

AN OVERVIEW OF SOLID WASTE MANAGEMENT IN SILIGURI MUNICIPALITY, WEST BENGAL

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ABSTRACT

Management of solid waste of any urban centre is one of the major challenges. The environmentally acceptable disposal of solid waste of an area is intrinsically complex because it is difficult to evaluate the various alternatives in managing it. This study investigates the sources, types, factors, characteristics of solid waste management operations and its environmental and health issues in Siliguri. The existing solid waste management of Siliguri town is influenced by institutional constraints which are also discussed in this paper. Particular care is given to the case of fruitful recommendations which may be helpful for the further improvement of the operations. The main reason for the present study is that solid waste management is now a basic obligatory function of urban local bodies. Thus if a reliable waste management service can be carried out in a sustainable manner, Siliguri will achieve significant success in improving other basic functions.

Keywords: landfill, dumping site, leachate.

Introduction: Every human with the operation of everyday domestic works produces solid waste for disposal. The growth of solid waste in any urban areas has outpaced the population growth in recent years. As the town or city expands, average per capita waste generates also increase. In Siliguri municipality, solid wastes have been increasing due to population growth, changes of lifestyle, income and economic development. As Siliguri is the centre of break of bulk point, every tourist who wants to go Sikkim, Darjeeling, Nepal; has to change the medium of transport in Siliguri. Hence solid waste management is urgently needed. The explosion of urban population of Siliguri is changing the nature of municipal solid waste management operation from a localized issue to a pervasive social problem.

Aims and objectives: The main purposes of this present study are-

- To explain the existing solid waste management operations of Siliguri town.
- To identify what kind of factors affects the generation of solid wastes and the types as well as the sources of solid wastes.
- Understanding of environmental and health issues related to solid waste in siliguri was the next important objective.
- To examine the shortcomings related to solid waste management operations.
- Finally the most important objective is to propose fruitful recommendations to improve the system.

Methodology: Following methods have followed up for preparing the present work-

- For this present work it is necessary to collect the data both from primary and secondary sources. The primary works have conducted through the method of field survey, inspections of dumping grounds. Interviews and discussions with local people were also done for collection of solid waste management related facts.
- Various secondary information and data was collected from Siliguri municipality office, census of India.
- To complete the reference works various books, articles, research works related to solid waste management was thoroughly consulted.

Study area: The survey was conducted in Siliguri municipal area in Darjeeling district of west Bengal state. Siliguri is situated on the banks of Mahananda River and the foothills of Himalayas. The study area was chosen because-

- Siliguri is called the Gateway of northeast India.
- It is a principal, commercial, tourism, transportation and the largest city of northeast India after Guwahati and fourth largest in west Bengal after Kolkata, Asansol and Durgapur.

• Siliguri town of Darjeeling district is a rapid building town and massive quantities of solid wastes are generated daily, thus Solid waste management is an emerging problem.

Location and extent: Siliguri is situated at the latitude of 26°71'N and the longitude of 88°43'E. It connects three international borders i.e. Bangladesh, Nepal and Sikkim by road. There is a connection of rail between Darjeeling and Jalpaiguri. Because of its unique location it becomes a trade hub for the entire West Bengal.

What is Solid waste management? Solid waste is an unwanted material disposed by person, which can neither flow into streams nor escapes immediately into the atmosphere. It is non-liquid waste arising from domestic, trade, industrial, agricultural, mining, construction activities and from public services. On the other hand solid waste management defined the process of removing discarded materials from inhabited places in a timely manner to prevent the spread of disease, and to dispose the discarded materials in a manner that environmentally.

Sources and types of solid waste in Siliguri town: According to census 2011 the population of Siliguri is 513264. **Table 1** indicates that the population as well as the number of households of Siliguri increases at a high rate. The increasing population of Siliguri adds greatly to the generated waste which exceeds the waste retrieval service of Siliguri municipality.

