

# Chennai, India

City Waste Management Profile



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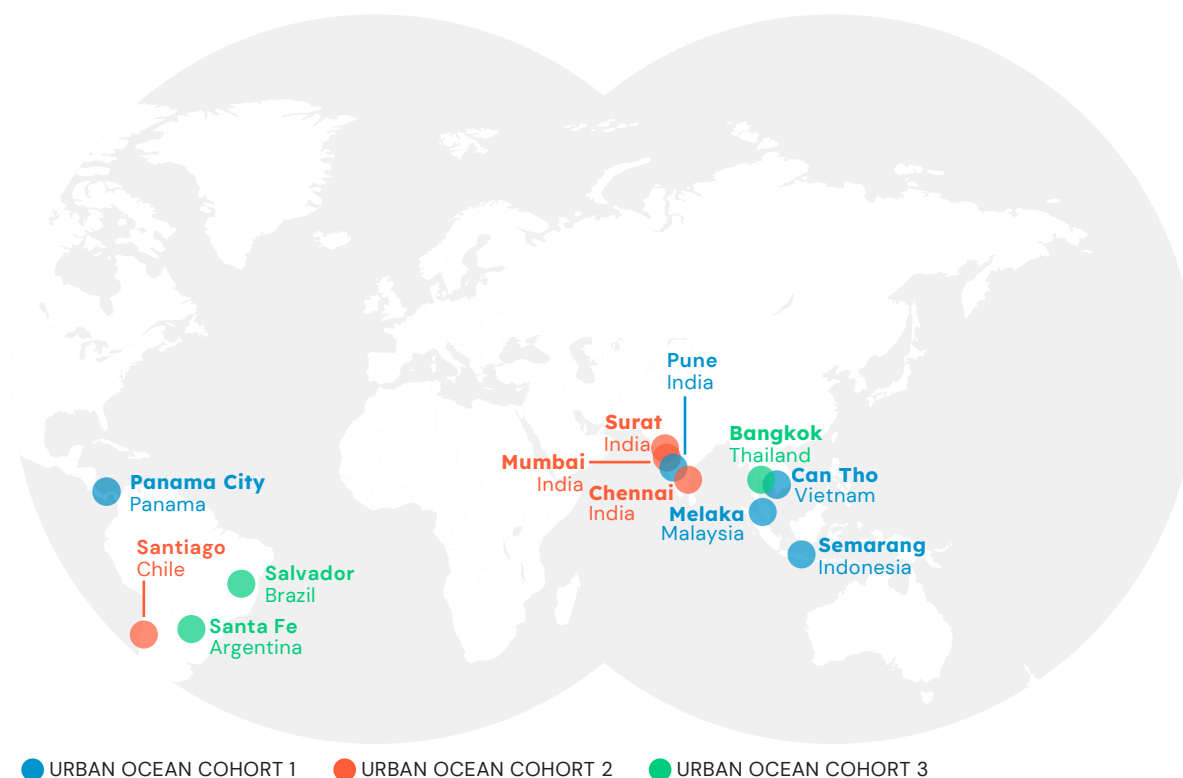
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# 1. Introduction to Urban Ocean

Urban Ocean is a capacity-building and accelerator program for cities that champions circular economy principles, builds awareness of ocean plastic pollution, and assesses waste management systems. The program leverages city leaders to bring new ideas, partners, and resources together and solve interrelated resilience challenges related to: waste management; plastic leakage; and protecting water bodies and the ocean. The program demonstrates how actions to improve waste management and recycling can provide resilient and sustainable solutions that reduce ocean plastic pollution while addressing key city priorities, such as improving public health, supporting economic development, and reducing greenhouse gas emissions. Furthermore, Urban Ocean provides cities with the opportunity to demonstrate thematic leadership and share knowledge and experience across the Resilient Cities Network (R-Cities) community and beyond. The program is jointly led by R-Cities, Ocean Conservancy (OC), and The Circulate Initiative (TCI).

**FIGURE 1**  
Urban Ocean cities map



## Overview of the Urban Ocean Challenge

Cities are home to over half of the global population and account for nearly three-quarters of global greenhouse gas (GHG) emissions (IPCC, 2021). No climate nor social target will be met without a deep transformation of urban centers towards a more inclusive, sustainable, and resilient path. Approaching urban waste management systems through a resilience lens reveals complex, interrelated ramifications for social, economic, and environmental indicators. In 2018, the International Labor Organization estimated that the waste management sector alone has the potential to create 45 million jobs globally by 2030 while reducing GHG emissions by 15 to 20%. Additionally, circular economies offer a USD 4.5 trillion economic opportunity by reducing waste, stimulating innovation, and creating employment by 2030 (WRI, 2021). Currently, plastic usage is growing and continues to be a threat to public and environmental health in the ocean and in cities. A huge opportunity exists for city governments to implement policies and projects that promote a more resilient and circular waste sector in their cities. Now is the time to set out on the path towards a more resilient urban–ocean relationship that highlights the importance of preventing marine plastic debris.

## Program Objective

The Urban Ocean program aims to collaborate with urban leaders to gather new ideas, partners, and resources to address interconnected challenges related to resilience in waste management, reduce plastic leakage and protect water bodies and the ocean. Urban Ocean provides a platform for ocean advocates and urban leaders to join forces in developing comprehensive solutions that meet the needs and priorities of governments, cities, communities, and other stakeholders to create real and lasting impacts.

## Cohort Two Cities

Urban Ocean works closely with cities to demonstrate tangible solutions and highlight progress in addressing waste management challenges. The first cohort of Urban Ocean cities included Pune (India), Can Tho (Vietnam), Panama City (Panama), Semarang (Indonesia) and Melaka (Malaysia).




The work further expanded to four additional cities in Cohort 2 – Chennai, Surat and Mumbai (all India) and Santiago (Chile) – to expand the geographic scope of the program, expand the waste management, circular economy and resilience ecosystem, increase collaboration with local governments and establish effective waste management systems that generate environmental, social and economic co-benefits to cities.

## Methodology

This report summarizes the information collected to develop a resilience-oriented analysis of the urban waste management system in Chennai. The profile was conducted in collaboration with the Greater Chennai Corporation, R-Cities, Ocean Conservancy, The Circulate Initiative (TCI), Chennai Resilience Centre and Okapi Research and Advisory. The analysis involved desk research, a collaborative workshop with city stakeholders, and interviews. The following table presents the key stakeholders who were interviewed as part of the development of this profile.

As part of Urban Ocean, cities create a City Waste Management Profile, in which a city's waste management systems are presented, including technical components, sustainability aspects, and formal and informal actors in the system. The City Waste Management Profile ("the profile") examines major disturbances and stresses prevalent

**TABLE 1**  
Interviewed stakeholders

 <p><b>Government/ public sector agencies</b></p> <p>Greater Chennai Corporation</p> <p>Urbaser Sumeet</p>	 <p><b>Academia</b></p> <p>IIT Madras</p> <p>Anna University</p>	 <p><b>Private sector</b></p> <p>Amazon</p> <p>Pepsi CO</p>
 <p><b>Waste service providers</b></p> <p>Earth Recyclers</p> <p>Kabbadiwala Connect</p> <p>Paperman</p> <p>Saahas Zero Waste</p> <p>Wasted</p>	 <p><b>Civil Society</b></p> <p>Residents of Kasturbanagar Association (ROKA)</p> <p>Federation of OMR Residents Association (FOMRRA)</p>	 <p><b>Informal Sector</b></p> <p>Waste pickers at a dumpsite</p> <p>Scrap shops</p>
 <p><b>NGOs</b></p> <p>Citizen Consumer and Civi Action Group (CAG)</p>		



## 2. About the City Waste Management Profile

As part of Urban Ocean, cities create a City Waste Management Profile, in which a city's waste management systems are presented, including technical and sustainability aspects, and formal and informal actors in the system. The City Waste Management Profile ("the Profile") examines major disturbances and stresses prevalent in the city that impact the city's waste management system. It brings together preexisting data and information collected in the initial phases of the program to allow the city to assess the risks and vulnerabilities of the system, as well as support project design.

The Profile seeks to provide insight for the city to better plan and identify appropriate solutions to increase the resilience of their waste management system, reduce plastic leakage into the environment, and improve the city's ability to respond to, adapt to or otherwise address current and future shocks and stresses. It summarizes the baseline assessment conducted in all cities in the Urban Ocean program and highlights the most relevant data and information to address urban resilience, ocean conservation, and plastic pollution.

