are more ecosystem compatible with material handling, use, and eventual disposal/recovery in consideration, rather than solving just for user needs or costs, will bring about long-term sustainability to the space.

Annexures



Annexure 1: Methods of the study:

The EQUITY WORKSHOP



INTRODUCTION

In game terminology, a field of view refers to what is visible to the player. Fields of View thus refers to the common ground, where different people with different perspectives can come together and have a dialogue. At FoV, in order to design tools, we have developed an in-house interdisciplinary methodology that involves participation of different stakeholders which we developed into the workshop. The disciplines we have drawn from to design the workshop include design theory, ethnographic and studies of collaborative work settings, and theories of cognition.

Drawing upon our in-house interdisciplinary methodology, the workshop thus involves a guided process involving two phases — the Problem Articulation phase and the Design

phase. The first phase of the workshop, the problem formulation phase, involves participants working through different activities that lets them come up with a commonly agreed upon problem statement. The problem formulation phase is followed by the design phase, where the participants work together to imagine futures and figure out how to design for these transformations.

Phase 1: Problem Articulation



“The search for scientific bases for confronting problems of social policy is bound to fail, because of the nature of these problems. They are "wicked" problems, whereas science has developed to deal with "tame" problems. Policy problems cannot be definitively described. Moreover, in a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about "optimal solutions" to social problems unless severe qualifications are imposed first. Even worse, there are no "solutions" in the sense of definitive and objective answers.”

- Horst W.J. Rittel and Melvin M. Webber, 'Dilemmas in a general theory of planning'

In their paper, Rittel and Webber defined a certain set of problems such as problems related to social policy as 'wicked problems'. Such problems have no true or false solutions, rather what we have are a range of options. Even defining what a wicked problem is a contentious process, because of differing perspectives. For instance, is poverty the problem, or a lack of opportunities, or a lack of adequate skill sets to avail oneself of those opportunities or the education system? Wicked problems inherently are complex, and thus even articulating what the problem is, is in itself a wicked problem. Thus, in order to formulate what the problem is, we need a space where the participants can meaningfully deliberate, discuss, and come to a consensus. In the first phase, we create such a space.

Activity 1: List of problems

Type: Group activity

Outcome: Minimum 'acceptable' set of problems common across groups

Description: The participants are asked to break out into smaller groups (3-5 participants in each group) and discuss the nature and type of the problems they would like to address and prioritize in their group. We ask the participants to then list the problems on Post Its to ensure that it is stated as clearly and unambiguously as possible. We then ask them to vote on the top ten problems they would like to work on during the exercise.

Activity 2: Actors and institutions



Type: Group activity

Outcome: Defining individual/collective actors and institutions for the previously selected problem set and mapping the relationship between them.

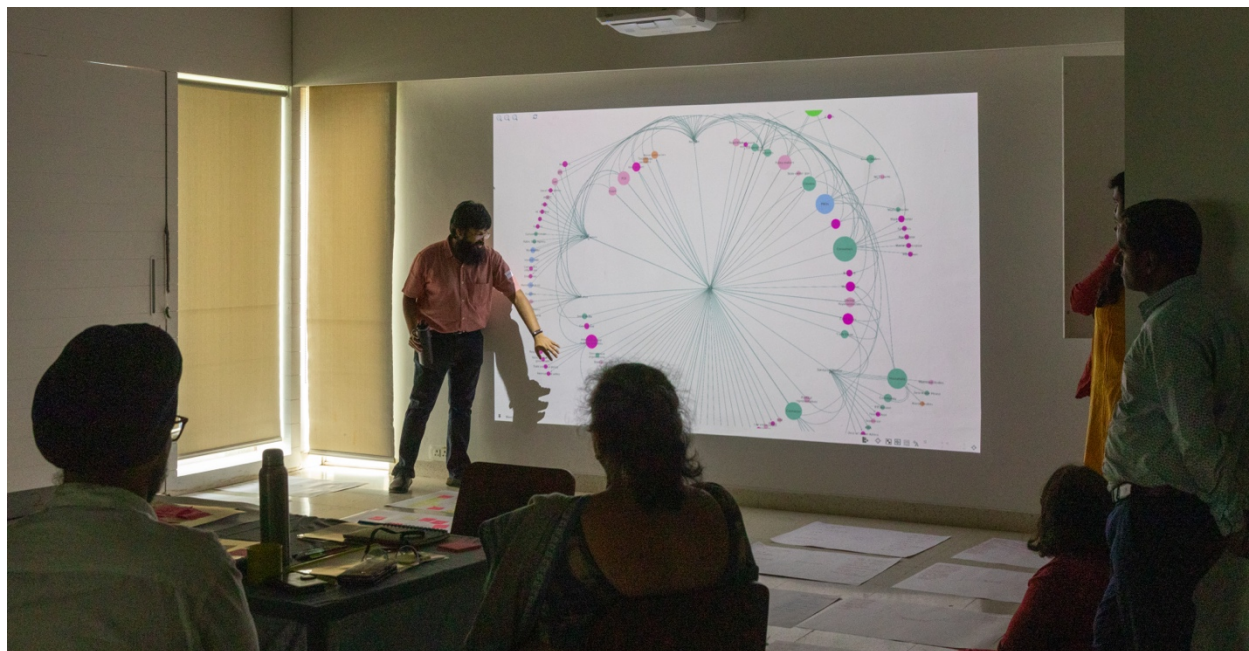
Description: In the actor space, the actors could either be individuals/groups who are associated with the problem or affected by the problem. In the institutional space, the actors are the more cultural and formal institutions that can shape the problem space. The groups can then map the relationship between the different stakeholders and add/remove/modify any problems that were listed in the first session.