Table 1: Population, Decadal growth rate & No. of households in Siliguri town

Census year	Population	Decadal growth rate (%)	No. of households (in lakh)
1991	216950	41.04	0.42
2001	472374	117.73	0.98
2011	513264	8.6	1.15

Source: Census of India

Sources: Some of the sources of solid waste in Siliguri Municipal Corporation are domestic sources, markets, hotels, streets, commercial establishments, hospitals, shops etc. The solid waste generation of Siliguri ranged from approx. 280 tons/day to 400 tons/day.

Table 2: Sources of municipal solid waste in Siliguri Municipality Corporation

Source of Waste	Municipal Solid Waste generated (TPD)
Domestic Source	163
Markets	55
Hotels	10
Commercial establishments	20
Street sweeping/ drain silt	29
Marriage hall	18
Hospital & nursing home (except- bio-medical waste)	5
Total	300

Source: Status Report on various schemes & projects of Siliguri Municipal Corporation, 2013

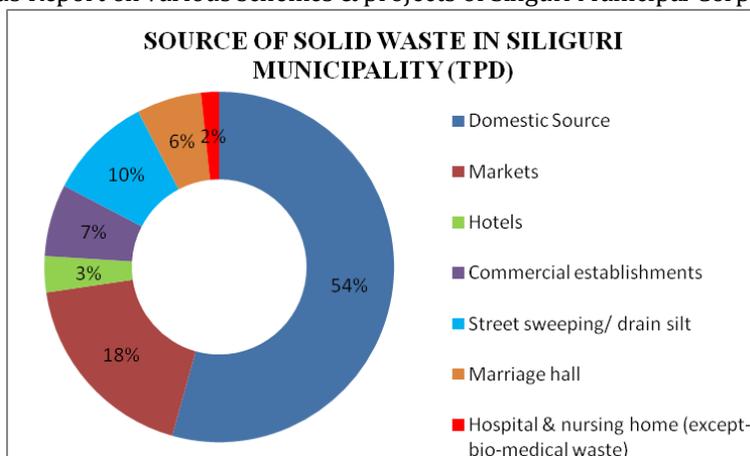


Fig.1 Sources of Solid Waste in Siliguri Municipality

It is found from the above table (**Table 2**) that the domestic source or the residences are some of major sources of solid waste and it is followed by market areas mainly the Bidhan market of Siliguri where a bulk of garbage are accumulated on the ongoing streets. Some of the solid wastes also brought by the municipal services include street sweeping. Siliguri hospitals and nursing homes also produced solid waste though the amounts are very little as compared to other sources.

Types:The following types of waste produced in this town-

- Foods and kitchen waste of households includes remains of vegetables and other food items, peeling of fruits, paper, pieces of old torn cloths, glasses etc.
- Various construction and demolition waste e.g. concrete, copper wires, steel materials from the constructional sites of Sevoke Road.
- Cotton swabs, Plaster casts etc. biomedical waste is generated from hospitals, clinical halls of Siliguri.



Plate 1: Waste dumped on the street



Plate 2: Community bin provided by SMC

Solid waste management practices in Siliguri town:At present Siliguri have 47 wards, though the ward is self-sufficient in terms of solid waste management but still the management facilities are not equally distributed among these wards. Following are the characteristics of solid waste management of Siliguri municipality-

1. **Institutional framework of solid waste management:**The conservancy department of Siliguri Municipal Corporation supervised the solid waste management system. The institutional framework found in Siliguri Municipality is shown below.



Fig.2 Institutional Framework of Siliguri Waste Management

2. **Door to door collection of solid waste:** Waste generated at households is often stored in plastic buckets and sweepers are appointed under each ward for door to door collection of those wastes.

3. **Transportation of solid waste:** In this town collection of waste by hi-tech vehicles may not work efficiently due to poor maintenance facilities. Hence tractors, vans, trucks are utilized for carrying waste.

