

Solid Waste Management in Puri Municipality

Er. L.K. Bisoyi

Solid Waste Management is an integral part of the Environment Management of each city. Due to rapid growth of urban population, as well as constraint in resources, the management of municipal solid waste poses a difficult and complex problem for the society and its improper management gravely affects the public health and degrades environment. By 2025 it is expected that urban population shall reach 50% of total population and the problem also shall increase further. Analysis across countries reveals that generation of MSW is positively related to variation in per capita income and with population size. At present in many large cities developed countries less than 70% of MSW are collected and 50% of households are served.

Solid Waste Scenario

In India MSW or city garbage is a heterogeneous mixture of paper, plastic, cloth, metal, glass, earth, demolition matter, organic matter, bio-medical waste etc. generated from household, industries, hospitals, commercial institutions and contains solid waste generated in cities depending on its size varying from 0.1 to 0.5 kg/capita/day and contains recyclable materials varying from 13 to 20%.

The growth rate of population, solid waste generation, required land fill area in Indian scenario is as given below :

	1947	2001	Growth %
Urban Population (in million)	56.9	285	500
Waste generated (kg/capita/day)	0.295	0.56	190
Total waste generated (million ton/year)	6.0	55.3	920
Land fill area (in ha)	0.12	23.3	19415

Laws for Management of MSW

Prior to 1974 certain laws at regional and national level were there to punish the offender for making nuisance in public places and pollution of water bodies. Even in 300-400 B.C. in Arthasastra of Kautilya (Chanakya) provisions were there to punish offenders for making nuisance in public places but these were either ineffective or not strictly enforced. Even the E.P. Act 1986 was silent in solid waste management and the Govt. of India's consciousness is mostly after U.N. declaration and declaration by some developed countries.

Laws pertaining to SWM since 1974 is as enumerated below :

Post independence period :

- 1974 Water (prevention and control of pollution) Act-amended in 1978 and 1988.
- 1981 Air (prevention and control of pollution) Act-amended in 1987.
- 1986 Environment protection act (umbrella act) even was silent in MSW management.
- 1989 Hazardous waste management and handling rule.
- 1990 Govt. of India and Supreme Court instigated on the necessity of solid waste management.
- 1998 Bio-medical waste (Management and handling) rules amended in 2000.
- 1999 Recycled plastic manufactured and usage rules.
- 1999 Solid waste management in Class-1 cities in India-guidelines by Supreme Court of India.
- 2000 Municipal waste (Management and Handling Rules).

Status of MSW in Puri Municipality

In Puri Municipality there exists a mechanised Bio-compost plant for treatment of garbage generated of capacity 100 TPD installed by M/s Excel Industries Ltd., Bombay and other details related to MSW is given below :-

Population (2001)	- 1,57,776
Floating population	
Daily Average	- 30,000 to 40,000
During Car Festival	- 7 to 8 lakh
Slum pockets	- 32
No. of Wards	- 30

No. of employees	- 890
Waste generation kg/capita/day	- 0.3 to 0.5
Garbage generated / day	- 79 M.T
Garbage collected / day	- 50 M.T.
Public Toilets	- 13 nos.
Sweepers	- 484
Janadars	- 24
Sanitary Inspectors	- 6
Health Officer	- 1
Road Paved	- 150 km
Kutchra	- 185 km.
Length of drain	- 118 km.
Equipment	- Short and long handle broom, wheel barrow, auto trolley, tractor, mini truck

The waste collected by the sweepers during sweeping is brought by them to dustbin sites by wheel barrows and ultimately to solid waste management plant at Baliapanda.

Generated Bio-Medical Waste

Waste generated (considering 1kg/patient day)	- 500 kg
Bio-Medical/day	- 100 kg
Domestic waste/day	- 400 kg.

(Govt. Hospital-6, Public Sector-1, Nursing Home-3)

Transportation : Fleet Strength

Mini truck	- 1
Tractor with trolley	- 8
Wheel barrows	- 480

N.B.: - During special occasion like world famous Car Festival Extra tractor with trolley and sweepers engaged for cleaning of different roads, drain etc. for a fortnight.

MSW Details of Puri Municipality

	1991	2001	2011 (Prob.)
Population in lakhs	1.25	1.58	1.97
Total solid waste / day (leaving the recycling)	62 MT	79 MT	98 MT
Approx. volume @ 450 kg/cum	138 cum	176 cum	218 cum
Total organic content @ 20% of volume	28 cum	35 cum	44 cum
Compostable materials @ 35% of volume	48 cum	62 cum	76 cum
Approx. community bins required @ 1 Bin/100	1250	1580	1970
Solid waste generated / 100 population with	100 kg.	100 kg	100 kg.
Alternate day cleaning	=0.2 cum	= 0.2 cum	=0.2 cum
Capacity of each community bin	0.3 cum	0.3 cum	0.3 cum
Considering 50% extra volume	=300 ltr.	300 ltr.	300 ltr.
Growth in solid waste generated with respect	0.3 cum	0.5 cum	0.75 cum
To usage and demand for packed products	=300 ltr.	= 500 ltr.	= 750 ltr.

