Solid Waste Disposal and its Management: a Case of Sibsagar Urban Area in Assam, India

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Abstract

Widespread industrial development and unplanned urbanization has resulted in the creation of ever increasing problem of solid waste disposal and its management, which has been experienced mostly in the developing countries including India. Moreover, advanced waste management techniques are not used in India. It is high time to think about a technique which can be practised easily to reduce the impact of waste problem permanently without affecting the environment and biodiversity. In the present study, a few waste-prone areas were selected in Sivasagar town area of Assam state in India. Heaps of garbage is a familiar sight in these places. Though Sivasagar municipality board has arrangement to collect and dispose the garbage at a fixed place, the way they dispose seems unscientific and unhygienic. Also the guidelines are not followed properly. The study aims to find the reason behind such incidence and to recommend a solution which is environmentally sound and easily applicable.

1. Introduction

Rapid and widespread industrial development, unplanned urbanization, regular movement of people from rural to urban area coupled with improper and inadequate action of the authorities entrusted with the work of pollution control and environmental protection have largely contributed to unhealthy and degraded environment. Unplanned urbanization at an alarming rate has given rise to many environmental problems. Apart from air and water pollution, most serious problem which modern cities are facing is the solid waste disposal problem (Sharma, 1975). The Municipal Solid Wastes Management and Handling Rules (2000) has defined 'municipal solid waste' as 'commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but includes treated bio-medical wastes'. Solid wastes are the ever increasing problem in most of the developing countries including India. Heaps of garbage are seen here and there at public places which cause nuisance in daily city life. Solid waste may affect both terrestrial and aquatic life as well. The municipal authorities have been practicing various techniques for solid waste management. But most of them cannot be considered as permanent solution to get rid of this problem. It is important to ascertain the nature of waste whether it is bio-degradable or combustible in handling and disposal of solid waste. Combustion and landfill method of disposal further gives rise to problems like air, water and land pollution, affecting adversely the health of the man, and flora and fauna. Further, advanced and environmentally sound solid waste management techniques are not used in India. Instead of advanced scientific techniques, old methods are used which lead to the production of various pollutants affecting the environment. Therefore, a permanent solution is required to get rid of this problem. It is high time to think if there is any management technique we can practise easily which may reduce the impact of this problem permanently without adversely affecting the environment and biodiversity. Keeping these in view, a study was conducted to survey the present status of garbage management and how much safe it is. Urban areas are severely affected by solid waste disposal. Therefore, Sivasagar town area was selected purposively wherein waste disposal is a serious problem. Specific objectives of the study were as follows:

a. To collect solid wastes from various sites prone to solid waste disposal problem.
b. To assess the problems faced by the local people due to these wastes.
c. To know the methods followed by the municipal authority to manage this problem.

d. To find out a safe and scientific method which is environmentally sound and sustainable.

2. Materials and Methods

2.1. Study area

The study was conducted at Sivasagar town of Sivasagar district located about 150 km east from Kaziranga National Park and 50 km east from Jorhat of Assam state in north-east India between 94°25' and 95°25' E longitude and 21°45' and 27°15' N latitude at 86.6 masl. Sivasagar district is characterized by high humidity with annual rainfall about 2000-2300 mm nearly 60-80% of which occurs during the monsoon months (June-August). Pleasant autumn commences from October and winter from the end of November which lasts till the middle of February. Sivasagar is a moderately populated town with a total area of 12.55 km^2. Sites selected for the present study included ward 9, central market, Pragati nursing home, Sampreeti nursing home and civil hospital which were highly waste-prone. The study was carried out during June-September 2010.

2.2. Collection of data and materials

2.2.1. Collection of wastes

Samples of solid wastes were collected randomly from the selected sites every two days interval in covered boxes and vessels with the help of wage laborers.

2.2.2. Separation of wastes

Collected garbage was separated in two groups, viz. bio-degradable and non-bio-degradable.

2.2.3. Surveying the practices followed by the municipal authority

Visits were made to the concerned municipality office. Local people and laborers engaged in the collection and disposal of the wastes were interviewed at random with some open-ended questions related to the issue.

3. Results and Discussion

3.1. Market area

Samples collected from central market area were found to contain wastes which were categorized in to two groups, viz. bio-degradable and non-bio-degradable. Production of bio-degradable wastes was approximately 1.5 q day^{-1} and that of non-bio-degradable was approximately 80 kg day^{-1} (Table 1). Dustbins provided were not in proper condition and were not sufficient in number. Therefore, though garbage was collected daily, heaps of garbage was found at road sides crating a public nuisance.

3.2. Residential area (ward 9)

Collected wastes were grouped in two categories as that of market area's wastes. Bio-degradable wastes were found to be approximately 5 q day^{-1} and non-bio-degradable were found to be approximately 100 kg day^{-1} (Table 2).

Table 1: Total production of solid wastes in central market area

Category	Wastes	Quantity day^{-1}
Bio-degradable	Decayed vegetables, rotten meat, fish, feathers	1.5 q
Non-bio-degradable	Plastic bottles and containers, glasses, polythene bags and boxes	80 kg

Source: Sivasagar Municipality Board

Daily collection and disposal of wastes have been practicing since long time, but only 60% can be collected in this way and 40% remained uncollected. As a result heaps of indisposed garbage was found in public places creating an unhealthy environment. Moreover, a significant quantity of garbage was thrown in nearby water bodies and drains resulting into water and air pollution. Further, in certain residential areas garbage was burnt without following the proper method.

