

## **SOLID WASTE MANAGEMENT IN NASHIK**

**PREPARED BY:**

**16BPL008**

**GAUTAMEE BAVISKAR**

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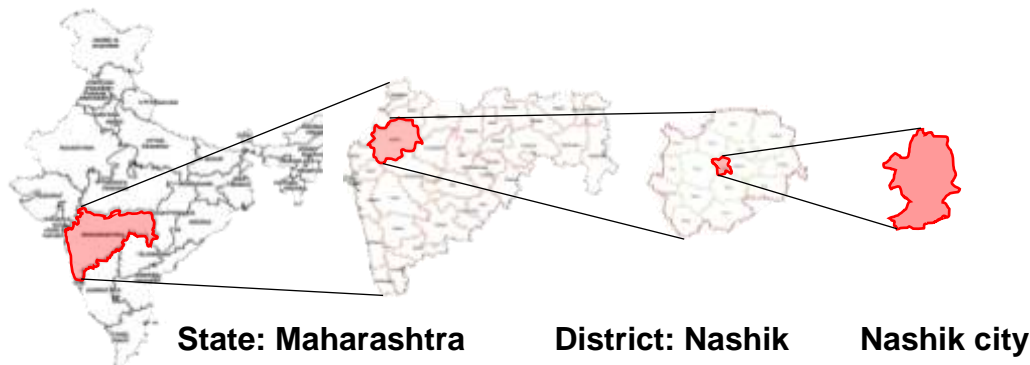
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## INTRODUCTION:

The city of Nashik situated in the state of Maharashtra, is popularly known as the “Grape City” of India because of its many vineyards. The city is administrated by the NMC<sup>1</sup> and is also the headquarters of the Nashik District. Nashik has 108 wards within 6 administrative zones making Nashik the third largest city in Maharashtra.



Nashik is a part of the industrial and manufacturing triangle in Maharashtra along with Mumbai and Pune. It's location on the banks of river Godavari makes it a major pilgrimage centre as well. Its fast-growing population, religious importance and industrial orientation results in a significant sanitation problem in city.

Nashik secured an overall sanitation score of 45.91 out of 100 and has been ranked on 42nd out of the 423 Indian cities evaluated in the sanitation ranking exercise carried out under the mandate of the National Urban Sanitation Policy (NUSP) through Ministry of Urban Development, Govt. of India. This score indicates the need for considerable improvements in the sanitary conditions of the city.

Nashik has been on the tourist map of India, especially Hindu religious tourism, because of the legend that Lord Rama lived here during his exile. Nashik **Municipality** was formed in the year **1864** and in the same year, Nashik was made a full-fledged district with 13 Talukas.

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<sup>1</sup> Nashik municipal corporation

## BACKGROUND:

### I. Population and Waste Generation

According to the Census of India (2011), NMC had a population of 1486973 and present population is estimated to be 1759783 (projected by the end of the year 2020 by arithmetical increase method). Presently, NMC collects approximately 350 tons MSW per day with waste generation rate of approximately 235 g/c/day. It contains compost-able materials (40%); recyclables (25%); ash, fine earth and others (18.80%); and textiles, plastic, rubber (16.20%) approximately. According to DPR for SWM, 2007 the average waste generation is only 218 gm/capita per day. This situation is either due to collection inefficiencies.

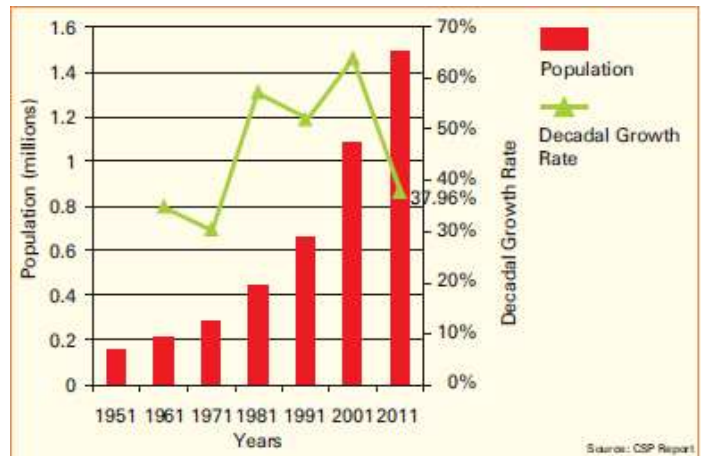


Figure 1 Nashik's population and decadal growth rate

Figure 2 Generation of MSW(projection)