Approximately 226 numbers of vans, 20 tractors, 320 tricycles and 60 dumper trucks usually carried solid waste.

Table 3: Available Transportation for Waste Collection

Particulars	Existing No.
Covered Vans	226
Dumper placers	4
Tricycles	320
Tractors	20
Dumper Trucks	60
Total no. of vehicles	630

Source: Conservancy Department, SMC

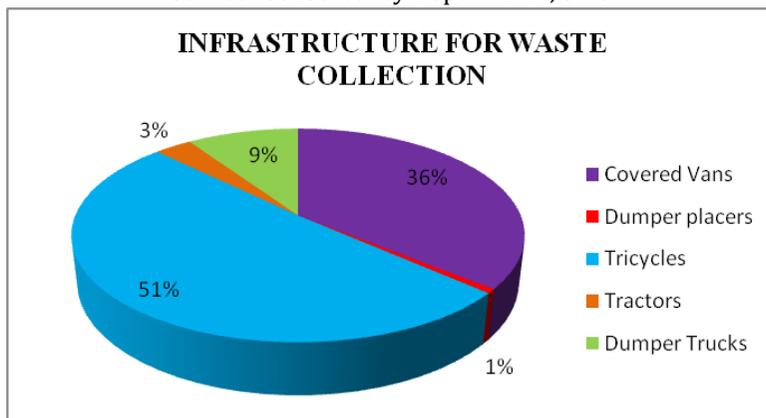


Fig.3 Available Infrastructure for Waste Collection

4. **Clearance of Dumper places:** There is approximately less than 50 numbers of dumper places are present in Siliguri town. These are cleared every Sunday by the *safaikarmachari* appointed by conservancy department of Siliguri municipality. In the central business district areas of Siliguri where the Bidhan road, Hilcart road, Sevoke road joined each other, the clearance of dumper places is urgently needed because these are areas of high pedestrian traffic and all important business and commercial centres are located in these area. Thus if the proper clearance does not take place there can be occurrences of unhygienic environmental condition.

5. **Segregation of waste:** The municipality have not encouraged segregating waste from biodegradable to non-biodegradable items. Some people segregate waste like remains of vegetables and use it as manure for gardening purposes but the municipality does not look out this matter seriously.

6. **Plastic waste management:** As per West Bengal Pollution Control Board rules all kinds of plastic bags are banned in Siliguri town. The shops, hotels usually use paper bags in order to replace demands for poly bags. In this context it can be said that there having a sustainable alternative for poly bags in Siliguri municipality.

7. **Processing of waste:** Generally no processing of waste has been done in Siliguri. In this town un-segregated waste is put into the dump yards and allowed to decay.



Plate 3: Waste collection from street

Plate 4: Waste collection from market



Fig.4 Schematic Diagram of Solid Waste Management Practice in Siliguri

Drawbacks of Solid waste management in Siliguri: There are many weaknesses are found within Siliguri municipality for solid waste management system. Some of them are as follows-

A. **Inadequate landfill site:** There having inadequate landfill site in Siliguri municipality. Siliguri and Jalpaiguri development authority jointly has set up landfill site at Binnaguri. But in core area of Siliguri noadequate landfill site is present.

B. **Improper disposal of waste:** Disposal of waste is the most neglected part of Siliguri solid waste management services and the practices are very unscientific. The wastes are thrown into the Mahananda river banks without any proper treatment, as a result the household around the Mahananda river banks often suffered by serious health problems.

C. **Irregular transportation of waste:** Siliguri has limited number of waste carrying vehicles and transportation of waste does not take place at regular intervals. As a result foul smells emanate causing insanitary conditions.

D. **Increasing slum population:** With the increasing population of Siliguri town, slum population also increasing. At present Siliguri has 36% of slum population of total population. The slum dwellers have a lack of willingness towards involvement in solid waste management. The adjoining slums of Siliguri Town Railway Station areas and the TenzingNorgee Bus Stand areas disposed ofsolid wastes by open dumping.

