



A Centre for Science and Environment initiative

FORUM OF CITIES THAT SEGREGATE

ASSESSMENT REPORT
2017-18



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INTRODUCTION

Municipal solid waste (MSW) continues to be a severe problem in India due to poor management systems. From the collection of wastes to disposal, most Indian cities are struggling to implement an affordable and sustainable model. Urban India alone generates a gigantic 1.5 lakh metric tonnes per day of MSW. Rising incomes, rapidly growing but unplanned urbanisation, and changing lifestyles have resulted in increased volumes and changing composition (increasing use of paper, plastic and other inorganic materials) of municipal solid waste in India. The volume of waste is projected to increase from 64-72 million tonnes at present to 125 million tonnes by 2031.

Past few years have observed a paradigm shift in waste management with a major focus towards segregation at source and processing. Solid Waste Management Rules (2016) provide a reasonable framework to address the multiple challenges of municipal solid waste management. Strategic direction and funding by the Government of India through national missions such as AMRUT, Smart Cities and Swachh Bharat Mission have also created an environment in which there is more but by no means an adequate focus on the problem. It is extremely important to translate the vision from the Rules and the Missions into an operational integrated strategy of solid waste management. While the principles of solid waste management are being better understood and more discussed, the attention on the part of city officials to a collection of segregated waste and its transportation, treatment/processing, recycling and safe disposal is still in a nascent stage. Consumer behaviour patterns in Indian cities have also not adapted to facilitate the process of management of this waste by segregating organic or biodegradable waste from other waste at the source of generation.

Centre for Science and Environment (CSE) has been working with cities to promote and implement source-segregation and decentralized model of waste management. To advance this work and to create a movement in the country on source-segregation, CSE launched the 'Forum of Cities that Segregate' on 12th December 2017. Under this forum, 26 cities from 14 states have come together to ensure that they adopt 100 per cent source segregation and become the pioneers of waste management in the country. These cities are aspiring to be the focal points for other cities to learn waste management.

MAIN OBJECTIVES OF THE FORUM ARE:

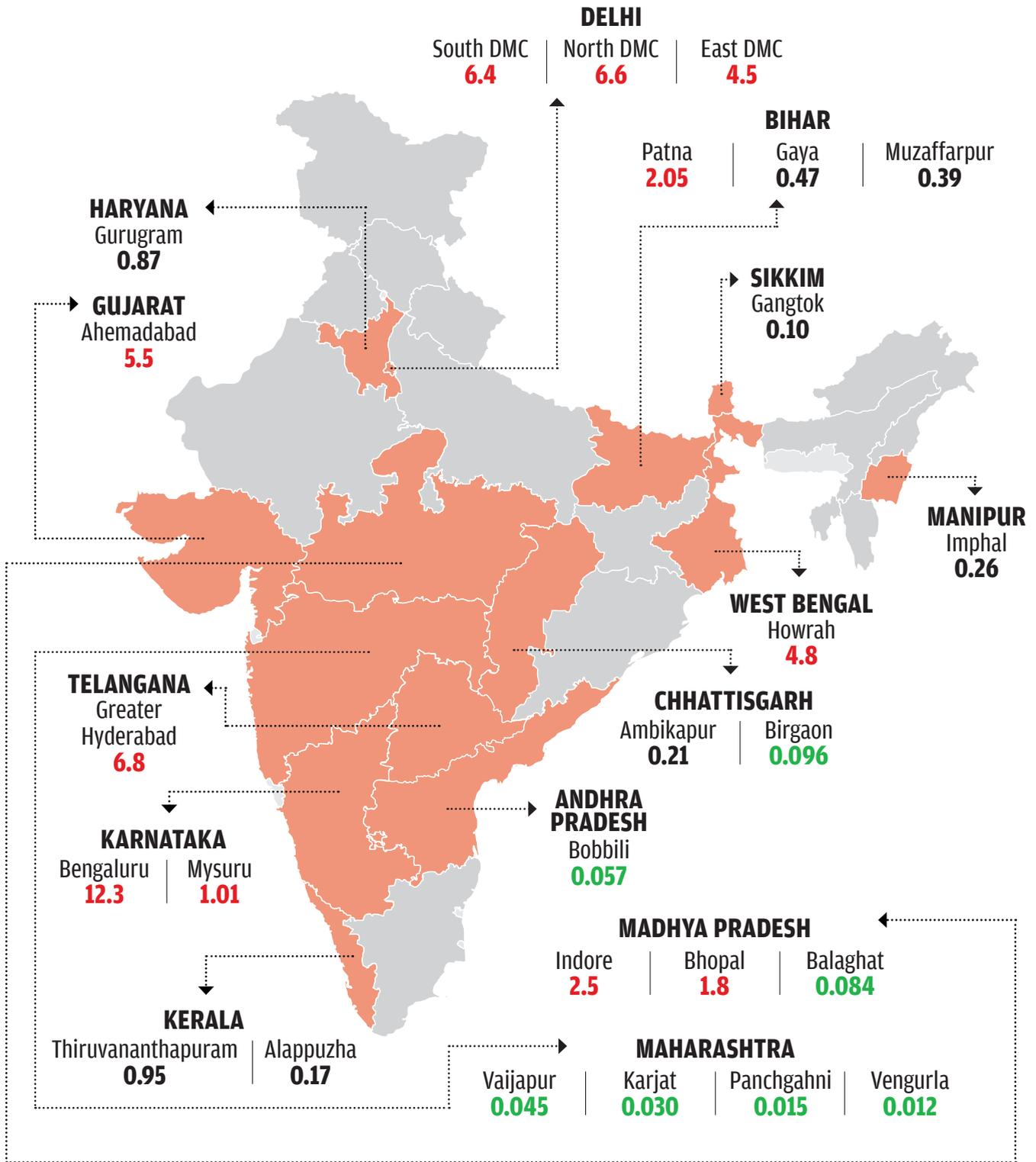
- Developing a knowledge exchange platform for participating cities on solid waste management (SWM)
- Training and capacity building on the source-segregation model of SWM
- Tracking and assessing the progress of cities
- Forum cities to become pioneer cities and handhold other cities on technical, economic and social aspects of SWM
- The forum shall collate the feedback and inputs from the forum cities and provide policy-relevant information to the state governments and Centre on SWM.
- Documentation of best practices