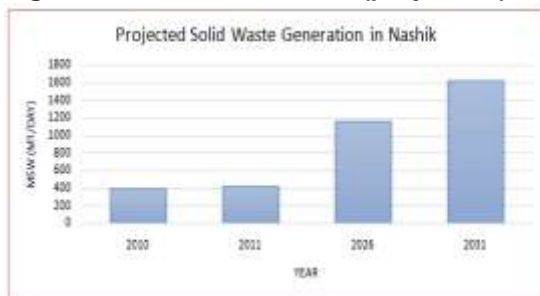


Figure 3 devotees taking bath in Godavari

### II. Kumbh Mela:

Nashik host one of the largest religious gathering in the world known as Maha Kumbh. Kumbh mela (festival) is celebrated once in twelve years. In the year 2015-2016 recently kumbh mela was being held. The floating population was more than 50 lacs. During this event the Solid Waste was generated in a great amount like Plastic, Paper as well as Biomedical Waste also. During kumbh mela city generates 500 tons per day approx. Changes in the water quality due waste generation after kumbh mela:

PARAMETER	BEFORE	AFTER
pH	7.25	8.06
Alkalinity	133.83	136
hardness	130	230
chloride	34.7	38.3

## WASTE DISPOSAL METHOD:

Existing type of system is Biogas and Biomass Production. The collection system in the Nashik city involves door to door collection of MSW through PCV<sup>2</sup>s known as Ghanta Gadis (vehicles with bells) and transportation to integrated MSW management facility. The integrated MSW management facility is situated in the south-west extreme of the city and known as Khat Prkalp site.



Figure 4 Primary collection vehicle (Ghanta Gadis) at the time of MSW collection in Panchvati division (Nashik).

### I. Processing Of MSW:

#### Stage 1: Pre-sorting Unit

It is electromechanical segregation system for incoming non-segregated MSW with the capacity of 500 TPD<sup>3</sup> and it comprises of two lines with all necessary requirements and materials.

#### Stage 2: Aerobic Composting Unit

Composting is done through windrow composting method and sheds have been constructed for windrows. Out of total MSW 3 to 5 % is converted into compost. The compost has already become popular amongst the farmers within 100 km radius of the city. By maintaining the price line of Rs2000/MT Ex-factory level for loose form and Rs. 2450/- for packed form with necessary backup support, entire quantity of compost will be saleable in this belt.

#### Stage 3: Inert processing unit

Inert processing unit, with capacity of 50 TPD, comprises of mechanical sieve and air density separator. Main purpose of inert processing plant is to recover the construction material from the waste and to recycle it by selling or utilizing it for inhouse construction activities.

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<sup>2</sup> Primary collection vehicle

<sup>3</sup> Tons per day

**Stage 4: Leachate treatment plant:**

capacity of 0.4mld leachate or 10 TPD organic wastes has been installed for treatment of leachate coming out from the windrows, the solid waste dumps and sanitary landfill site.

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**Stage6: Animal Carcass Incinerator:**

Dead animal carcass incinerator with the capacity of 250Kg per hour is installed for the incineration of dead animals such as dogs, cattle's etc.