The Profile encourages a more holistic approach to existing challenges and supports cities in the development of individual solutions suited to their specific history, economy, demographics and culture while being aligned with the city's unique institutional, environmental, and financial resources. An added benefit of being part of Urban Ocean is how cities can learn from each other by comparing common elements in their respective Profile.

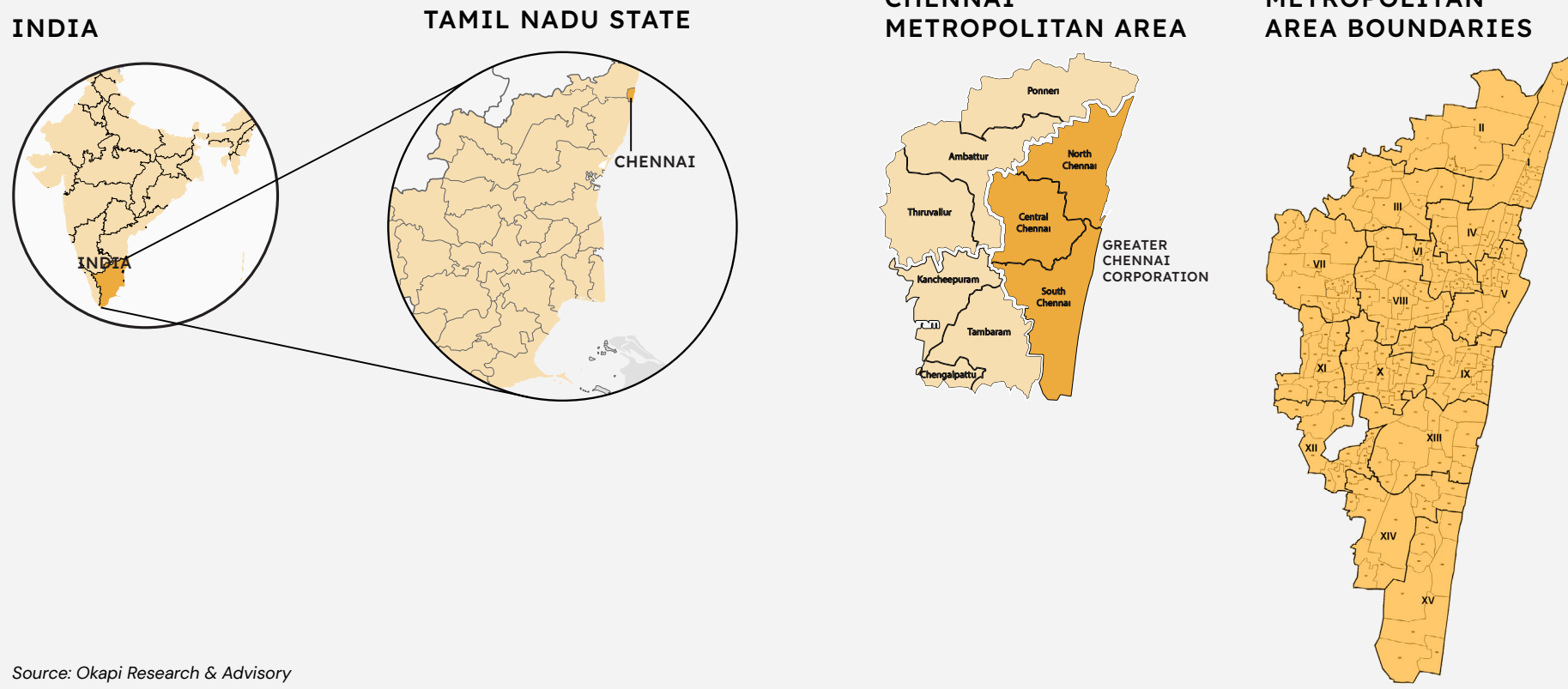


Source: Chennai Resilience Strategy 2019

# 3. Overview of Chennai and its Resilience Journey

FIGURE 2

Chennai city and metropolitan area boundaries





Chennai is the capital of the southern Indian state of Tamil Nadu, located on the Coromandel Coast, along the Bay of Bengal. The Chennai Metropolitan Area (CMA) is the fifth largest urban agglomeration in India with a population of 11.5 million and an annual population growth rate of ~2.4%.<sup>1</sup> To accommodate its growing population, Chennai city and the larger CMA boundaries have been redrawn multiple times and currently occupy 426 km<sup>2</sup> and 1,189 km<sup>2</sup>, respectively. In October 2022 the Government of Tamil Nadu passed an order to greatly expand the CMA to 5,904 km<sup>2</sup>. Within Chennai city limits of 426 km<sup>2</sup>, the city is divided into 15 zones. Basic services in the city, including solid waste management (SWM), are administered by the local government – the Greater Chennai Corporation (GCC).

With respect to SWM, collection and transport of waste is managed by three different agencies in the city while waste processing and disposal is managed by GCC: Ramky Enviro Engineers Pvt. Ltd. is in charge in Zones 1, 2, 3 and 7; GCC itself does collection and transportation of waste in Zones 4, 5, 6 and 8; and Urbaser Sumeet has been contracted for Zones 9 to 15.

<sup>1</sup> UN World Population Prospect: <https://population.un.org/wpp/>

FIGURE 3

Socio-demographic indicators of the Greater Chennai Corporation



**9 million**  
(city limits)

### Population

(Greater Chennai Corporation, 2022)



**426 km<sup>2</sup>**

### Area

(Greater Chennai Corporation, 2022)



**26,000** per km<sup>2</sup> (city limits)

### Population density

(Census of India, 2011)



**30 %**

### Population in informal housing

(Chennai Resilience Strategy, 2019)



Total estimated budgetary expenditure on SWM was INR 424 Cr (~50M USD) for 2022–2023 (~18% of the total budget expenditure). In 2023–2024, the share of SWM spending in the total budget reduced to ~6%. However, this forms only a part of the income stream as the city gets funding from central and state government schemes and international funding agencies to carry out its SWM operations.

## City budget for waste management

(GCC Budget Note 2023–2024)

## Chennai's Connection with its Rivers and the Ocean

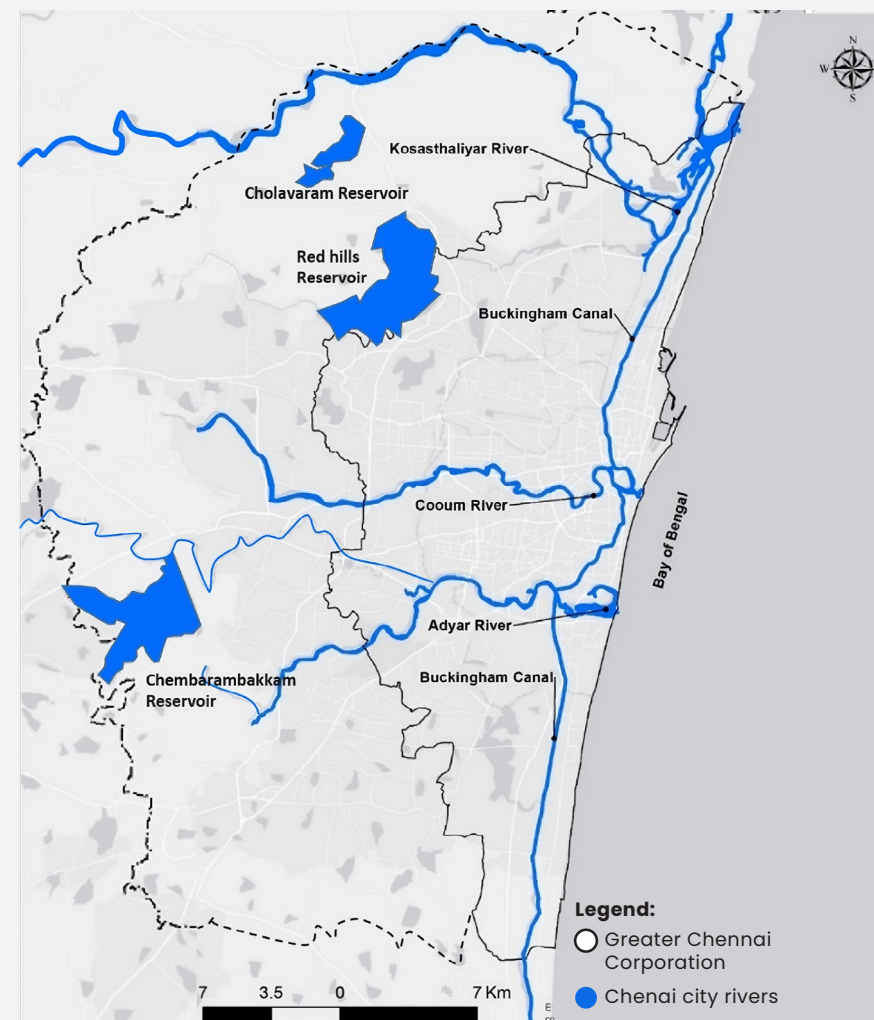
Chennai is divided into two administrative areas: the Greater Chennai Corporation (GCC) area encompasses 426 km<sup>2</sup> and includes Chennai city, while the larger Chennai Metropolitan Area (CMA) currently encompasses 1,189 km<sup>2</sup> and comprises GCC, Chennai district and portions of the neighboring districts of Kancheepuram, Chengalpattu and Tiruvallur. In addition to the rapid urban growth, Chennai's state of resilience and vulnerabilities are inherently linked to its location. As a low-lying coastal city with an average height of 6.7 meters from the mean sea level, and with three non-perennial rivers – the Adyar in the south, Cooum in the center and Kosasthalaiyar in the north – traversing the metropolitan area, and thousands of water tanks<sup>2</sup> (also known as *Erys*), Chennai maintains a complex relationship with its waterscape.