This year, to take the forum initiative forward and in order to push cities to adopt effective waste management systems, CSE has come out with an assessment report. Our objective through this assessment is to work with cities and help them perform better and continue to reinvent their waste management systems. Cities have been assessed based on their performance in the past six months, since the forum launch, on parameters such as segregation at source, collection, transportation, wet waste and dry waste processing, adoption of decentralised systems, the inclusion of informal sector in municipal systems and adoption and enforcement of SWM bye-laws.

We are clear that sweeping cities clean is only half the solution; sustainable treatment, recycle and reuse of waste is the other half.

FORUM CITIES

26 cities from 15 states



POPULATION IN MILLION

■ 1 million plus
 ■ Between 0.1 - 1 million
 ■ Below 0.1 million

ASSESSMENT OF FORUM CITIES: 2017-18

The assessment has been done for the 20 forum cities that joined the 'Forum of Cities that Segregate' on 12th December, 2017. Cities that joined the forum after January, 2018 are not part of this assessment.

(A) ASSESSMENT CRITERIA

Cities were assessed on the following 13 parameters:

- Segregation at source
- Collection efficiency
- Transportation efficiency
- Wet waste processing
- Dry waste processing
- Disposal in landfill
- Decentralised processing
- Enactment of SWM bye-laws and enforcement of plastic waste management rules
- Inclusion of informal sector
- Common Bio-medical Waste Treatment Facility
- C&D processing
- E-waste collection
- Innovation

Annexure 1 contains details of the assessment process

(B) PERFORMANCE ASSESSMENT

1. Segregation

Only four out of the 20 forum cities assessed in 2017-18 have segregation percentage higher than 90 per cent — Indore in Madhya Pradesh, Panchgani and Vengurla in Maharashtra and Alappuzha in Kerala. Alappuzha municipality has been pushing for source segregation since 2013. Today, all 52 wards of the city are practising segregation of waste at source at household, commercial and bulk generator level. In Vengurla, every household segregates waste into wet, dry and domestic hazardous waste. Dry waste further gets segregated into twenty different categories. In Indore, the municipal corporation has enrolled four NGOs to promote cleanliness and source segregation. All households, commercial establishments and bulk generators practice source segregation. Cities such as Muzaffarpur, Bihar launched their segregation programme in 2017; within a year's time, the segregation levels have improved significantly in the city. East Delhi Municipal Corporation (EDMC), South Delhi Municipal Corporation (SDMC), Patna, Gaya, Imphal and Gurugram have segregation levels below 33 per cent.