**Stage 7: sanitary Landfills**

The solid waste is not suitable for any processing and is transported to sanitary landfill. For this purpose, a sanitary landfill at Lasalgaon in 2 hectares has been developed. This place is 54 km from Nasik. Proper arrangement for leachate is also provided and this is connected to the leachate treatment plant for further processing

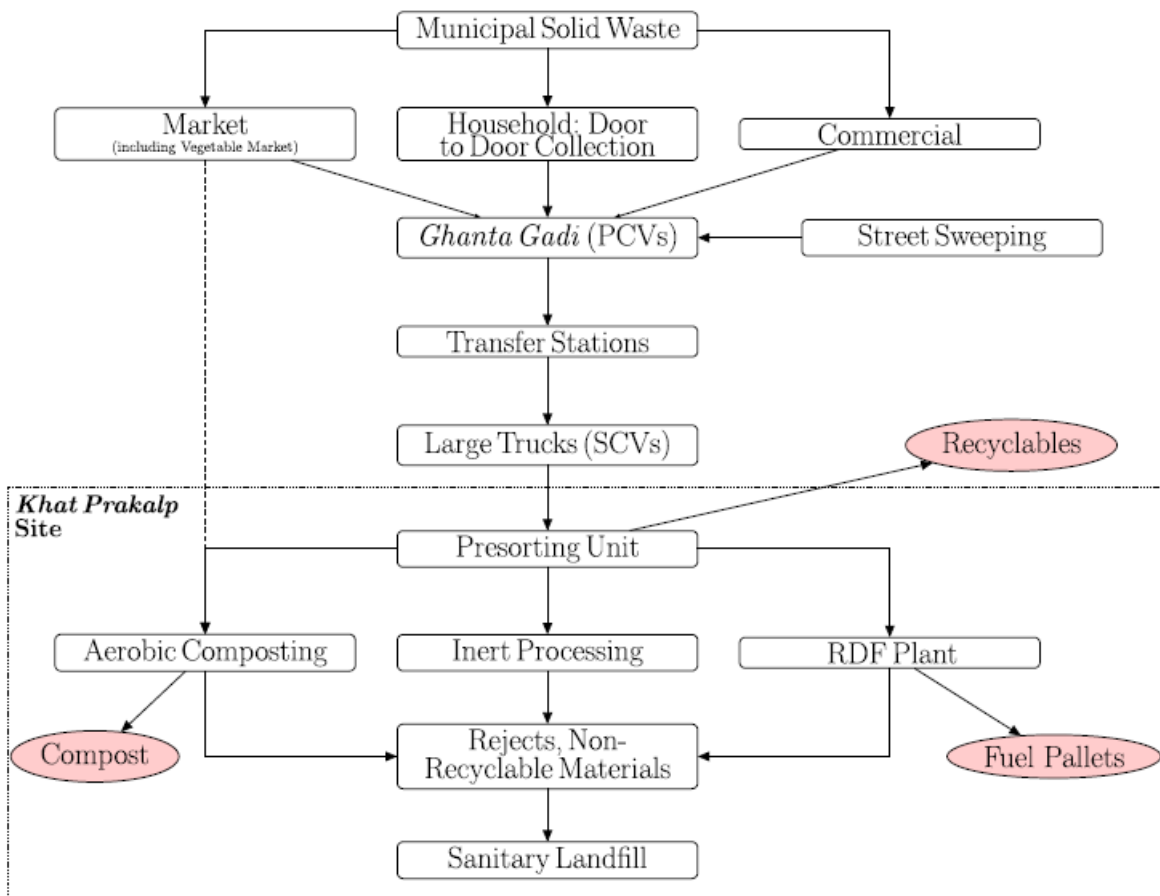


Figure 5 flow chart of process

## DESIGN PERIOD:

This plant came into operation in 2000. this plant was small and could not deal with the entire 350 TPD waste reaching the plant and a backlog of >2.50 lakh MT waste was generated, which was piled up in two heaps close to the plant. Under JNNURM, NMC sought more funds and upgraded the plant to a capacity of 500 to 600 TPD. There is no fix design period but the NMC has decided that whenever there would be backlog they would upgrade the capacity.