M.S.W. Characteristics	By Volume in %
Paper	2.0
Polythene Plastic	2.8
Green Leaves, vegetables	15.4
Dry Leaves, gross wood cotton rags, coir etc.	14.0
Cow dung, animal excreta	2.5
Green Coconut shell	4.0
Ash, silt, sand etc.	44.0
Debris	14.5
Glass	0.3
Leather waste	0.3
Metal scrap	0.2
	100.0

(Source - Excel Industries sample 53 M.T.)

Existing Disposal site of MSW -	Puri
Location area	- Baliapanda

Project Cost	-	Rs.3.5 crores
Land value	-	Rs.1.5 crores
Machinery & Civil works	-	Rs.2 crores

Present Practices of Solid Waste Management

A mechanical aerobic compost plant of 100 TPD capacity has been installed with financial assistance from NORAD at Baliapanda area since November 1998. The project is meant for reduction of polluting substance in the domestic city waste by treating it with enzymes and herbal concentrate and driving value added in organic manure/organic fertiliser for use in agriculture.

The aerobic formentation is progressed under controlled temperature and proper aeration capacity hence no obnoxious or foul smell gases are allowed to generate. The residues from the process or inert materials in

the range of 8 to 15% like bricks, stone pebbles plastic etc. are used for sanitary land fills. The whole process of waste recycled for organic manure production itself is an effective pollution weeks (Location plan and existing plant in Fig.1 & 2).

Financial Outlay

Financial	Total Expenditure in Rs.crores	Expenditure on SWM in crores	% of Total
2000-01	5.13	1.26	24.56
2001-02	5.18	1.32	25.48
2002-03	5.88	1.38	23.47

Problem

- The plant runs for 210 days excluding rainy season.
- Moisture content is about 38% of garbage by weight on wet basis. During the process available moisture (40-50%) get evaporated thus net recovery of organic manure will be around 20% of the fresh garbage.
- For every M.T. of finished product assuming 20% recovery 5kg innoculam is needed and takes 4 to 6 weeks and energy consumption is KWH/T on of finished product.
- The residues are to be utilised for land filling (sanitary land filling).
- The surroundings of compost plant presents an ugly look due to lack of infrastructure and beautification.
- Facilities are not existing to maintain and monitor ground water pollution.
- Important waste management infrastructure like roads, garden, laboratory-cum-office, concrete platform to process the garbage and illumination of the area is lacking.

Prospects :

- Improved Env. posterity though an eco-friendly method and general aesthetic of Puri town to help in promotion of tourism.
- Generation of organic manure from waste and earning of income by Municipality through sale of manure.
- Prevention of annual loss of land covered by the present garbage disposal system.
- Promotion of organic farming and consequential ecological advantages.
- Prevention of risks of health hazard of the rag pickers.

Proposals for Future Improvement:

Puri city has been included in eco-city project by the Central Pollution Control Board, New Delhi. The project proposal after discussion and recommendation of District level meeting ultimately finalised by Orissa Pollution Control Board. The summary of project proposals is as under.

Details of project	Estimated cost in Rs.
Improvement of 3 nos of religious tanks (Narendra, Markandeya & Indradyumna)	3,70,22,000/-
Beautification and provision of parking areas around Jagannath temple	35,87,000/-

The items of works on Sl.4 above shall be taken up excluding land cost Rs.1,87,50,000/- out of total cost of Rs.2,09,86,000/-.

Proposed works to be taken up under Eco-city Project :

- * Construction of compound wall around plant.
- * Construction of B.T. road and drain inside plant.

- * Development of lawns and garden inside plant.
- * Construction of approach road.
- * Construction of cement concrete platform for processing the garbage.
- * Construction of 50 mm dia shallow tube wells for monitoring of ground water.
- * Construction of Office-cum-Laboratory building.

Revenue out of solid waste management :

Annual lease rent of Bio-compost plant with site - Rs.6.50 lakhs

Royalty @ Rs.85/- i.e.
5% of Rs.1700/- per M.T.
for 2100 MT. - Rs.1.79 lakhs

Total - Rs.8.29 lakhs

The mechanised aerobic compost plant has positive impact on Puri town by improving sanitary and health condition. The project is cost effective and eliminates requirement of more and more areas in the old open dumping system which Puri town can not afford such vacant lands. The system is eco-friendly and epidemics will be prevented due to better cleaner, effective collection and supply of

garbage to plant site and management of solid waste. Local bodies may opt, appropriate waste treatment methods according to financial situation and finally disposable residues in a land fill.

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3. Project proposal on SWM of Puri town by Orissa Env. Programme - 1998 (Indo-Norwegian Development Co-operation Department of Forest and Environment) Govt. of Orissa.
4. Project Report - Solid Waste Management Report, Puri - Orissa-MS-Excel Industries Ltd. Mumbai-62.
5. Project Proposal of Eco-city Puri-2002 submitted to CPCB Delhi by Orissa Pollution control Board Bhubaneswar.

Er. L.K. Bisoyi is presently working as the Executive Engineer, Puri Municipality, Puri.



His Excellency the Governor, Shri Rameshwar Thakur releasing the magazine of Institute of Co-operative Management, titled 'Baibhav' at the Centenary Celebration of Co-operative Movement and Golden Jubilee of Institute of the Co-operative Management, Unit-8, Bhubaneswar on 25.2.2005. Smt. Surama Padhy, Minister, Co-operative and other dignitaries are also present.