Segregation percentage	Cities
>90 %	Indore, Panchgani, Alappuzha, Vengurla,
75-90 %	Thiruvananthapuram, Muzaffarpur, Mysuru, Gangtok
50 -75 %	Bhopal, Bengaluru, Bobbili, Vaijapur
33-50 %	Greater Hyderabad, Balaghat
<33%	SDMC, EDMC, Patna, Gaya, Imphal, Gurugram

2. Collection

Sixteen forum cities have collection efficiency above 90 per cent. This clearly indicates that most of the cities have invested in developing efficient systems for door-to-door collection of waste. In Alappuzha and Thiruvananthapuram, the municipality provides collection for only dry waste; residents are expected to treat their wet waste at source. In other cities, waste is collected on a daily basis. Cities such as Muzaffarpur, Patna and Balaghat need to create more efficient systems for door-to-door collection and ensure waste gets collected on a daily basis. Vaijapur has scored the lowest with collection percentages between 50-75 per cent.

Collection efficiency	Cities
>90 %	Indore, Panchgani, Alappuzha, Bhopal, Greater Hyderabad, SDMC, EDMC, Thiruvananthapuram, Mysuru, Gaya, Imphal, Bobbili, Gangtok, Gurugram, Vengurla, Bengaluru
75-90 %	Muzaffarpur, Patna, Balaghat
50 -75 %	Vaijapur
33-50 %	-
<33%	-

3. Transportation

Most of the forum cities have efficient transportation systems to collect and transfer waste to the processing/ landfill sites. Cities with a score of 90 per cent and above have compartmentalized GPS tagged vehicles to collect waste — Indore, Bhopal, SDMC, EDMC, Mysuru and Bobbili. Cities such as Patna, Gaya, Bengaluru, Gangtok, Gurugram and Balaghat need to further invest in efficient transportation systems. Muzaffarpur and Vaijapur have scored the lowest and need to further work to strengthen transportation.

Transportation	Cities
>90 %	Indore, Panchgani, Alappuzha, Bhopal, Greater Hyderabad, SDMC, EDMC, Thiruvananthapuram, Mysuru, Imphal, Bobbili, Vengurla
75-90 %	Bengaluru, Patna, Gaya, Gangtok, Gurugram, Balaghat
50 -75 %	Muzaffarpur, Vaijapur
33-50 %	-
<33%	-

4. Wet waste processing

Only six forum cities have wet waste processing greater than 90 per cent — Indore, Mysuru, Alappuzha, Panchgani, Balaghat and Vengurla. In Indore, the majority of the wet waste is treated in a centralized manner. However, residents are being encouraged to segregate and treat wet waste at source. Also, composters have been installed in markets and commercial areas to treat wet waste. In Mysuru, wet waste processing happens at the seven operational zero waste management units as well as the centralized composting facility. In Alappuzha, the majority of the wet waste processing is done in-situ. It is clear from the assessment that cities need to work towards processing of wet waste. If the wet waste contains over 50 per cent biodegradable fraction, it is imperative to go for technologies such as composting and biomethanation to process wet waste. Cities having below 50 per cent wet waste processing need to re-work to create efficient systems for wet waste management.

Wet waste processing	Cities
>90 %	Indore, Mysuru, Alappuzha, Panchgani, Balaghat, Vengurla
75-90 %	Bengaluru, Greater Hyderabad, Thiruvananthapuram, Bobbili
50 -75 %	Bhopal, SDMC, EDMC, Vaijapur
33-50 %	Imphal, Gangtok
<33%	Muzaffarpur, Patna, Gaya, Gurugram

5. Dry waste processing

Four forum cities have 90 per cent or higher dry waste processing — Panchgani, Vengurla, Indore, and Alappuzha. Panchgani, being an eco-sensitive zone, channelizes its dry waste to recycling centres in Pune. The non-recyclable plastic is shredded and sent to a contractor for making of roads. In Vengurla, the dry waste is sent to a material recovery facility (MRF) where it is further segregated into 20 different fractions. The recyclables are sold to the authorised recyclers. Other mixed plastic goes to a shredding unit. The shredded plastic is used in road construction. Indore city is working with two NGOs — Sarthak and Basix, who have further integrated informal sector to sort waste at the MRF. The dry recyclable plastic is sold to the recyclers; the non-recyclable plastic waste is bailed and sent to a cement plant at Neemuch and to M.P. Rural Road Development Corporation for construction of roads. Many forum cities have a mechanism for dry waste channelisation and processing, however, the scale is very small. This needs to be further up-scaled in the majority of the forum cities.