Activity 3: Refining problem statement

Type: Group activity

Outcome: Understanding of stakeholders constraints and resources, and refined problem statement.

Description: Each group picks a smaller set of problems and lists all the actors (both individual and collective) and the associated institutions for each problem. For each of the stakeholder, the group will list the resources at the stakeholders' disposal and the associated constraints for them. At this point, groups can then redefine the originally stated problem and iteratively map the stakeholders.



PHASE 2: Design



Where roads are made I lose my way.
 In the wide water, in the blue sky there is no line of a track.
 The pathway is hidden by the birds' wings, by the star-fires, by the flowers of the wayfaring seasons.
 And I ask my heart if its blood carries the wisdom of the unseen way.
 - Fruit gathering, Rabindranath Tagore

Design is about creating the future, an attempt to discover the unseen way. Design is about creating something that does not exist, it is about forming new knowledge, and concepts. In the second phase of the Fields of View workshop, we explore design — having identified the problem, how do we design for it? How do we imagine futures, and how do we make that future concrete?

Activity 1: Newspaper of the future

Type: Group activity

Outcome: A vision of the future where the world has evolved due to their work.

Description: Each group picks one problem and lists possible scenarios in a time frame of their choosing, the format of communication is a newspaper front page. The participants then creatively demonstrate their vision of the future.



Activity 2: How-to transitions

Type: Group Activity

Outcome: A roadmap for the future

Description: Each group defines the “How?” transition between the now and the three what-if scenarios in the short, medium, and long-term.

List of participating organisations:

1. Saahas
2. Chintan
3. “DBRC (Dalit Bahujan Resource Centre) /
4. AIW (Alliance of Indian Waste pickers)”
5. Swachhata Pukare
6. Better Bhalaswa
7. Sarthak

8. Waste Matters
 9. Indian Green Services
 10. Rise Foundation
 11. Planatearth
 12. NEEDS
 13. "DBRC (Dalit Bahujan Resource Centre) /
 14. AIW (Alliance of Indian Waste pickers)"
 15. Hasiru Dala
 16. Alliance of Indian Waste Pickers
 17. SWMRT
 18. Direct Initiative for Social and Health Action
 19. Indian Green Services
 20. Hand in Hand
 21. Sensing Local
 22. Waste Warriors

 23. GPS Renewables Pvt Ltd
 24. Riteways Enviro Pvt Ltd
 25. Kangaroo Hydraulic Pvt. Ltd.
 26. Eco Pro Environmental Services
 27. Cde Asia Ltd.
 28. Greentech Environ Management Pvt Ltd
 29. Carbon Masters
 30. Druid Systems
 31. Recity
 32. Recykal Foundation
 33. Msgp Infra Tech Pvt Ltd
 34. Hasiru Dala Innovations
 35. Clean Cunoor
 36. SWaCH
 37. Ndmc (Dc, Karolbaug)
-

Annexure 2: References used in the study:

Framework and Methodology

[Theory of Institutions](#), (Douglass North)

[Dynamic Material Flow Analysis of PET, PE, and PP Flows in Europe](#) (Eriksen, Marie Kampmann; Pivnenko, Kostyantyn; Faraca, Giorgia; Boldrin, Alessio; Astrup, Thomas Fruergaar)

[Recent trends in solid waste management status, challenges, and potential for the future Indian cities – A review](#) (Akhilesh Kumar, Avlokita Agrawal)

[Towards a care perspective on waste: A new direction in discard studies](#) (Justin Chun-Him Lau)

[Circular Indicators: an approach to measuring circularity](#) (Ellen McArthur Foundation, ANSYS Granta)

[Urban Planning and Informal Livelihoods in India](#) (WEIGO Working Paper),

Niti Ayog:

[Public Private Partnership in Integrated Solid Waste Management and Integrated Liquid Waste Management](#)

MoUHA (Swachh Bharat Mission)

[National Capacity Building Framework for Garbage-Free Cities](#) (February 2022)

[Swachh Bharat Mission - Urban](#) (October 2017)

[Toolkit for Swachh Survekshan 2023](#) (August 2022)

[Guidelines for use of RDF in Various industries.](#)

CPCB: (MoEFCC)

[The National Action Plan for Municipal Solid Waste Management](#)

[Solid Waste Management Rules 2016](#)

[Guidelines on Extended Producer Responsibility for Plastic Packaging](#)

[Central Pollution Control Website for Plastic waste rules](#)

Vehicle Scrappage Policy:

[Voluntary Vehicle Scrappage Policy](#)

Ministry of Mines

[NFM Scrap Recycling Framework3.pdf \(mines.gov.in\)](#)

Bioplastics:

[Recycling possibilities of bioplastics based on PLA/PHB blends](#)



www.fieldsofview.in