## CURRENT ACTIVITIES:

### I. Glass, paper, metal:

A substantial amount is collected by Ghantagadi workers and informal rag pickers and this is further handed over to scrap merchants in the city.

### II. Organic Waste:

Organic waste is segregated at the processing facility through the mechanical segregation process and it is then converted to compost through aerobic composting. Most of the organic waste is converted in compost and sold to farmers. Waste from permanent and temporary vegetable markets is collected and transported to the composting plant and reused as organic manure.

### III. Construction Debris:

NMC has identified sites for dumping the construction debris. This waste stream is currently not entering the MSW stream. The responsibility for disposing the construction debris is with the waste generators and not with the Corporation.

### IV. Street Sweeping/ Drain Cleaning:

This material is collected by the safai karamcharis and transported to the Ghantagadis in the respective wards. For a population of 17.5 lakh, Nashik Municipal Corporation (NMC) requires around 4,700 sanitary employees but has only 1,400 at present.



Figure 7 municipal solid waste facility in Nashik.



Figure 6 safai karamcharis



## V. SMART TRACKERS:

A tracker system installed by a local corporator is turning out to be a smart answer to the issue. Handed out division-wise, the garbage van contract was in question since the very first day, especially following opposition by many corporators. The system was set up at a cost of Rs 60,000 by the corporator. NMC launched its system in January 2014.

### Features:

- Web based solution
- Locate Vehicles real-time on a map
- Query vehicle's current position
- et alerts on speed stoppage
- Exception reporting
- Forward alerts to mobile devices and e-mails
- Access vehicle location information from mobile device