All three rivers – Kosasthalaiyar, Adyar and Cooum – flow west to east, draining into the Bay of Bengal. Water from two of the rivers – Kosasthalaiyar and Cooum – supply piped water to the city through four reservoirs: Poondi, Cholavaram, Redhills and Kannankottai Thervoy Kandigai. The Adyar river, however, primarily serves a drainage function, receiving surplus water from the Chembarambakkam reservoir and draining the southern and western portions of the city. Chembarambakkam is also a major water supply source for the city, with in-flow from several lakes and tanks.

Apart from the rivers there are several canals, of which the Buckingham Canal is the longest, running along the shoreline through the Chennai Metropolitan Area. It was built by the Portuguese and expanded by the British in the late 19th Century for transportation of goods and commodities. There are also an estimated 3,600 reservoirs, ponds, tanks, and lakes in the Chennai area (collectively known as *Erys*). These were developed by ancient rulers to

<sup>2</sup> Tanks in southern India are water reservoirs or ponds. These are centuries-old seasonal water-harvesting infrastructure from which water was used mainly to irrigate rice fields located downstream - <http://www.indiaenvironmentportal.org.in/content/253731/tanks-of-south-india/>

FIGURE 4  
Chennai's river network



Source: Okapi Research & Advisory

capture and store rainwater in a decentralized manner primarily for irrigation purposes. Canals or channels were built to allow for flow between the reservoirs or tanks when there is adequate pressure, or in case of excess water. These lakes are recharged primarily by river flow, which is diverted through a series of check dams, with some rainfall also contributing directly to recharge. However, most of the network of channels between the tanks and many of the smaller tanks has been lost to the last couple of decades' rapid urbanization.

## FIGURE 5

The Adyar river before it enters the Bay of Bengal, in South Chennai



## Key Shocks and Stresses Impacting Waste Management in the City

Chennai's rapid urban development has made the city vibrant and cosmopolitan, but it has caused massive transformation of its waterscape. This transformation has manifested in the form of direct human encroachment on floodplains, coastal land, and lakebeds as formal and informal housing, industry, and transportation corridors. These have been developed without attention to the natural environment. For example, the Ery schemes in the 1970s and 1980s involved reclaiming dry lakes for constructing housing blocks, and a portion of the local train network (MRTS) was built on the Buckingham Canal. The canal which was once a waterway has become a polluted drain, due to continuous discharge of waste. The Pallikaranai marsh which originally included 54 satellite wetlands,

has drastically reduced over the years from 6,000 hectares in the 1990s to 593 hectares in 2017 due to formal and informal encroachment.<sup>3</sup>

The city's unplanned and rapid growth has overburdened waste management services, which has made waterbodies extremely vulnerable to pollution due to the illegal dumping of residential and commercial solid waste and sewage. During the 2015 December floods, it was estimated that the Greater Chennai Corporation (GCC) had to clear 1.32 million tons of solid waste from water bodies in the city.<sup>4</sup> In 2021, when heavy rains caused flooding of the Adyar River, GCC collected 218 tons of plastic from a single location in the southern part of the city and subsequently cleared more trash from other areas.<sup>5</sup> Stormwater drains in the city are frequently clogged by waste, which greatly reduces the efficiency of stormwater infrastructure.

Compounding the stresses on Chennai's stormwater

infrastructure and waterways, Chennai is becoming more vulnerable to climate change-related phenomena; it is increasingly experiencing shocks such as storms, floods, cyclones and tsunamis, and stresses such as droughts, saltwater intrusion and sea level rise.

Because of its regional location, Chennai also faces increased risk from meteorological events such as El Nino and the warming of the Bay of Bengal, both of which impact the amount of rainfall and formation of storms during certain seasons and years.<sup>6</sup> Finally, Chennai's coastline features, like beaches, sand dunes, and brackish-water lakes, provide protection from storms, but unplanned developments pose a threat to sensitive ecosystems and impair their disaster mitigation performance.

Additional shocks and stresses in Chennai were identified by residents in the Preliminary Resilience Assessment Report, 2018.<sup>7</sup>

<sup>3</sup> Bhaskar, A., Babu Rao, G., Vencatesan, J. (2017). Characterization and Management Concerns of Water Resources around Pallikaranai March, South Chennai. In P. Rao & Y. Patil (Eds.), *Reconsidering the Impact of Climate Change on Global Water Supply, Use, and Management* (pp. 102 – 121). IGI Global.

<sup>4</sup> Chandrababu, D. (December 30, 2015). Chennai floods: Corporation removes 1.32 lakh tonne of garbage. The Times of India. <https://timesofindia.indiatimes.com/city/chennai/Chennai-floods-Corporation-removes-1-32-lakh-tonne-of-garbage/articleshow/50381980.cms>

<sup>5</sup> Omjasvin, MD (2021). Chennai: Over 200 tonnes of garbage cleared from Broken Bridge. Times of India. <https://timesofindia.indiatimes.com/city/chennai/chennai-over-200-tonnes-of-garbage-cleared-from-broken-bridge/articleshow/88082773.cms>

<sup>6</sup> Murty, B.S., Balaji Narasimhan, Arpita Mondal, Subimal Ghosh and Pradeep Mujumdar. Chennai Flood 2015, A Rapid Assessment Report. Interdisciplinary Research Centre for Water Research, IISc Bengaluru, 2016.

<sup>7</sup> Resilient Chennai. (2018). Preliminary Resilience Assessment. 100 Resilient Cities, Rockefeller Foundation & Greater Chennai Corporation.

**FIGURE 6**

Main shocks and stresses linked to waste management in Chennai

**SHOCKS**



Extreme rainfall



Flooding



Cyclones

**SHOCKS (NEW)**



Extreme heat

**STRESSES**



Water insecurity



Water scarcity



Unemployment



Lack of affordable housing



Informal housing and settlements



Inadequate solid waste systems



Inadequate sanitation systems

## Building Resilience through Waste Management

Chennai's resilience strategy was launched in 2019 in collaboration with GCC to move Chennai through a deeper, broader, and long-range conceptualization of resilience that results in a more just and integrated city. Drawing on stakeholder feedback and intensive research on Chennai's challenges, five thematic areas were identified by the strategy – healthy and planned urbanization, water systems, disaster preparedness, governance ecosystems and vulnerable communities. The overall story of Chennai's resilience challenges appears to be firmly anchored in the process by which it has urbanized, a process that has been rampant, unplanned, unfair, and led to poor uniformity in infrastructure and services.

Within each of these five challenge areas, the strategy delineates specific goals, including the need for addressing solid waste management (SWM)

in the city more effectively; this was identified as a goal under healthy and planned urbanization. The strategy also suggests actions to help achieve the goal which include setting up decentralized compost units in association with Resident Welfare Associations (RWAs) to help residents understand and experience first-hand how their waste can be converted to compost, and introducing targeted awareness programs for residents, especially school children.

