

## Panvel, India

### City Information

**Population:** 180,464

**Area (km<sup>2</sup>):** 14,829

#### Climate

The climate here is tropical. Most months of the year are marked by significant rainfall. The short dry season has little impact. The average annual temperature in Panvel is 27.0 °C. In a year, the average rainfall is 3267 mm.

#### Main Economic Activities

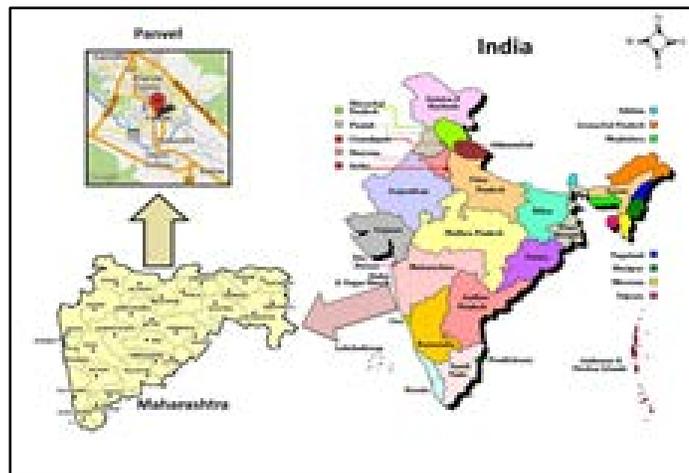
Panvel is surrounded by some major Maharashtra Industrial Development Corporation (MIDC) managed regions like Patalganga, Taloja, Nagothane, Roha, Khopoli, and Bhiwandi. Some of the major Indian industries like Larsen & Toubro Limited, Reliance, Hindustan, Organic Chemicals Ltd., ONGC and IPCL are based around Panvel providing mass employment.

**City Website:** <http://www.panvelcity.com/>

#### Government Agencies responsible for guidance on waste legislation

Panvel Municipal council - <http://www.panvelnagarparishad.com/EIPPROD/singleIndex.jsp?orgid=112>

CIDCO - [http://www.cidco.maharashtra.gov.in/RM\\_Taluka\\_panvel.aspx](http://www.cidco.maharashtra.gov.in/RM_Taluka_panvel.aspx)



## Country Information

**Population:** 1,210,193,422 ([Census, 2011](#))

**Area (km<sup>2</sup>):** 3,287,263

### **Economy and GNI/Capita**

Developing economy with fast growing service sectors; Rs. 53,331 (2010–11)

### **Main Economic Activities**

India has classified and tracked its economy and gross domestic product (GDP) as three sectors— agriculture, industry and services. Agriculture includes crops, horticulture, milk and animal husbandry, aquaculture, fishing, sericulture, aviculture, forestry and related activities. Industry includes various manufacturing sub-sectors. India's definition of services sector includes its construction, retail, software, information technology (IT), communications, hospitality, infrastructure operations, education, health care, banking and insurance, and many other economic activities.

With this increasing population, management of municipal solid waste in the country has emerged as a severe problem not only because of the environmental and aesthetic concerns but also because of the sheer quantities generated every day. According to Central Pollution Control board 1, 27,486 TPD (Tons per day) of municipal solid waste was generated in India during 2011-12, with an average waste generation of 0.11 kg/ capita/day. Of the total waste generated, approximately 89,334 TPD (70%) of MSW was collected and only 15,881 TPD (12.45%) was processed or treated. Segregation at source, collection, transportation, treatment and scientific disposal of waste was largely insufficient leading to degradation of the environment and poor quality of life.

## MSW Sector Overview: City Level

**Waste Generation (per capita/year):** 92.71 kg / year

### Collection Coverage

The total number of households as per Panvel Municipal Council are 43,231. 95% of the population receives the service.

### Number of Landfills/MSW Disposal rate (tonnes/year)

One serving two cities.