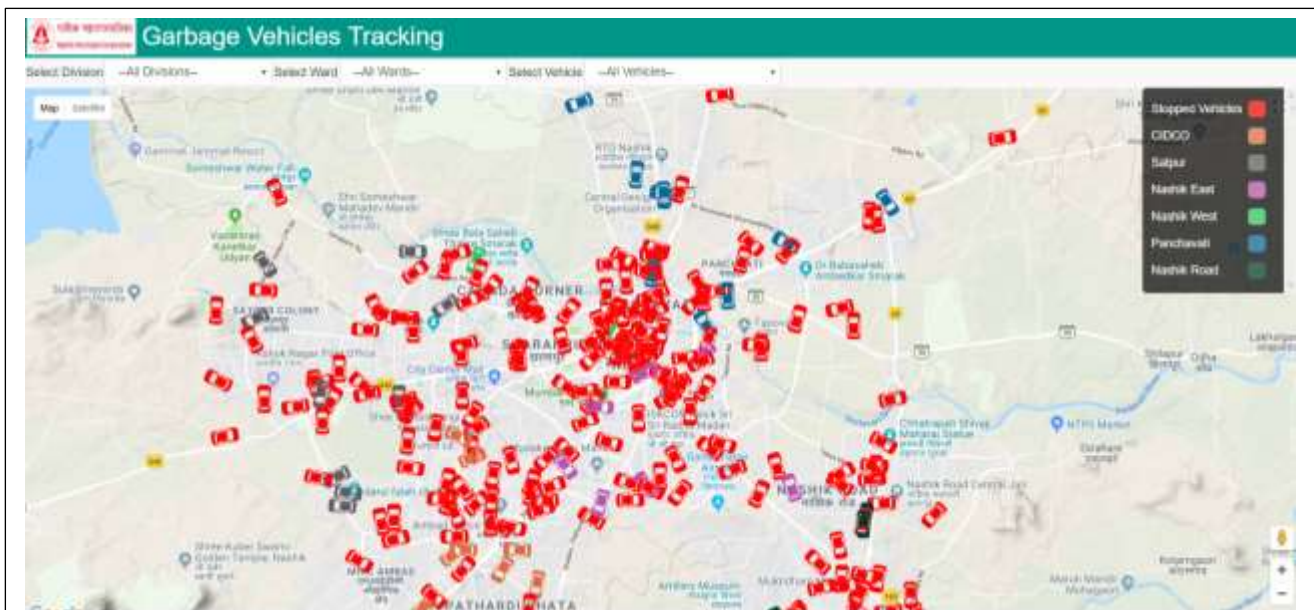


Figure 8 map of garbage vehicle tracking by NMC

## VI. Penalties for non-solidification of solid waste:

Nashikers will have to put hail and dry garbage separately in the garrison from April 1. Otherwise, a fine of Rs. 500 will be charged by the citizens and the penalty of Rs. 10 thousand will be collected by the professionals. Besides, the citizens who are not going to classify the solid waste will not be accepted in the garbage from April 15, the Municipal Corporation has clarified. Under Swachh Bharat Mission, Maharashtra Government has instructed all Municipal Corporations to concentrate on solid waste disposal till March 31. Municipal corporation has notified 80% of the solid waste but has warned all types of government subsidies to be stopped.

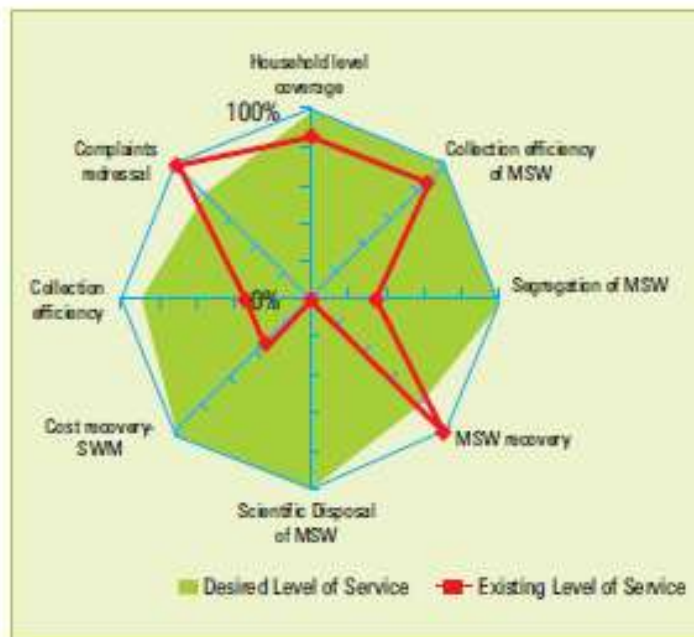


Figure 9 service level benchmarking

## FUTURE DIRECTION

### I. New System:

- **Type of System:** Energy Production
- **Components of the Unit:** Mass Burn Incinerator, Mass Burn plants, combustion unit, heating unit, generator, transformers.
- **Collection system:** Door to door collection system, street sweeping on daily basis by advance vehicles and techniques. Effective collection is possible.
- **Transportation of solid waste:** In new system numbers of vehicles used for transportation are increased, so that the total waste is collected and transported from all areas of Nashik city due to which city appears more clean and hygienic.
- **Fuel Consumption:** The Electricity generation by this process is much higher than any other although extra fuel is needed to run the process.

### II. Nashik Solid Waste Management Awareness Programme:

Creating awareness on the following aspects:

- Importance of Source Segregation
- Why is it necessary to give the waste to Safai karamcharis? Giving them respect and equal opportunities.
- Do not Litter: Keep your neighbourhood and your city clean
- Health impacts of unhygienic environment
- Solid Waste Management Process- from generation to safe disposal
- Introducing 3 R Principle- Reducing, Recycling and Reuse of Waste.
- Role of Citizen's active participation in improving SWM system
- Fines and Penalties for non- compliance with legal provisions.