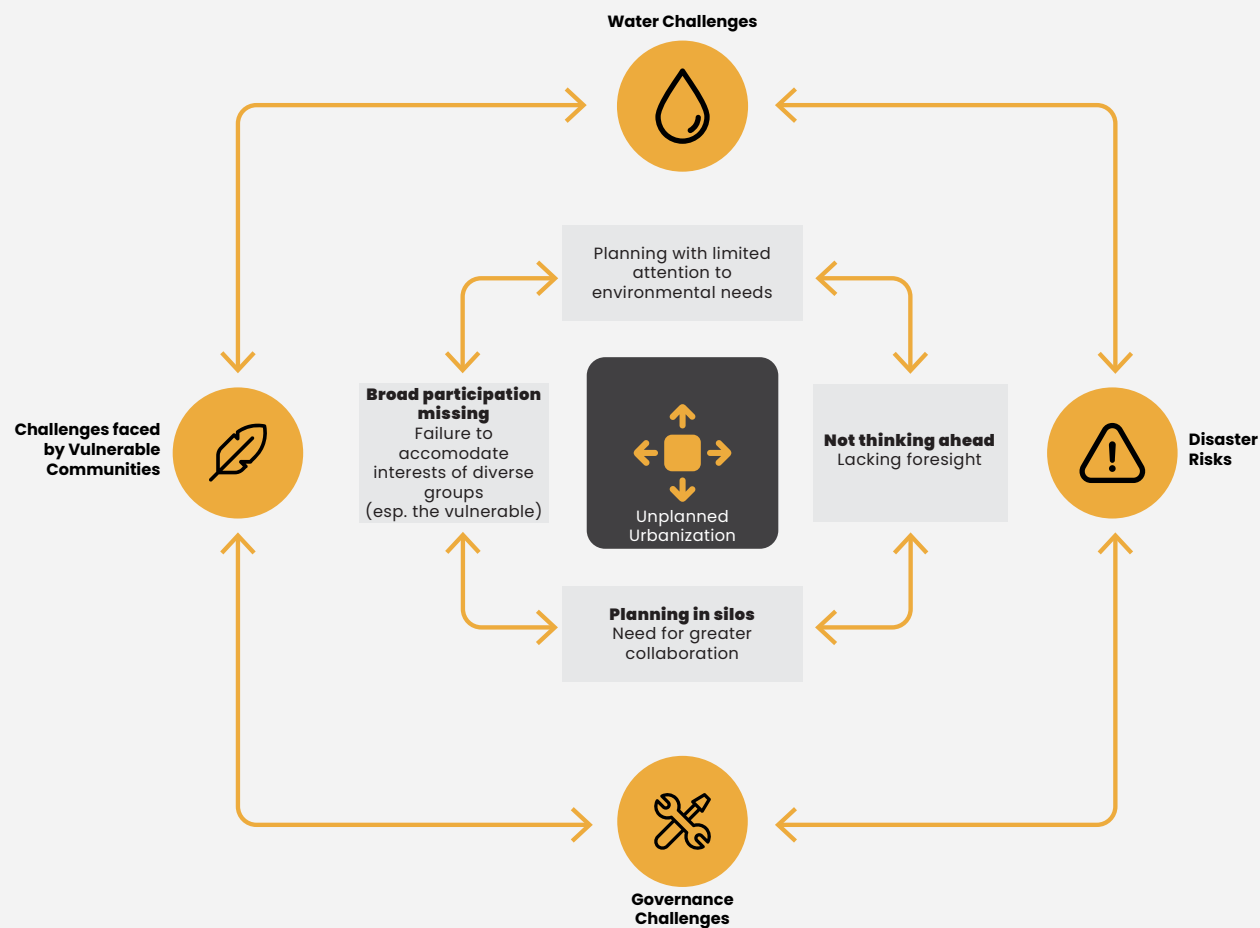
The Urban Ocean program aims to advance the goals from the strategy to further develop these actions based on rigorous research and stakeholder engagement, define opportunity areas in the city and develop pilot ideas ready to implement. Urban Ocean partners – Resilient Cities Network, Ocean Conservancy, and The Circulate Initiative – will work with Greater Chennai Corporation, Okapi Research and Advisory<sup>8</sup> and Chennai Resilience Centre in the city to implement the program and collaborate with other relevant local partners.

<sup>8</sup> Okapi Research and Advisory were strategy partners and helped Chennai Resilience Centre develop the resilience strategy.



**FIGURE 7**

Chennai's resilience challenges anchored by urbanisation



Source: Resilience Chennai 2019

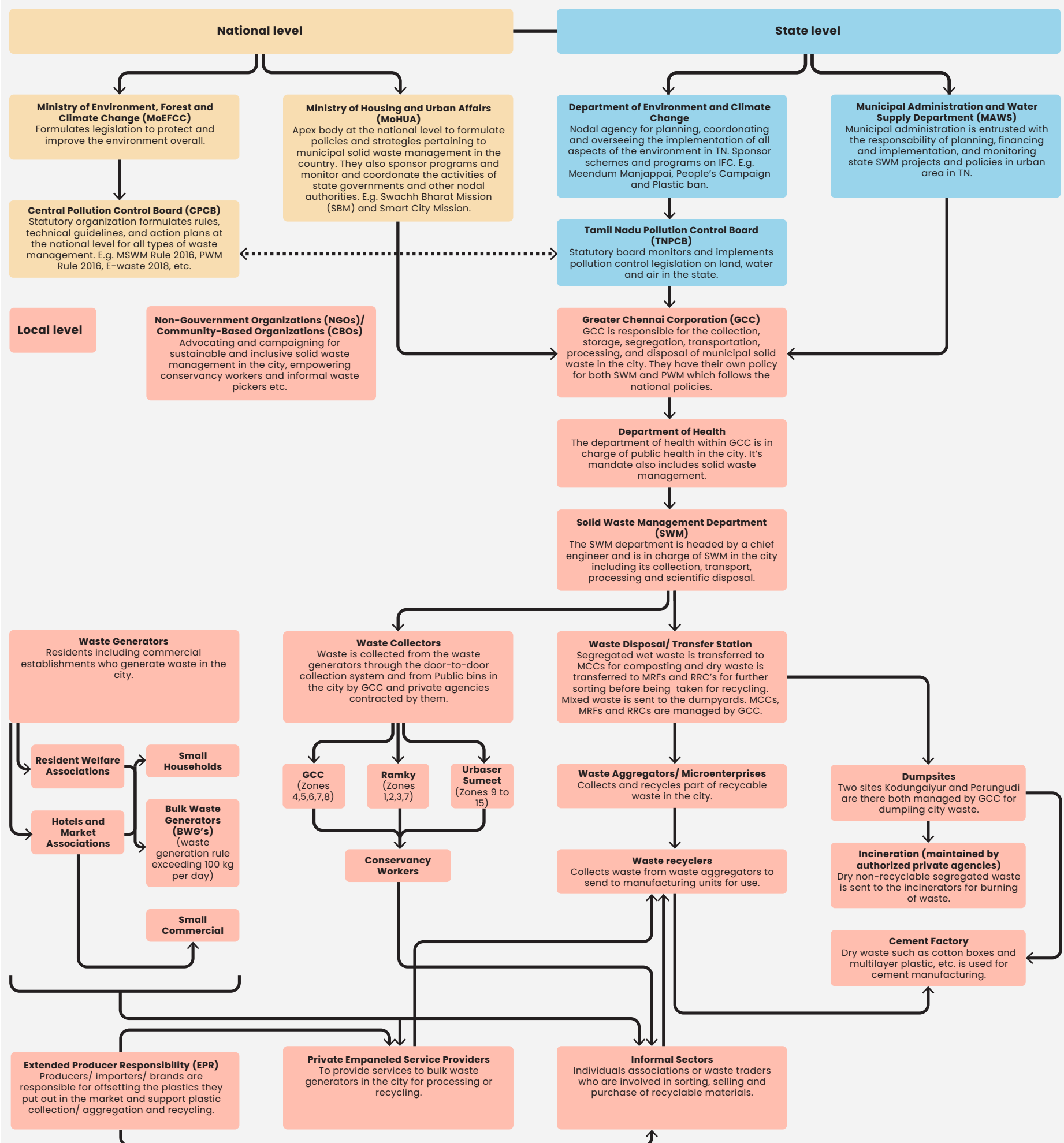


# 4. Legal, Policy and Governance

The following map illustrates the governance of solid waste in the city, highlighting the role of key stakeholders.