Dry waste processing	Cities
>90 %	Indore, Alappuzha, Panchgani, Vengurla
75-90 %	Bobbili, Thiruvananthapuram
50 -75 %	Mysuru, SDMC, Imphal, Gangtok, Balaghat, Bhopal
33-50 %	EDMC, Vaijapur
<33%	Bengaluru, Muzaffarpur, Patna, Gaya, Gurugram, Greater Hyderabad

6. Decentralised processing

Thiruvananthapuram and Alappuzha are the only cities that have invested in creating decentralised systems for waste management. In Thiruvananthapuram, approximately, 1.25 lakh households (50 per cent of the total households) are composting at source while 350 bulk generators are composting their wet waste. Also, close to 4000 households and 100 bulk generators have set up biogas plants for in-situ treatment of wet waste. The Alappuzha model requires the residents to treat the maximum amount of wet waste at source. Municipal Council has been providing subsidies on technologies for installation of plants in households. Basic aerobic technologies such as Matka (pot), pit and pipe composting are promoted as well as potable biogas plants are promoted. There are 23 aerobic composting centres in Alappuzha, which collectively treat 15-25 tonnes of wet waste per day. The residents also drop their dry waste at these centres, where it is further segregated and sent to the municipal Dry Waste Collection Centre at regular intervals.

In Mysuru, seven of the nine Zero Waste Management Units (ZWMs) are functional where wet waste is composted and dry waste is further segregated into 28 different categories. However, the corporation has not been able to maintain its ZWMs. The remaining forum cities have decentralised waste management percentages below 33 per cent and need to further work to create systems to support this.

Though decentralized waste processing is desirable, many smaller cities with less than 0.1 million population have performed very well with few centralized processing centres.

Some of these cities are also promoting decentralized processing at household level. These cities have not been assessed for 'decentralized processing' parameter because our assessment shows that at their scale of operation centralized processing is as feasible as multiple processing centres, as long as source segregation is being practised. Assessing then on this parameter would have penalized them for the good work they are doing in waste processing at centralized facilities.

Decentralised processing	Cities
>90 %	Thiruvananthapuram
75-90 %	Alappuzha
50 -75 %	Vaijapur*
33-50 %	Mysuru
<33%	Bhopal, Bengaluru, Greater Hyderabad, SDMC, EDMC, Muzaffarpur, Patna, Gaya, Gangtok, Gurugram, Balaghat*, Vengurla*, Indore, Panchgani*, Imphal, Bobbili*

*Cities not assessed on this parameter

7. Disposal

Only a few forum cities have worked to ensure minimum disposal in landfills and maximum resource utilization. Panchgani and Vengurla (fairly small cities) and Alappuzha have worked on creating systems to adopt a zero landfill model. Vengurla city has no dump site or landfill. The inert waste such as debris, silt etc. is mixed with organic waste and is used for mulching, therefore, maximum waste is recovered. A very limited quantity of inert waste generated is stored in the compound. Panchgani, a major tourist destination in Maharashtra has no disposal facility. The previous garbage disposal site has been remediated into a public park, which is now a major tourist attraction. The minimal amount of inert waste is stored in the MRF. Cities having disposal percentage higher than 33 per cent need to focus more on processing and ensure minimal waste is disposed of.

Disposal	Cities
>75 %	Patna, Gaya, Gurugram
50 -75 %	Bengaluru, Imphal, Bhopal, Muzaffarpur
33-50 %	SDMC, EDMC, Vaijapur, Greater Hyderabad
10-33 %	Mysuru, Balaghat, Bobbili, Gangtok, Thiruvananthapuram, Indore
<10%	Panchgani, Vengurla, Alappuzha

8. Bye-laws and enforcement

Only a few forum cities have enacted bye-laws as per the SWM Rules, 2016 — Indore, SDMC, EDMC, Muzaffarpur, Vengurla and Bobbili. The enforcement of the bye-laws remains a major challenge. Only Indore and Vengurla have ensured some level of enforcement of the bye-laws. The enforcement of Plastic Waste Management Rules (PWM), 2016 remains poor across many cities. However, cities like Alappuzha, Panchgani, Thiruvananthapuram, Mysuru, Vengurla and Vaijapur have done well in enforcing many provisions of the PWM Rules.

