

Experience of a Municipal Waste Landfill Disposal: A case study of Gorai landfill

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Municipal Solid Waste Greater Mumbai

- ▶ Area: 437.7 sq km
- ▶ Population: 21.7 million
- ▶ 11,124 tons per day of MSW, second largest in India after Kolkata
- ▶ Municipal Corporation of Greater Mumbai is responsible for SWM

Dumpsites in Greater Mumbai

Site	Started	Waste Collection (tons per day)	Available area (hectare)
Kanjur	2003	4, 000	65
Deonar	1927	2, 000	131
Mulund	1968	500	25
Gorai	1972	closed	20



Waste Scenario: Greater Mumbai 2005-06

Waste Composition (%)

Biodegradable (food and vegetables)	54.0
Biodegradable (from garden, yard & park)	9.1
Inert (glass, plastic, metal, etc.)	23.6
Pulp, paper and cardboard	6.4
Wood and wood products	4.6
Rags	2.3

Character of waste generated (%)

Compostable	62.4	54.0
Recyclable	16.6	18.6
Moisture	54.0	68.0

Most MSW is **not** processed; only 3.3 % is composted and 0.7 % is used to make Refuse Derived Fuel (RDF)

What does a Sanitary Landfill do?

Reduction, Recycling and Reuse of waste is a pre-requisite.

Only the absolute minimal waste must be disposed of in landfills because land is scarce.

- ▶ Sanitary Closure of Landfill helps in
 - controlled disposal of waste on land
 - avoiding ground water pollution by preventing leachate percolation
 - capturing methane, which contributes to greenhouse gas emissions

Gorai Dumpsite: Location and Amount of Waste

- ▶ Located in the North West of Mumbai, adjacent to a creek and very close to habitation
- ▶ Area: 19.6 hectare
- ▶ Mangroves were present to the North
- ▶ Dumpsite was in use from 1972 to 2007
- ▶ Was receiving 1,200 TPD of waste at the time of closing
- ▶ 2.3 million tonnes of unsegregated garbage with an average height of 26 meters had accumulated at the site by 2007



Gorai Dumpsite: Before Sanitary Landfill

- ▶ Breeding ground for microbial pathogens
- ▶ Pollution of ground water due to toxic leachate into the creek
- ▶ Uncontrolled surface emissions worsens air quality
- ▶ Degeneration of mangroves
- ▶ Market value of properties in the area decreased

A Health Hazard



To avoid flies, mosquitoes and foul odour people living in apartments next door had stopped keeping their windows open.

Gorai Dumpsite Closure Project: A PPP

- ▶ Project period: 2007- 09
- ▶ Project cost: Rs 50 crore
- ▶ Promoter: Municipal Corporation of Greater Mumbai
- ▶ Project developer and environmental consultant: IL&FS
- ▶ Private Partner Consortium UPL and M/s Van Der Weil Strotgas BV
- ▶ Design, Build, Own, Operate and Transfer (DBOOT) contract for 15 years
- ▶ O & M Contract to the Consortium at a cost of Rs 12 crore (15 years of post-closure care)

Scientific Closure

- ▶ Relocation and Reformation of existing waste
- ▶ Impermeable liner (geo-membrane and geo-synthetic)
- ▶ Surface water drainage for channeling storm water
- ▶ Sheet piling to secure the site against tidal inundation
- ▶ Installation of leachate collection system. The leachate collected is transported off-site to a sewage treatment plant in Versova
- ▶ Installation of landfill gas collection and venting system
- ▶ Installation of flaring system to recover methane on site
- ▶ Landscaping including a green cover over the dumpsite



Gorai Dumpsite Closure Project: CDM

- ▶ First dumpsite closure project in India to register under UNFCCC
- ▶ Expected Revenue from Carbon Credits Rs 72 crore
- ▶ ADB advanced to Municipal Corporation of Greater Mumbai (MCGM)
Rs 24.5 crore for the sale of CER units over the first 5 years
- ▶ MCGM is having to buy carbon credits in the open market to reimburse ADB's advance

Note: CER stands for Certified Emission Reduction

Less than Expected CERs Generated From Gorai Dumpsite

(information received from IL&FS)

Estimation of the CER to be generated from any Landfill Gas Collection Project is primarily affected by following:

- ✓ Quantity of Waste dumped at the dumpsite before Closure :-

In Gorai, as per MCGM, the quantity of waste dumped is 10 Million Ton. However , various studies have suggested that the Waste quantity deposited in the Gorai site is only around 3 Million Ton. ***This is the most important and primary reason for over estimation of CERs from Gorai.*** Taking quantity of Waste dumped in Gorai as 3 Million ton, the CERs estimated for 10 years should have been around 0.37 Million in stead of 1.2 Million.

- ✓ Management practice of the Dump site before Closure:-

If dumping site is scientifically managed (compacting and proper soil cover) number of CERs expected to be generated after closure would be more. In case of Gorai, MCGM gave an undertaking of following scientific practices during dumping of waste. This, however was not the case which lead to low CER generation

Less than Expected CERs Generated From Gorai Dumpsite.. *contd.*

(information received from IL&FS)

- ✓ **Quality of Waste:-**

The Number of CERs estimation further depend on the quality of waste present in dumping site. Lesser the inert or construction and demolition waste better are the chances of CER generation during LFG operation.

- ✓ **Operation of Land Fill Gas (LFG) Capture:-**

Operation of LFG ,including the maintenance of the collection wells , technique of collection of LFG ,design of the collection system also impact the collection of LFG after capping. It is important to ensure O&M of the LFG plant is as per standards.

Gorai has been an experiment in learning by doing

Thank You