FIGURE 8

SWM governance in Chennai



Source: Okapi Research and Advisory

## National and Local Regulations and Guidelines

<b>National Level</b>	Ministry of Housing and Urban Affairs	Solid waste management is a state-level matter, according to the Indian Constitution. Yet national legislation plays a key role in determining the effectiveness of solid waste systems through the development of legal mandates which govern their management in states and cities. Two rules are important in this aspect: the SWM Rules (2016) and the Plastic Waste Management Rules (2011) (later amended to PWM Rules (2016)). These include Extended Producer Responsibility (EPR) for plastic waste. The SWM Rules (2016) provide an overall framework for municipal solid waste management in urban and rural areas. The rules include clauses that intend for the manufacturers to be responsible for the waste they are producing. They state that it should be the duty of manufacturers or brand owners of products such as tin, plastic packaging should provide financial assistance to local authorities for a take-back waste management system for all non-biodegradable packaging material, and to educate people on best disposal mechanisms (SWM Rules (2016)). <sup>9</sup>
	Ministry of Environment, Forests and Climate Change	
<b>State Level</b>	Tamil Nadu State Government	The PWM Rules (2016) provide a regulatory framework for the management of plastic waste generated in the country. In 2020, as an amendment to these rules, EPR was first introduced. Since then, the EPR framework has been amended several times, with the most recent in February 2022 detailing filing processes and targets for brands and manufacturers to significantly reduce their plastic packaging and introduce recycled plastic in their packaging by 2030. The EPR framework describes in detail the methods by which producers, importers, and brand owners (PIBs) can recover and recycle plastic waste produced through three possible models: a fee-based model; a producer responsibility organization (PRO) model; or a plastic credit model. <sup>10</sup> The amendment also includes guidelines for managing non-compliance and the role of the state Pollution Control Boards in setting the financial penalties.
	Department of Environment, Forests and Climate Change Municipal Administration and Water Supply Department	
<b>City Level</b>	Greater Chennai Corporation	The Ministry of Environment, Forests and Climate Change (MoEFCC) amended the PWM Rules in August 2021 to include a nationwide ban on manufacture, import, stocking, distribution, sale and use of identified single-use plastics from 01 July 2022. <sup>11</sup>  At the state level, the Government of Tamil Nadu was one of the first states to implement a ban on single-use plastic with effect from 01 January 2019. The ban prohibits manufacture, sale, stocking, transport and use of “throwaway plastics” including plastic coated paper cups, thermocol (polystyrene foam) plates, water pouches, plastic straws, plastic carrier bags of all sizes and thickness and plastic flags.  Chennai city introduced SWM Bylaws in 2019, in accordance with the SWM Rules (2016), which discuss the roles and responsibilities of waste generators and GCC within the city limits. The bylaws state that waste generators should segregate and store the waste generated in three separate streams: biodegradable, non-biodegradable and domestic hazardous wastes. The three types of waste should be stored in suitable bins and collected by authorized waste pickers or waste collectors. It also mandates payment of a user fee for all users of SWM services.

<sup>9</sup> Ministry of Environment, Forest and Climate Change (MoEFCC) (2016). Solid Waste Management Rules, 2016. Government of India. New Delhi.

<sup>10</sup> Ministry of Environment, Forest and Climate Change (MoEFCC) (2022). Guidelines on Extended Producer Responsibility for Plastic Packaging. Government of India. New Delhi.

<sup>11</sup> MoEFCC (June 28, 2022). Ban in identified single use plastic items from 1st July 2022, <https://pib.gov.in/PressReleasePage.aspx?PRID=1837518>

National legislation and guidelines have played a key role in enabling effective waste management in cities. SWM rules were passed in 2016, and it is now mandatory that cities establish bylaws and manage waste in accordance with these rules. Yet, even with this regulatory framework in place, many of these rules are still evolving, with several amendments like the EPR regulations changed as recently as 2022. The state-level plastic ban also has its challenges with alternatives to plastic either too expensive or too inconvenient. There is a need for government policies to be clear in their intent and consistency in enforcement to all stakeholders. The CAP report suggests that many stakeholders interviewed expressed frustration with the lack of transparency and clarification for policies and there were polarized opinions of how these policies were being implemented. Consistent monitoring on compliance with these rules will be crucial to sustain efforts being undertaken in Chennai.

## Existing Waste Management Projects

### Implementation of People's Campaign

In November 2021, the Environment, Climate Change and Forest Department of Tamil Nadu State issued a Government Order (No.116), to adopt a four-pronged strategy to “fight plastic pollution and eliminate single-use plastics”. The four steps were:

- An impactful and innovative communication campaign to trigger a people's movement against plastics. The campaign would include tackling marine litter.
- A framework for effective monitoring and reporting on implementation of the plastics ban throughout the state.
- Coordinating with stakeholders to design and popularize eco-friendly alternatives.
- Working with industry and manufacturers to create a road map for large-scale production of alternatives through knowledge sharing.

### Swachh Bharat Mission

Swachh Bharat Mission – Urban 2.0 is an initiative of the National Government which aims to make all cities clean and garbage free, with 100% scientifically-tested processing methods for municipal solid waste, source segregation, effective management of construction and demolition waste, plastic waste management, and remediating all legacy waste dumpsites. The initiative also focuses on a bottom-up approach through capacity-building and creating awareness among citizens in recognizing their important role with the aim of improving citizen engagement in SWM. The large scale participatory and competitive approach of this nationally-led mission has helped to create an enabling environment and accelerate waste management efforts in cities. Through this mission, GCC has employed ‘Swachh Bharat Animators’ at the ward level to increase awareness among citizens, especially Bulk Waste Generators and commercial establishments. The Swachh Bharat team has also developed a City SWM action plan with details on the current state of SWM in Chennai and future predictions, including infrastructural requirements.

### Meendum Manjappai

Tamil Nadu's government launched the Meendum Manjappai scheme (the yellow bag campaign) to promote the use of cloth bags by the public and discourage the use of plastic bags (image below). The campaign started towards the end of 2021 with “Manjappai” as a logo. Manjappai cloth bag vending machines have been installed at a few places and the cost of the bag is fixed at INR 10 (USD 0.1). However, compared to the ease of finding plastic bags, accessing these yellow cloth bags is more difficult with limited vending machines in isolated spots