### Recycling Rate

Plastic, glass, paper, and cardboard were recycled by CIDCO and Panvel Municipal Council. Segregation takes place from home. During collection for door to door the waste the recycled waste materials were collected and transported to recycle Centre where all the waste goes for recycling. Rag pickers help most in recycling the waste. Currently the recycling site processes 55-60 MT/ day.

### Waste management of organic fraction (composting, anaerobic digestion)

The composting of organic waste is done. Currently, 100 tonnes of organic waste is processed, producing approximately 14,600 tonnes of compost per year.

### Energy Recovery Rate

Currently there is no waste to energy facilities.

### Classification of MSW

*Other than medical waste and hazardous waste, all other wastes are considered in MSW*

Source No.	Source	Generated Waste In MT (Per Day)
1	Residential	42.13
2	Commercial	
3	Industrial	2.0
4	Medical	1.5
5	Institutional	1.2
6	Other	3
	TOTAL	49.83 MT

### MSW Generation

18187.95 MT/year and per capita is 92.71 kg / year.

### Collection Coverage and Type –

About 95% of the city's solid waste is collected and taken to the transfer site. After the transfer station, the waste is sent to the recycling / landfill site. About 80% of the city waste goes to the landfill site.

There is segregation of **bio degradable** and **non-biodegradable** waste at source.

Community participation in **door-to-door waste collection** in society and biodegradable waste to be composted itself.

- At present, the Panvel City currently uses segregated total waste at the generation point. As per the study, only two wards out of 38 wards, are composting and is being done by the societies privately. 1,500 households segregate waste from the two wards, for the area of ward no. 6, 790 households of Sai Nagar, and for the ward Kalpataru Society for 710 households. The segregated waste is utilized for compost formation.)

#### **Collection per source**

Type / Source	Method	Wet	Dry	Bio – medical	Inert /Construction waste
<b>Individual households</b>	Door to door collection	3.5 tonnes	5.5 tonnes	----	----
<b>Co-operative society</b>	Society single point collection	2.0 tonnes	5.0 tonnes	----	----
<b>Slums</b>	Door to door collection	2.0 tonnes	3.0 tonnes	----	----
<b>Market</b>	Litter bins	Dry and wet garbage – 16 tonnes.		----	----
<b>Hospitals</b>	External agency	----	1.5 tonnes	----	----
<b>Vegetable markets</b>	----	4.0 tonnes	2.0 tonnes	----	----
<b>Hotel waste</b>	----	1.5 tonnes	----	----	----
<b>Total dry and wet garbage – 46.00 tonnes.</b>					

#### **Waste Composition:**

Materials	Percentage
Plastic	11.06
Rubber	0.98
Fuel	15.30
Paper	3.02
Cloth	12.75
Organic	27.97
Food waste	16.47
Inert	4.11
Glass	1.49

Metal	0.74
Hard Plastic	0.66
Coconut	5.41

### **Waste Management Practice**

For the final disposal of wastes, an open dump is used. At the same site, there is recycling and composting of organic wastes. Plastic bottles, glass, paper, cardboard and scrap metal are the type of materials that are recycled. 37 MT of plastics are recycled per year.

### **Formal Waste Sector**

The development authority of Panvel is the Panvel Municipal Council (PMC) and for New Panvel is City & Industrial Development Corporation (CIDCO). In many areas, the dustbin facilities were provided by the CIDCO & PMC. The total number of community dustbins is 210. There are different vehicles for collection, transportation of solid waste, which are provided by PMC/CIDCO and by contractor appointed for the solid waste management by council. The number of vehicles provided by CIDCO contractor are 8 and 14 by PMC contractor for waste collection, transportation etc.

### **Informal Waste Sector**

Informally there are waste pickers at the dump/land fill and street waste pickers who have legal access to the dumpsite.

### **Financing of MSW**

The management of solid waste in the municipality is paid by the door-to-door collection of fee, municipal budgetary allocation to solid waste sector, and the revenues from the sale of the compost. The budget for solid waste management is a significant part of the city budget.