	Cities
SWM bye-laws	Indore, SDMC, EDMC, Muzaffarpur, Vengurla, Bobbili
SWM bye-law enforcement	Indore, Vengurla
Enforcement of Plastic Waste Management Rules, 2016	Alappuzha, Panchgani, Thiruvananthapuram, Mysuru, Vengurla, Vaijapur

9. Inclusion of informal sector

As per the SWM Rules, 2016, municipalities need to formalize the informal sector and issue identity cards to them. Also, the informal sector has to be incentivized by selling dry recyclable waste. Considering that the occupational health risks, workers also have to be provided personal protective equipment (PPE) as well as health facilities, including health insurance.

Most cities have tried to include informal sector in varied extent. These cities have issued ID cards and have also given the right to sell dry wastes to the informal collectors. However, cities have done poorly on protecting the health of these workers. PPE has been provided by many cities, but health check-up, health facility and insurance are missing.

	Cities
Informal sector made part of SWM	Indore, Alappuzha, Bhopal, Bengaluru, Greater Hyderabad, Panchgani, Muzaffarpur, Mysuru, Patna, Imphal, Bobbili, Gangtok, Vengurla, Vaijapur
ID cards issued	Indore, Alappuzha, Bhopal, Bengaluru, Greater Hyderabad, Panchgani, , Muzaffarpur, Mysuru, Patna, Imphal, Bobbili, Gangtok, , Vengurla, Vaijapur
Incentives such as right over dry waste	Indore, Alappuzha, Bhopal, Bengaluru, Greater Hyderabad, Panchgani, Muzaffarpur, Mysuru, Patna, Gaya, Imphal, Bobbili, Gangtok, Vengurla, Vaijapur
Health	Indore, Alappuzha, Bhopal, Bengaluru, Greater Hyderabad, Panchgani, Muzaffarpur, Mysuru, Imphal, Bobbili, Gangtok, Vengurla, Vaijapur

10. Collection and treatment of Biomedical waste, C&D waste, E-waste and adoption of any other innovative methods

Only Indore of all the forum cities has set up an efficient system for collection and processing of E-waste, construction and demolition (C&D) waste and bio-medical waste. Cities that have adopted any of these systems for management of different streams of waste have been allocated points. Also, additional points have been allocated to cities that have worked on innovation of their existing waste management systems. For instance, Mysuru has seven operational decentralised zero waste management (ZWM) units which are run by local NGOs and self-help groups who make money from the sale of compost and dry recyclables. Alappuzha and Thiruvananthapuram are practicing are model examples of decentralised waste management in the country. Balaghat is encouraging all the households to segregate their waste at source and is working towards transforming its dumpsite into a processing facility. Muzaffarpur is the only city of Bihar to adopt decentralised waste management model and has witnessed transformation in terms of cleanliness, people's participation and behaviour change. Panchgani has made significant efforts in improvising cleanliness and adoption of a segregation intensive waste management model.

	Cities
Common Bio-medical Waste Treatment Facility	Indore, Alappuzha, Bhopal, Bengaluru, Greater Hyderabad, Panchgani, SDMC, Muzaffarpur, Thiruvananthapuram, Mysuru, Patna, Gaya, Gangtok, Gurugram, Vengurla, Vaijapur
C&D processing	Indore, SDMC, EDMC
E-waste collection	Indore, Alappuzha, Bhopal, Bengaluru, Mysuru, Gangtok, Gurugram, Balaghat
Innovation	Alappuzha, Panchgani, Muzaffarpur, Thiruvananthapuram, Mysuru, Balaghat

FINAL ASSESSMENT

CITIES HAVE BEEN AWARDED GREEN LEAVES AWARD BASED ON THE PERCENTAGE OF MARKS OBTAINED.

	Score (%)	Leaves
A	>90	
B	75-90	
C	50-75	
D	33-50	
E	<33	

To reflect the size of cities and the scale of the Solid Waste Management systems, the assessment has been done separately for cities of different sizes. The Forum cities were divided into three categories: Cities with a population of more than 1 million, cities with a population between 0.1 – 1.0 million and cities with less than 0.1 million population.

- Smaller cities have performed best in our assessment. Vengurla has got the highest 5 Leaves Award. Panchgani with less than 0.1 million population, has got 4 Leaves Award.
- Overall, mid-size cities have performed better than million-plus cities. Alappuzha and Thiruvananthapuram, both with a population of 0.1 — 1.0 million range, have got 4 Leaves Award.
- In million plus cities, Indore and Mysuru have also got 4 Leaves. NCR has performed poorly. SDMC and EDMC have got 2 Leaves Award and Gurugram has got just 1 Leaf.