FIGURE 9  
Posters of Meendum Manjappai Campaign



Source: Tamil Nadu State Pollution Control Board



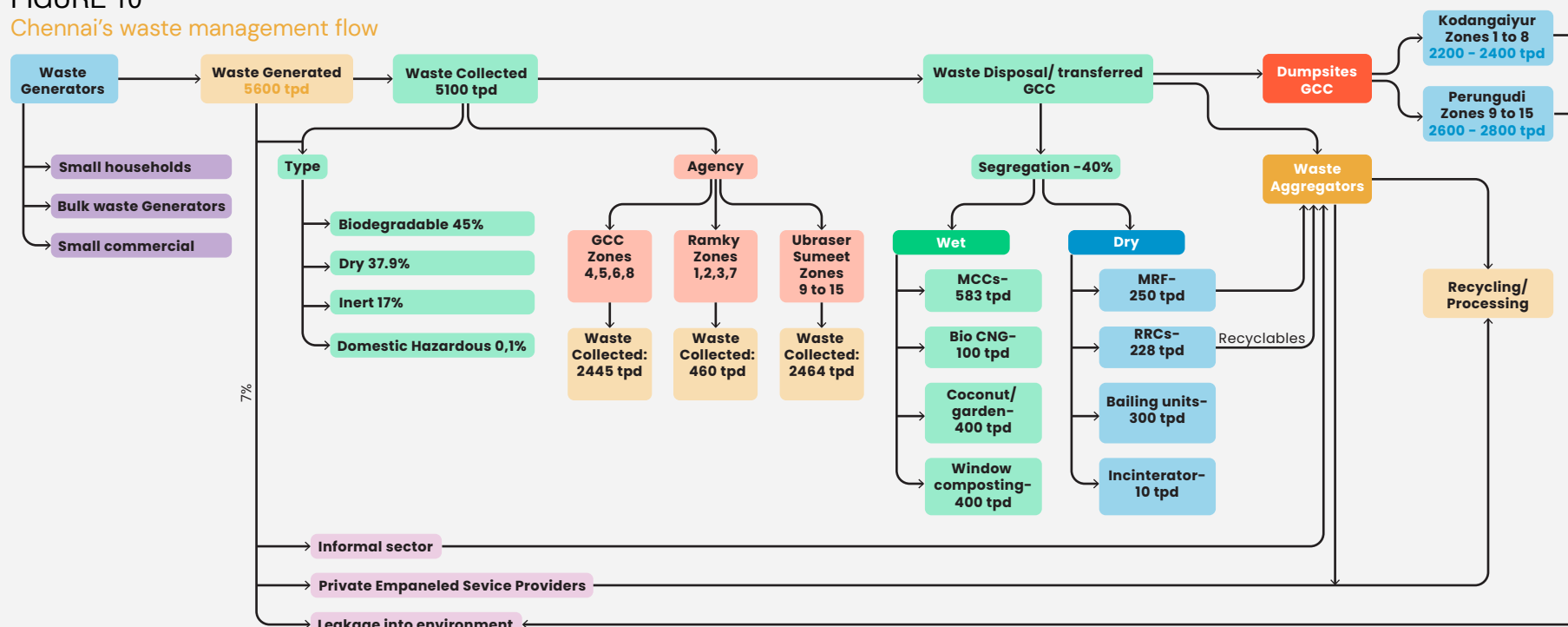
# 5. Waste Management in Chennai

## Overview of the Waste Management System

Solid Waste Management in Chennai is the mandate of the local government – Greater Chennai Corporation (GCC) – and is under the city's Department of Health. The city generates 5,400 metric tons of waste per day (as of 2016), most of which ends up at the city's two dumpsites: Kodungaiyur in the north and Perungudi in the south. GCC has contracted private waste management companies for door-to-door waste collection and transportation in 11 of 15 zones in the city while it directly manages the other zones. GCC also manages waste processing/disposal facilities across the city which include a network of more than 100 ward-level wet and dry waste processing facilities, waste-to-energy plants and the dumpsites – Perungudi and Kodungaiyur. Simultaneously, there exists a system of informal waste pickers and aggregators that contributes significantly to recycling efforts, especially given that official figures estimate a very low percentage of waste diverted for recycling through the formal system. The following graphic summarizes the city's waste flow:

FIGURE 10

Chennai's waste management flow



Source: Okapi Research and Advisory

## Waste Generation and Characterization

Chennai city generates 0.71kg of solid waste per day per capita, the highest per capita amount of waste generated in India. Solid waste generation has been steadily increasing from 3,000 metric tons per day in 1996 to 5,400 metric tons per day in 2016. Based on official data, nearly all waste generated goes to the city's two dumpsites – Perungudi and Kodungaiyur.<sup>12</sup>

In 2016 and 2019, GCC conducted a municipal waste characterization survey which identified around 20 categories of waste, including: biodegradable, horticulture, coconut shells, general plastic, PET bottles, wood, paper, Tetra Pak, rubber, rags & clothes, glass, construction, and demolition materials (C&D), metals, inert (bricks, rubble), bio-medical waste, banana leaves/stems, household hazardous, leather, and sanitary napkins. The survey also indicated that biodegradable waste comprises the highest proportion of total waste generated by volume ranging from 25–40% in all 15 zones; followed by inert waste which includes bricks, rubble, and material for paving (~35%); and plastic and paper waste each of which range between 7 and 10%. These are the major categories of waste collected in the city in all the zones.

<sup>12</sup> Dumpsites – City does not have any landfill by definition and the two main dumpsites are often described as landfills.

FIGURE 11

Breakdown of material type for convenience item packaging

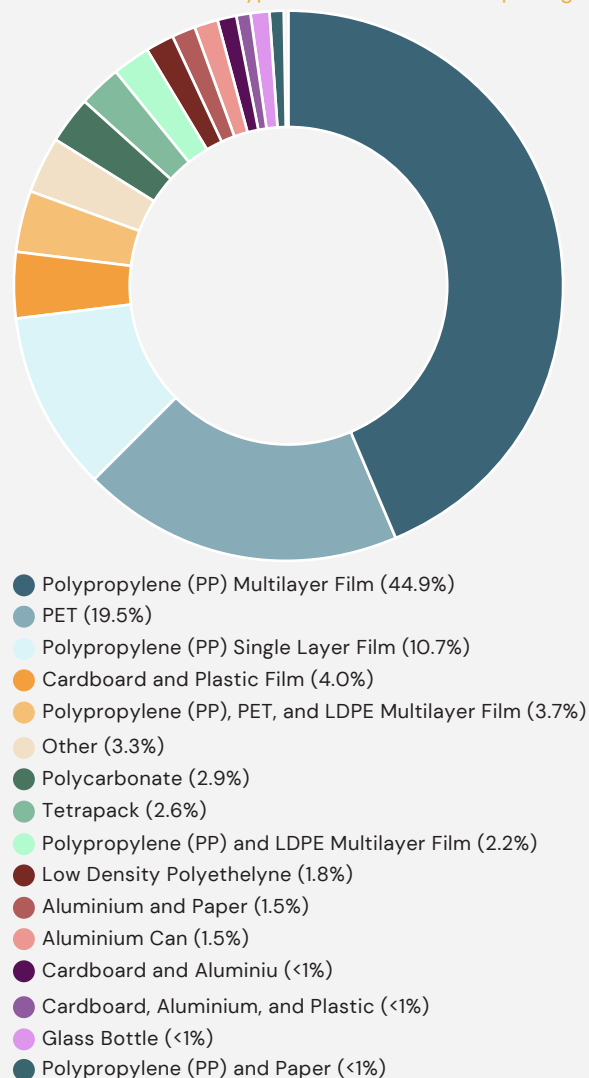
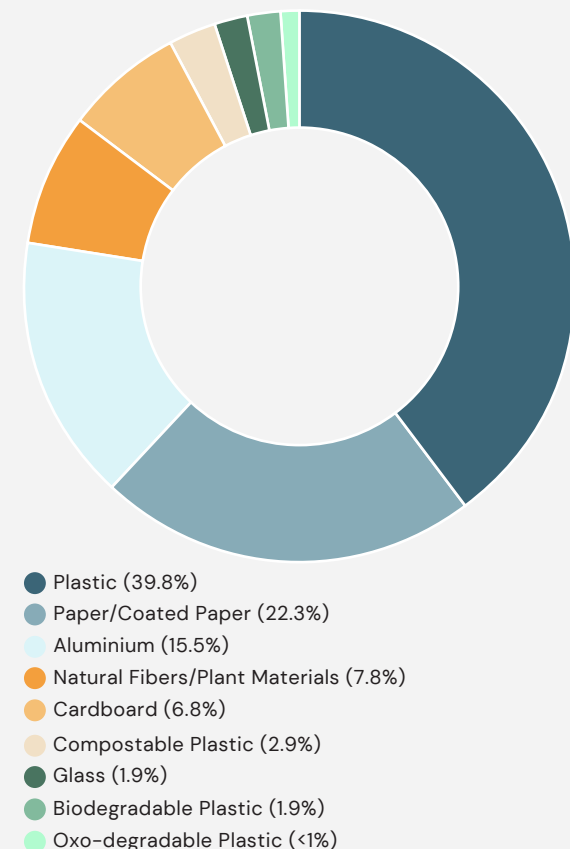


FIGURE 12

Breakdown of material type for to-go items; Source: Chennai CAP Report



Chennai CAP Report

The Circularity Assessment Protocol (CAP),<sup>13</sup> a key baseline assessment of plastics and circularity within the city conducted as part of the Urban Ocean program, found that of the 272 convenience items sampled such as chips, beverages, tobacco, biscuits, and candy, nearly 50% had some multi-layer packaging. Further, of the 26 convenience stores sampled, nearly 40% of the to-go items were plastic.<sup>14</sup>

It is estimated that the majority (68%) of municipal solid waste generated in Chennai comes from residences, 16% from commercial enterprises, 14% from institutions or other businesses, and the remaining 2% from industries that include construction and demolition waste.<sup>15</sup> Furthermore, as the cultural capital of the south, Chennai attracts many domestic and international tourists. There are no official estimates of how much tourism contributes to the waste generated in the city, however the city beaches are major attractions. On average, the most popular beaches, Marina and Elliot's, generate five and three tons of garbage every day, respectively. During festive seasons this increases manyfold; for example, in January 2020 (a major festival month), 15.8 tons of garbage from Marina and 10 tons from Elliot's beach was collected, which is three times the usual amount.<sup>16</sup>

<sup>13</sup> Circularity Informatics Lab, August 2022. Circularity Assessment: Chennai, India. University of Georgia, Athens, GA, USA. - [https://resilientcitiesnetwork.org/downloadable\\_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf](https://resilientcitiesnetwork.org/downloadable_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf)

<sup>14</sup> Circularity Informatics Lab, August 2022. Circularity Assessment: Chennai, India. University of Georgia, Athens, GA, USA. [https://resilientcitiesnetwork.org/downloadable\\_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf](https://resilientcitiesnetwork.org/downloadable_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf)

<sup>15</sup> Greater Chennai Corporation (2021). Chennai City SWM Action Plan.