## **MSW Sector Overview: Country Level**

### **General description and overview of common practice**

India, with a population of over 1.21 billion account for 17.5% of the world population (Census of India 2011). According to the provisional figures of Census of India 2011, 377 million people live in the urban areas of the country. This is 31.16 % of the Country's total population. The growth of urban population is at a much faster rate than the growth of rural population. India has 475 Urban Agglomerations (UA), three of which has population over 10 million. The very high rate of urbanization coupled with improper planning and poor financial condition has made MSW management in Indian cities a herculean task.

Generally, in India, MSW is disposed of in low-lying areas without taking proper precautions or operational controls. Therefore, municipal solid waste management (MSWM) is one of the major environmental problems of Indian megacities. SWM involves activities associated with generation, storage and collection, transfer and transport, treatment and disposal of solid wastes. However, in most Indian cities, the MSWM system comprises only four activities, i.e., waste generation, collection, transportation, and disposal. Poor collection and inadequate transportation causes the accumulation of MSW at every nook and corner. The management of MSW is going through a critical phase, due to the unavailability of suitable facilities to treat and dispose of the larger amounts of MSW generated daily in metropolitan cities.

Adverse impact on all components of the environment and human health occurs due to unscientific disposal of MSW. The MSW amount is expected to increase significantly in the near future as India strives to attain an industrialized nation status by the year 2020.

MSW generation rates in small towns are lower than those of metro cities, and the per capita generation rate of MSW in India ranges from 0.2 to 0.5 kg/ day. It was also estimated that the total MSW generated by 217 million people living in urban areas was 23.86 million tonnes per year in 1991, and more than 39 million tonnes in 2001. MSW composition at generation sources and collection points, determined on a wet weight basis, consists mainly of a large organic fraction (40–60%), ash and fine earth (30–40%), paper (3–6%) and plastic, glass and metals (each less than 1%). The C/N ratio ranges between 20 and 30, and the lower calorific value ranges between 800 and 1000 kcal/kg.

### **Collections and Storage of MSW**

For both decomposable and non-decomposable waste common bins are used to collect the waste without any segregation, and disposed of at a community disposal Centre. Two types of storage bins are used - movable bins and fixed bins. The fixed bins are more durable but their positions cannot be changed once they have been constructed, while the movable bins are flexible in transportation but lacking in durability. Collection of MSW is the responsibility of corporations/municipalities. In most of the cities, the predominant system of collection (through the communal bins) at various points along the roads, and sometimes this leads to the creation of unauthorized open collection points. House-to-house collection is just starting in many megacities such as Delhi, Mumbai, Bangalore, Madras and Hyderabad.

### **Treatments and Disposal of MSW**

- 1. Composting:** Composting has a long tradition particularly in rural India. Composting is difficult process because the waste arrives in a mixed form and contains a lot of non-organic material. Only 300 t/ day capacity is being utilized currently due to certain problems, but the plant is working very successfully and the compost produced is being sold at the rate of 2 Rs. /kg. In India, composting is used around 10-12% because composting need segregation of waste and sorting is not widely practiced
- 2. Incineration:** In India, the incineration is a poor option as the waste consists mainly high organic material (40–60%) and high inert content (30–50%). In addition, the MSW has low calorific value content (800–1100 kcal/kg), high moisture content (40–60%) in MSW. The costs of setting up and running the plants are high.
- 3. Gasification Technology:** In India, there are very few gasifiers in operation, but they are mostly for burning of biomass such as agro-residues, sawmill dust, and forest wastes. In India, one gasification unit was installed at Gaul Pahari campus, New Delhi, by Tata Energy Research Institute (TERI) and the other is installed at Nohar, Hanungarh and Rajasthan by Narvreet Energy Research and Information (NERI) for the burning of agro-wastes, sawmill dust, and forest wastes. The waste-feeding rate is about 50–150 kg/h and its efficiency about 70–80%. About 25% of the fuel gas produced may be recycled back into the system to support the gasification process, and the remaining is recovered and used for power generation.
- 4. Landfilling:** Open, uncontrolled and poorly managed dumping is commonly practiced, giving rise to serious environmental degradation. 60%- 90% of MSW in cities and towns are directly disposed of on land in an unsatisfactory manner. The daily cover techniques are poor, which makes leakage easier. This is mainly because of a lack of knowledge and skill on the part of the local authorities.
- 5. Refuse Derived Fuel (RDF) Plants:** The RDF plant reduces the pressure on landfills. Many RDF plants are in operation in India. In Bangalore, a RDF plant was established and has had regular production of fuel pellets since October 1989. This plant compacts 50 t/day of garbage, converting it into 5 t of fuel pellets, which can be designed both for industrial and domestic uses. The Hyderabad RDF plant was commissioned in 1999 near the Golconda dumping ground with a