FINAL ASSESSMENT OF FORUM CITIES

CITY	SCORE (%)	AWARD
1 million plus cities		
Indore	81	
Mysuru	75	
Bhopal	54	
Greater Hyderabad	48	
Bengaluru	47	
South Delhi Municipal Corporation	44	
East Delhi Municipal Corporation	40	
Patna	26	
Population between 0.1 – 1 million		
Alappuzha	89	
Thiruvananthapuram	75	
Gangtok	60	
Muzaffarpur	44	
Imphal	41	
Gurugram	28	
Gaya	23	
Below 0.1 million population		
Vengurla	91	
Panchgani	88	
Bobbili	73	
Balaghat	56	
Vaijapur	52	

ANNEXURE 1: ASSESSMENT METHODOLOGY

THE FOLLOWING METHODOLOGY HAS BEEN ADOPTED TO ASSESS CITIES:

- Collection of data from ULBs: Data sheets shared with ULBs to submit information
- Authentication of the data and verification of data from various stakeholders.
- Processing of data and scoring of cities.
- The maximum allotted score is 50. There are 9 questions (maximum 5 points each) and 4 bonus questions (3 with one point and 1 with 2 point).
- If a ULB scores,

	Score (%)	Leaves
A	>90	
B	75-90	
C	50-75	
D	33-50	
E	<33	

PARAMETERS FOR SCORING CITIES

THE FOLLOWING PARAMETERS HAVE BEEN USED TO SCORE CITIES

S.No	Parameter	Maximum points
1	Segregation	5
2	Collection	5
3	Transportation	5
4	Wet waste processing	5
5	Dry waste processing	5
6	Disposal	5
7	Decentralised processing	5
8	Bye-laws and enforcement of plastic waste management rules	5
9	Inclusion of informal sector	5
10	Common Bio-medical Waste Treatment Facility	1
	C&D processing	1
	E-waste collection	1
	Innovation	2
Total points		50

1. Segregation: Percentage of households, commercial establishments and bulk generators practising segregation at source

	HH	CE	BG	Score
>90 %	3	1	1	5
75-90 %	2.5	0.75	0.75	4
50 -75 %	1.5	0.50	0.50	2.5
33-50 %	1	0.125	0.125	1.5
<33%	0	0	0	0

HH: Households, CE: Commercial Establishments, BG: Bulk generators

2. Collection

Collection efficiency	Score
>90 %	5
75-90 %	4
50 -75 %	2.5
33-50 %	1.5
<33%	0

3. Transportation: Percentage of waste collected and transported to processing/ disposal site

Transportation	Score
>90 %	5
75-90 %	4
50 -75 %	2.5
33-50 %	1.5
<33%	0

4. Wet waste processing: Percentage of wet waste processed and converted into useful products

Wet waste processing	Score
>90 %	5
75-90 %	4
50 -75 %	2.5
33-50 %	1.5
<33%	0

5. Dry waste processing: Percentage of dry waste collected, segregated and channelized for recycling, reuse or recovery

Wet waste processing	Score
>90 %	5
75-90 %	4
50 -75 %	2.5
33-50 %	1.5
<33%	0

6. Decentralised processing: Promotion of waste processing at household, institutional and decentralized facilities.

Decentralised processing	Score
>90 %	5
75-90 %	4
50 -75 %	2.5
33-50 %	1.5
<33%	0

7. Disposal: Percentage of wastes disposed at landfill/ dump sites

Disposal	Score
>75 %	0
50 -75 %	1.5
33-50 %	2.5
10-33 %	4
<10%	5

8. Bye-laws and enforcement: Enactment of municipal bye-laws based on SWM Rules, 2016 and enforcement of Plastic Waste Management Rules, 2016

	Score
Enactment of SWM bye-laws	1.25
SWM bye-law enforcement	1.25
Enforcement of Plastic Waste Management Rules, 2016	2.5

9. Inclusion of informal sector

	Score
Informal sector made part of SWM	1.25
ID cards issued	1.25
Incentives given	1.25
PPE, Health check-up, health facilities and insurance	1.25

10. Collection and treatment of Biomedical waste, C&D waste, E-waste and adoption of any other innovative methods

	Score
Common Bio-medical Waste Treatment Facility	1
C&D processing	1
E-waste collection	1
Innovation	2



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