<sup>16</sup> Greater Chennai Corporation (2021). Chennai City SWM Action Plan.

**FIGURE 13**

Waste strewn across Marina Beach after Kanum Pongal in 2018



Source: The News Minute

## Waste Collection and Transportation

As mentioned earlier, GCC has contracted waste collection and transportation to private entities in most of the zones. Zones 1, 2, 3 and 7 are currently managed by Ramky Enviro Engineers Pvt. Ltd.; Zones 9–15 by Urbaser Sumeet; while Zones 4, 5, 6 and 8, are managed by GCC directly. Solid waste is collected from all 200 wards across the 15 zones, through a door-to-door collection system and from community bins, which according to GCC covers 95% of all households in the city including low-income settlements and resettlement colonies.<sup>17</sup> Street sweeping also contributes to the total municipal solid waste.

The waste management sector has a significant formal workforce. GCC employs 5,686 permanent and 4,427 contract workers for SWM activities, and private operators have 9,505 workers for carrying out these operations.<sup>18</sup>

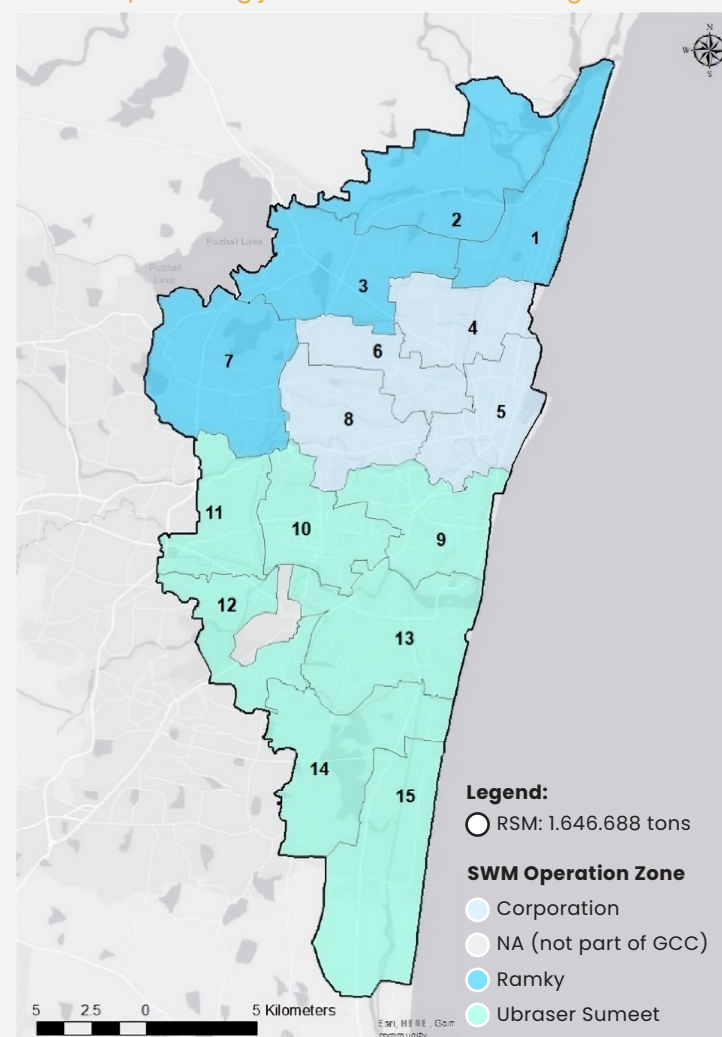
To support and complement the sector's workforce, both GCC and the contracted private companies use battery-operated vehicles, battery-operated tricycles, HMTV/LMV compactors & tippers, mechanical sweepers etc. in their daily operations. GCC operates 293 battery-operated vehicles, 97 battery-operated tricycles, 136 HMTV/LMV compactors, 18 HMTV/LMV tippers, and 16 mechanical sweepers. The contracted private waste companies operate 3,071 battery-operated vehicles, 130 HMTV/LMV compactors, 80 HMTV/LMV tippers, and 39 mechanical sweepers.<sup>19</sup> Apart from this, GCC also has special equipment such as amphibious vehicles and robotic multipurpose excavators for clearing floating garbage in canals, vehicle-mounted machinery for clearing stormwater drains, and beach cleaning machines to pick up waste material from the sand. Since 2018, trash booms have been placed over Adyar and Cooum rivers to stop solid waste from flowing into the ocean.

<sup>17</sup> Greater Chennai Corporation (2021). Chennai City SWM Action Plan.

<sup>18</sup> Government of Tamil Nadu. (2021). Municipal Administration and Water Supply Department. Policy Note 2021-2022. [https://cms.tn.gov.in/sites/default/files/documents/masw\\_e\\_2021\\_22\\_pn.pdf](https://cms.tn.gov.in/sites/default/files/documents/masw_e_2021_22_pn.pdf)

<sup>19</sup> Government of Tamil Nadu. (2021). Municipal Administration and Water Supply Department. Policy Note 2021-2022. [https://cms.tn.gov.in/sites/default/files/documents/masw\\_e\\_2021\\_22\\_pn.pdf](https://cms.tn.gov.in/sites/default/files/documents/masw_e_2021_22_pn.pdf)

**FIGURE 14**  
Zonal map showing jurisdiction of the SWM agencies





**FIGURE 15**

A trash boom placed across the Adyar river



Source: Okapi Research and Advisory

The Chennai city bylaws of 2018 included a provision for a user fee that can be levied to households for SWM. The amount to be charged ranges from INR 10 to INR 100 (USD 0.1–1.2) per month for residential buildings based on the built-up size. Similarly for commercial and other establishments it ranges from INR 1,000 to INR 20,000 (USD 12–240) per month.

However, this bylaw has not been enforced and households do not in practice have to pay for the SWM services provided by GCC and/or the private operators. The private companies are instead paid from the city's annual budget. This is because charging for SWM services is a highly unpopular political issue.

While this levy has not yet been implemented due to political pressure, GCC is considering levying SWM charges to the households, along with the existing property tax.

## Waste Treatment and Disposal

After collection, segregated waste is transported to local wet and dry waste processing centers spread across the city. To process wet waste the city counts on 245 micro-composting centers (MCCs), bio-methanation<sup>20</sup> plants, vermicomposting centers etc. with a total capacity of 1,218 tons per

<sup>20</sup> Bio-methanation is a process by which organic material is microbiologically converted under anaerobic conditions (absence of oxygen) to biogas.



day. For dry waste processing the city has 185 dry waste processing centers, which include Material Recovery Facilities (MRFs) and Resource Recovery Centres (RRCs) with a total capacity of 529 tons per day.<sup>21</sup> Both wet and dry waste processing facilities are managed by GCC.

Recyclable waste is given to waste dealers identified by GCC through an empanelment (jury) process, and low-value plastic is sent to cement factories for use as a co-processing material and alternative to coal. As per the CAP report, around 50 metric tons is sent for co-processing every week in Chennai. Unsegregated or mixed waste ends up at either of the two dump yards, Perungudi or Kodungaiyur, depending on the proximity of the sites to transport waste. Both these dumpsites are nearing full capacity and biomining<sup>22</sup> activities are underway to sort and sustainably dispose of legacy waste. According to most stakeholders interviewed, MCCs are working relatively well while the efficiency of the MRFs and RRCs are often questioned, primarily because much of the waste collected is unsegregated/contaminated and therefore is taken to the dump yards.

<sup>21</sup> Government of Tamil Nadu. (2021). Municipal Administration and Water Supply Department. Policy Note 2021-2022.

<sup>22</sup> Bio-mining entails digging out the legacy waste and sorting it into different categories to be recycled or used in co-processing. According to the Central Pollution Control Board (CPCB) of India's guidelines, "Biomining is the scientific process of excavation, treatment, segregation and gainful utilization of aged municipal solid waste lying in dumpsites typically referred to as legacy waste."