Figure 10 Solid Waste Awareness Campaign in Nashik

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# CASE STUDY: SOLID WASTE MANAGEMENT IN PANAJI, GOA

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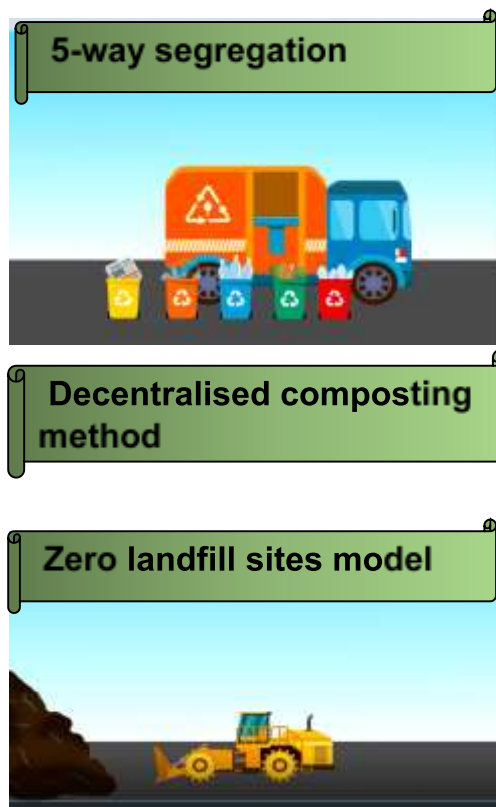
## INTRODUCTION:

Panaji, the capital of Goa, is a major city of attraction for both national as well as international tourists. Though as per 2011 census the population of Panaji is around **114,759**, the city also has a high floating population because of the large number of tourists both from India and abroad. Panaji is responsible for generating approximately **55 tons** of municipal waste every day. **CSE's clean city award 2016 to Panaji city corporation.** SWM program on a public-private-partnership basis and was part of a multi-pronged campaign aimed at the revitalization of the city, called **"Together for Panjim"**

## WASTE DISPOSAL METHOD

Panaji has adopted a **3R (Reducing, Reusing and Recycling)** method of waste management and **5-way segregation method at source**

### Panaji works on this model



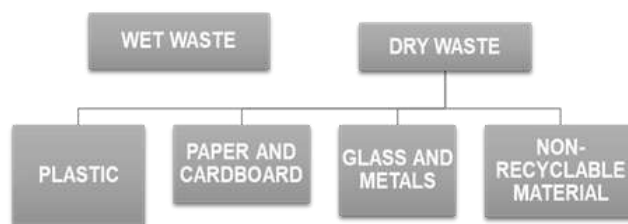


Figure 11 flow chart of segregation of dry waste



Figure 12 Different Bins for Different waste

Under this program, the institutional set-up includes adaptation of bin-free system was complemented by a door to door collection scheme and rolled out in the entire city. The **115 residential colonies** of Panaji are divided into **12 waste management zones**, each under a supervisor who manages the collection and transportation for the zone.

The same workers carry out the street sweeping and door to door collection. CCP charges **INR 365 per year** as sanitary fee from every household for SWM; this fee is linked to the property tax. Hotels are charged **INR 300-10,000**, depending on the quantum of waste generated. Panaji has set up 12 sorting centres to segregate dry waste. Apart from this 99 composting units has been set up in the city (**20 tons per day compost plant**).



Figure 13 Composting units

All the city's dry waste goes to a central sorting facility and here waste segregated to **30 different categories**. The sorted dry waste is then sent to certified recycler.

Green and black coloured bins were sold at a subsidized rate to households. The bins came with a locking system, which eliminated the chances of tipping over by stray dogs or cats. Separate vehicles were deployed for collecting bio-medical, hotel and household wastes. Wet waste is collected daily and dry waste three-times a week. Wet waste is handled in the composting units built within housing colonies and the rest is sent to the big composting unit in the market area. Organic waste converters were also deployed to process waste from hotels, markets and households. Mondays and Thursdays are designated for collecting the household waste, Tuesdays and Fridays for hotel waste and Wednesdays, Saturdays and Sundays for sorting waste at the centre.

The entire program cost approximately **USD 88,900** and had certainly **generated many employment opportunities** for local youth and has a very high avoided **CO2 mitigation potential**.



Figure 14 composting machine

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