1000 t/day capacity (but receiving only 700 t/day at present). The RDF production is about 210 t/day as fluff and pellets, and it is going to be used for producing power

### **Treatment & Disposal**

MSW is usually disposed as it is without any treatment. Most of MSW is still disposed of in dumps causing severe environmental and health risks. The progress in moving towards sanitary landfills and/or disposing through well-designed and well-operated incinerators is rather slow

### **Policy Issues**

A vigorous policy framework to give a direction and thrust to environmentally sound waste management does not exist in India. Policy measures to promote waste minimization, recycle and recovery are rather lean. No national targets have been set up to deal with overall issue of waste management in line with country's economic development programme. The environmental policies are 'discharge end control' based instead of shifting to 'source end control' based approach. There are no policies to promote segregation and reuse at source and conversion of waste into useful materials/energy.

## ***Plans, Strategies, Policies [including financial instruments] and National Objectives***

### **City Level**

In current situation, PMC proposed the several plans for the solid waste management regarding following main sectors in order to achieve the advancement in SWM.

1. Decentralization of Solid Waste.
2. Recycling of recyclable waste.
3. Decrease the health hazards.
4. Bio – Methanation of waste and generate the electricity.
5. Decrease the load on the PMC of costing of transportation of waste.

The specific objectives of the project is to be achieved through undertaking a city waste assessment, developing waste management, city action plan and preparing a city profile for the city, that will significantly reduce SLCP emission.

The preferred waste management strategies within the hierarchy include:

- At source reduction and reuse at source
- Waste recycling
- Waste to composting
- Waste-to-Energy

### **Country Level**

Ministry of Urban Development aims to guide all urban areas in the country towards Sustainable Municipal Solid Waste Management, adopting the aspects of waste minimization at source with an emphasis on the 3R principles of reduce, reuse and recycle; with proper systems of segregation, collection, transportation, processing, treatment and disposal in complete harmony with the environment, thereby leading to the achievement of the aim of NUSP.

## Legislation

### City Level

Other than the Municipal Solid Waste (Management & Handling) Rule, 2000, the other legislations by the state are:

- Maharashtra Non-Biodegradable Garbage (Control) Act 2006.
- Maharashtra Plastic Carry Bags (Manufacture and Usage) Rules 2006.
- Maharashtra Non-Biodegradable Garbage (Control) Act 2006.

### Country Level

- Municipal Solid Waste (Management & Handling) Rules, 2000 by MoEF.
- Revised draft of Rules circulated in the year 2013 by MoEF.
- MSW (M&H) Rules 2013 by the Ministry of Environment and Forest (MoEF) and
- Manual on Municipal Solid Waste Management and Handling 2014.
- National Urban Sanitation Policy (NUSP).
- Plastic Waste (Management and Handling) Rules, 2011
- Bio-medical Waste (Management and Handling) Rules, 2009 and draft 2011
- E-Waste (Management and Handling Rules), 2011
- Battery (Management and Handling Rules), 2001
- Construction & Demolition (C&D) Waste Rules, under consideration

## Involvement to date in CCAC MSW Initiative

### Discuss Action Plan with wider stakeholders to reach consensus for implementation

TERRE organized a stakeholder meeting at Panvel city with a wide variety of participants to share the project findings and identify actions to get more commitment from the stakeholders for its implementation.