3.3. Hospital and nursing home areas

According to the Bio-medical Waste Management and Handling Rules (BMWMHR) 1998, bio-medical waste means 'any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities'. Total solid waste production was found to be 30 kg day^{-1} in Sibsagar civil hospital, 5-7 kg day^{-1} in Pragati nursing home and 6-9 kg day^{-1} in Sampreeti nursing home (Table 3). Medical wastes collected were grouped into several categories as per the guidelines of BMWMHR 1998 (Table 4).

The study reveals that the guidelines for the disposal of bio-medical wastes were not followed properly and if followed it was not up to the mark. Further, there was an effluent treatment plant in Pragati nursing home for the treatment of wastes, functioning of which was largely unscientific. Besides, incinerators were found in respective nursing homes and civil hospital, which were not functioning to their full extent. Incinerator of the civil hospital had been damaged since last one year, which had resulted in the disposal of medical wastes without proper treatment.

Table 2: Total production of solid wastes in the residential area (ward 9)

Category	Wastes	Quantity day^{-1}
Bio-degradable	Decayed vegetables and fruits, left-off food, kitchen wastes	5 q
Non-bio-degradable	Glass and plastic containers, juice and oil packets, packing materials, polythene bags, clothes	100 kg

Source: Sivasagar Municipality Board

Table 3: Total production of solid wastes in nursing home and hospital sites

Hospitals/nursing homes	Quantity day^{-1} (kg)	Quantity yr^{-1} (kg)
Civil hospital	30	10,950
Pragati nursing home	5-7	1,825-2,555
Sampreeti nursing home	6-9	2,190-3,285

Source: Concerned authority

3.4. Steps taken by the sibsagar municipality

- Solid wastes collected from market and residential areas were disposed untreated in Darikapar which was not supposed to be the proper place for waste disposal. Disposal of untreated wastes had been in practice since last 24 years which had resulted in the mountain of garbage and unhealthy surroundings. During rainy season, rain water carrying a large part of these wastes drains into the Darika river causing water pollution.

Table 4: Bio-medical wastes collected from the hospital and nursing home sites

Category	Treatment of the wastes		
	Civil hospital	Pragati nursing home	Sampreeti nursing home
Human anatomical waste (tissues, organs, body parts)	Thrown away	Incinerate	Incinerate
Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps) Discarded medicines and cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Thrown away	Disinfection and deep burial	Disinfection and deep burial
Liquid ash (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Thrown away	Disinfection and purification	Disinfection and purification
Incineration ash (ash from incineration of any bio-medical waste)		Deep burial	Thrown away and land filling
Chemical waste (chemicals used in production of biologicals, chemicals used in disinfection as insecticides, etc.)	Thrown away	Chemical treatment and discharge	Chemical treatment
Solid waste (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	Disinfected and thrown away	Autoclaving and incineration	Incineration
Solid waste (wastes generated from disposable items other than the waste sharp such as tubings, catheters, intravenous sets, etc.)	Disinfected and thrown away	Disinfection	Disinfection

Source: Respective hospitals and nursing homes and the Bio-medical Waste Management and Handling Rules, 1998

- Municipality had five trolleys and seven apes which were not sufficient for proper disposal. Besides, one tractor did not work properly.
- A few dustbins were constructed which were in broken and damaged condition.
- Twenty five laborers and 40 sweepers were employed in the collection and disposal of wastes. But due to irregular payment and lack of strictness of municipal authority, they did not work as expected. Thus, unscientific methods of garbage collection and disposal became a serious cause for environmental pollution and threat to human health.

4. Conclusion

People should come forward to find the feasible solution. We must create public awareness and scientific technologies regarding solid waste management. Though various laws are available but either they are not well equipped to meet such type of exigencies, or are not implemented.

5. Recommendations

Following recommendations are made to get rid of the problem of solid wastes disposal and their managements-

- Storage facilities or dustbins should be easy to handle. Vehicles used for the transfer and transportation of wastes must be covered, not visible to the public. Storage facilities and dustbins should be cleaned on daily basis and should not be overflowed. Broken and damaged dustbins must be repaired or newly constructed and also be provided with a lid over these.
- Disposal should be proper and scientific. Before disposal, the municipal authority must take the labor of separating the wastes accordingly, so that recyclable things can be sent for recycling. To encourage recycling of materials, some motivation should be given.

- Bio-degradable wastes shall be processed by composting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes. Bio-degradable wastes can be processed at source only. If the wastes are stored in certain properly constructed pits and suitable microorganisms are mixed, these will become converted in to valuable compost.
- Only non-biodegradable and other wastes which are not suitable either for recycling or for biological processing shall be used for land filling. Before land filling the wastes should be treated to make it safe for land and water of the area.
- Incineration must be proper. There will be no chemical pre-treatment before incineration. Chlorinated plastics should not be incinerated.
- The most important point is the public awareness about solid waste problem. They must be concerned about the danger of unscientific and untreated disposal of solid wastes. In order to ensure community participation in segregation of waste, the municipal authority shall organize awareness programs through regular meetings of representatives of local residents, welfare associations and non-governmental organizations.
- Merely having laws cannot solve the problem. Proper mechanism, will of the government and attitudinal change among the public are needed.
- Bio-medical wastes should not be mixed with other wastes. The workers engaged in cleaning of these bio-medical wastes are ignorant about the waste problem and pollution control. So, it is the duty of the concerned authority to make them aware and skilled through proper training.

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7. References

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