FIGURE 16

Beach cleaning equipment (top left); street bins (top right); and battery operated door-to-door collection vehicles (bottom);



Source: Okapi Research and Advisory

**FIGURE 17**  
A GCC composting facility



Source: Citizen Matters

## Recycling of waste

According to official records, the city recycles approximately 10% of its waste either through formal or informal systems. The informal sector has been in existence for decades, especially recycling paper and plastic of different grades (cardboard, soiled cardboard, white paper, soiled paper, PET bottles, etc.), glass, and e-waste. Although no formal database exists to quantify their contributions, it is believed informal waste pickers and recyclers divert several tons of waste from the landfills.

The Chennai CAP report mentions the lack of public recycling bins set up by GCC in the city. Certain railway stations, major bus depots, organic stores have waste deposit points set up for certain kinds of waste like Tetra Pak cartons,<sup>23</sup> PET bottles etc. PET bottle collection systems have been installed by organizations like the Tamil Nadu Pollution Control Board or the Railways department.<sup>24</sup> However, these are not that effective due to a lack of awareness among people about their usage.

The effectiveness of Chennai's recycling system is dependent on source segregation rates, which are not very high. The GCC SWM Action Plan reports that the current household-level segregation rate

<sup>23</sup> <https://www.takemebackcampaign.com/deposit-points>

<sup>24</sup> Circularity Informatics Lab, August 2022. Circularity Assessment: Chennai, India. University of Georgia, Athens, GA, USA. [https://resilientcitiesnetwork.org/downloadable\\_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf](https://resilientcitiesnetwork.org/downloadable_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf)



averages around 45%,<sup>25</sup> although most interviewees from the CAP report suggested the true rate was likely closer to 25%. The reasons for the low rate of segregation include lack of awareness/need for behavior change, lack of incentives (fines/positive incentives) and lack of trust among citizens that household-level segregation will ensure proper handling post-collection by GCC and private waste collectors.

Microenterprises are emerging as important players in Chennai's SWM. Several start-ups, including Wasted, Paperman, Kuppathotti.com, Sahaas Zero Waste, and Kabbadiwala Connect have sprung up in the past 10 years. They primarily deal with door-to-door collection of certain kinds of dry waste or buy materials from informal aggregators and sell it to private recyclers. These organizations either have employees collecting waste from customers or directly connecting customers to the local informal recycling shops that have been in operation for many years. They cater to a relatively small market consisting of informed, well-to-do and environmentally aware individuals who realize the implications of the waste they generate and have the wherewithal to do something about it.

<sup>25</sup> Greater Chennai Corporation (2021). Chennai City SWM Action Plan.

**FIGURE 18**  
A Material Recovery Facility in Mylapore



Source: Mylapore Times

# 6. Key Findings and Opportunities

## Key Findings

- 1. Low segregation rates:** While GCC estimates that the average segregation rate is ~45% in the city, the Chennai CAP report<sup>26</sup> estimates the actual number to be much lower at 25% based on stakeholder interviews and workshops. The SWM Bylaws include a mandate for fining people for not segregating waste, yet this has not materialized due to political reasons.
- 2. Lack of awareness among citizens:** The Chennai CAP report also finds a lack of awareness and distrust among citizens, government stakeholders and waste collectors regarding post-collection waste handling processes, disincentivizing residents from segregating.
- 3. Ineffective dry waste processing infrastructure:** Official data from GCC suggests that recycling rates are around 10% and that nearly all the waste generated is ending in the dumpsites. Furthermore, low segregation rates are impacting the efficiency of existing dry waste processing infrastructure since mixed/contaminated waste is often received at these facilities, according to the Chennai CAP report.
- 4. Vulnerabilities of informal workers:** The Chennai CAP report also finds that much of the recycling in the city is driven by informal networks and systems including through rag pickers and scrap shops. Yet these workers work in hazardous conditions, risking their health and safety with little to no socio-economic protection.
- 5. Leakage into the environment:** While the city has put in place a system for door-to-door collection, transport, and processing of waste, there is still frequent leakage of waste into the environment. Especially during flooding events and festivals, large flows of waste leakage pose a threat to public health and the ecosystem.

## Opportunities

- **Increase citizen awareness and promoting pro-SWM behaviors**, especially source segregation, through sustained city-wide campaigns linked to calls for action by leveraging existing neighborhood level work.
- **Create pathways to integrate informal waste pickers and collectors** into the formal system through different strategies, learning from other Indian cities like Pune and Bengaluru which have had some success in this respect.
- **Support innovations and efforts through collaboration** between citizen groups, the government, private waste aggregators and recycling companies to improve waste processing and recycling, research and development of alternatives to single-use plastics (e.g. paper, bamboo, 3D wood fibers etc.).

<sup>26</sup> Circularity Informatics Lab, August 2022. Circularity Assessment: Chennai, India. University of Georgia, Athens, GA, USA, [https://resilientcitiesnetwork.org/downloadable\\_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf](https://resilientcitiesnetwork.org/downloadable_resources/UR/SP/2022/Urban-Ocean-CAP-Report-Chennai.pdf)

→ **Development of a city-scale EPR plan/policy:** Brands of products with manufacturers and parent companies in and near Chennai can be targeted to increase responsibility for the waste they are putting out in the market, in line with the EPR guidelines and SWM Rules (2016). The EPR mandate has already created a market for high- and low-value plastics and plastic recycling which will keep this material out of dumpsites and the environment and has triggered conversations on recycled plastics as alternative source material, increasing its circularity. This could be the catalyst that can be used to drive more targeted action that will divert waste from the dumpsites.

## Questions to Consider

1. Which plastics are covered by the national law – how does the city interpret the national law?
  - CAP provides the most common kinds of plastic found in the environment.
  - Does it allow for incentives for reuse, refill and disincentives for non-recyclable plastics?
2. How should the money from fees collected go?
3. How will the EPR policy incorporate/involve the informal sector at the local level?
4. What are the target dates for producers to avoid fees or fines for non-compliance?
5. What should be the role of GCC?



## 7. Glossary of terms

**Bio-methanation** Bio-methanation is a process by which organic material is microbiologically converted under anaerobic conditions (absence of oxygen) to biogas.

**Bio-mining** Bio-mining entails digging out the legacy waste and sorting it into different categories to be recycled or used in co-processing. According to the Central Pollution Control Board (CPCB) of India's guidelines, "Biomining is the scientific process of excavation, treatment, segregation and gainful utilization of aged municipal solid waste lying in dumpsites typically referred to as legacy waste."

**CAP** Circularity Assessment Protocol. Assessment protocol developed by the University of Georgia to identify and analyze waste streams, particularly plastics.

**EPR** Extended Producer Responsibility

**GCC** Greater Chennai Corporation

**GHG** Greenhouse Gases

**IPCC** Intergovernmental Panel for Climate Change

**MLP** Multilayered Plastic

**MoEFCC** Ministry of Environment, Forest and Climate Change

**MRF** Material Recovery Facility. A materials recovery facility receives, separates, and prepares recyclables to be sold to an end buyer. An MRF uses a combination of equipment, machines, and manual labor to separate and prepare the materials.

**MSW** Municipal Solid Waste. Waste that originates in homes and establishments such as commercial establishments, hotels, educational institutions etc.

**MT** Metric Ton

**NGO** Non-Governmental Organization

**OAT** Opportunity Assessment Tool

**OC** Ocean Conservancy

**PWM Rules 2022** Plastic Waste Management Rules notified specifically for plastic waste along the SWM Rules in 2016, later modified in 2022. The PWM Rules define Extended Producer Responsibility on Producer, Importer, and Brand Owner for both pre-consumer and post-consumer plastic packaging waste.

**R-Cities** Resilient Cities Network

**RRC** Resource Recovery Center. Resource recovery centers are like MRFs, that receive, separate and prepare recyclables. In the context of Chennai, RRCs are larger MRFs, in scale and occupy more space.

**SBM** Swachh Bharat Mission. The mission was launched on 02 October 2014 by the Ministry of Housing and Urban Affairs as a national campaign to promote cleanliness, sanitation, and proper waste management in urban areas.

**SWM** Solid Waste Management

**SWM Rules 2016** Solid Waste Management Rules 2016 notified by the Ministry of Environment, Forest and Climate Change of Government of India

**TCI** The Circulate Initiative

**WRI** World Resources Institute

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URBAN  
OCEAN