### Organized Workshop

- TERRE organized an inception workshop in Panvel in collaboration with city staff, and invited representatives from relevant institutions to brief on the project idea and methodology of the city assessment and action plan preparation.
- After the inception workshop, a project coordinating team was established, including key representatives from the city departments, civil society, academic and the private sector.
- TERRE, in consultation with the coordinating committee, selected a suitable candidates for local consultant positions to carry out the fieldwork.
- The suitable consultant provided input regarding past and present local municipal solid waste management issues and preliminary suggestion, identify local stakeholders, and assess the local problems and issues related to solid waste management in nearby buffer area due to lack of proper management.

### **Undertake City Assessment and City Profile**

- In close cooperation with the city government, a city assessment undertaken based on the template prepared by the CCAC-MSWI. The city assessment helps to evaluate the current situation of waste management in the city. It also covered a broad range of information to identify clear linkages of waste and climate change focusing on SLCPs in the city.
- In close cooperation with the city, a city profile was prepared on the current waste management trends and practices, noting gaps therein. The waste management trends include the quantification and characterization of various waste streams within the city and waste generation projections into the future.

### **Prepare final Action Plan and recommendations for replication**

- In close cooperation with all the stakeholders, an action plan was developed based on the results of the city assessment and stakeholder consultation. The action plan was developed with a set of suggestions for improving waste management practices to address SLCPs from municipal solid waste in addition to other conventional challenges linked with waste management such as public health and environmental contamination.
- TERRE is working closely with national ministries to share the experience of Panvel to other cities in India through sharing information and organizing exchange visits locally and by organizing a community dialogue workshop in collaboration with local authorities. TERRE will further support and coordinate to bring the new cities to the CCAC-MSWI.

## ***Current Projects or activities aimed at reducing SLCP Emissions***

The city will participate in the Initiative and undertake a city waste assessment, which will allow for the current activity aimed at reducing short-lived climate pollutants (SLCP) emissions by collection of current and future waste generation data and patterns, as well as the current waste management system and gaps therein. The city waste assessments also cover a broad range of information to identify the clear linkages of waste and climate change focusing on SLCPs in each city. The city assessment highlights a broad list of priority interventions and is accompanied by a city waste management action plan.

Currently Panvel municipal council is planning for enforcing a law for waste segregation at source and also thinking for providing a compost bins to each household for utilize their organic waste. This will also help in reducing municipal solid waste at source. Constructions of composting pits (capacity of 400kg of organic per day) are also setup in various societies which also helps in reduction of SLCPs emission. The current composting pit is also seen as replica for other societies in the panvel city. Their aim is to setup 1 compost bin at every 1km distance of the area in the city.

## ***Key Stakeholders***

Panvel Municipal Council - <http://www.panvelnagarparishad.com/EIPPROD/singleIndex.jsp?orgid=112>

CIDCO - [http://www.cidco.maharashtra.gov.in/RM\\_Taluka\\_panvel.aspx](http://www.cidco.maharashtra.gov.in/RM_Taluka_panvel.aspx)

## ***Contacts***

### **MSW Initiative City Lead:**

Mr. Ganesh Chandrakant Kadu, Corporator- Panvel Municipal Council ([gkadu75@gmail.com](mailto:gkadu75@gmail.com))

### **MSW Initiative City Representative:**

Dr Vinita Apte, President - TERRE Policy Centre ([aptevh@gmail.com](mailto:aptevh@gmail.com))

Ankit Gaurav, Project Leader – TERRE Policy Centre ([ankit.vicky215@gmail.com](mailto:ankit.vicky215@gmail.com))

### **MSW Initiative Country Contact:**

TERRE Policy Centre, [terrepolicycentre@gmail.com](mailto:terrepolicycentre@gmail.com)