E. **Poor segregation of waste:**Segregation of organic and inorganic waste is environmentally importance. Siliguri Municipal Corporation failed to take proper steps despite the matter being brought to their attention.

F. **Irregular street sweeping:** Street sweeping is not carried out on a regular basis. Generally no sweeping is done on public holidays and Vardaman road, Sevoke road,Bidhan roads etc. important commercial roads are prioritized but the interior streets of ward Hong Kong market areas are swept occasionally.

G. **Lack of civic awareness:** Nowadays the people of Siliguri have a tendency to throw their garbage upon streets instead of throwing them on bins or municipal vats. Thus environmental pollution often arises.



Plate 5: Waste disposal at Mahananda river



Plate 6: Dumping field behind Don Bosco School

Environmental Issues:

1. **Air pollution:** Air pollution occur when the waste collected in dumping sites keeps rooting and spreading foul smell. Combustion of solid wastes produces smoke which causes air pollution.
2. **Ground pollution:**All kind of solid wastes including Municipal and household wastes are amassed on the open dump yard behind Don Bosco school on Eastern Bypass of Sevoke road, which polluted the ground and the environment becomes messy.
3. **Water pollution:**The Mahananda River water of Siliguri continuously deteriorating due to random dumping of wastes from all over Siliguri town which poses threat of life of local residents.
4. **Water logging problem:** The tendency of thrown away of wastes on the drains causes water logging problems. Water logging areas become breeding ground of mosquitoes, flies and health issues for the common man.

Health issues:Dumping of solid wastes within the community e.g. building sites of Sevoke roads, along Mahananda river banks and other unauthorized places of Siliguri have the tendency to engender health risks among the residents-

- The students of Don Bosco School and Salesian College at Baikunthapally in the ward 42 have been bearing terrible bad odour from the nearby located dumping ground, which can be smelt from a kilometre away. Moreover the wastes are contaminating the water of those areas often posing health risks for the students. Students are often suffered by vomiting, diarrhoea, cholera, typhoid which is caused by those wastes.
- Among the 47 wards of Siliguri 29, 18, 5 are the most densest ward and the Hong Kong market area, town station area are the congested part of Siliguri, generates a mound of solid wastes which are the fertile ground of mosquitoes, flies, that might cause dengue, malaria and other types of diseases.
- River Mahananda is facing serious water pollution due to contaminating solid wastes. This river water meets the demand for drinking and domestic activities on local residents. They often suffered by stomach pain after drinking the water of Mahananda river.

Recommendations for development of sustainable solid waste management system:some of the important recommendations are-

- Participation of people should be encouraged by organising awareness campaigns through NGOs, ward solid waste management committees, youth clubs etc. Siliguri Municipal Corporation should extend helping hand to those people who volunteer participation.
- Participation of school and college students in solid waste management system through keeping their campus clean. Workshop should be organised on school and college campus. Students should participate to generate awareness among the local people about the harmful effects of solid waste. An initiative towards solid waste management is found at Salesian College, where workshop was organised by the college in collaboration with NSS unit in Siliguri on 8th September, 2016.
- To improve the collection of household solid waste there is a need to provide a better wage structure to the workers to provoke them not only in proper wastes collection but also in maintenance the rules while disposing wastes at dumper sites.
- It is necessary to build at least one vat bin at the intersection of Sevoke road, Bidhan road and Hilcart road of Siliguri.
- The vendors should not be allowed to cast their waste in front of their shops; they should store their waste in closed container or community vat which may be cleared regularly by sweepers.
- Solid waste generation in household can be recycled and reused to prevent generation of waste at sources and reducing amount of waste thrown into the dustbins. Besides, Ward level composting process should be developed.
- Construction of scientific landfill site for final disposal of solid waste. There should be provisions for leachate and gas control facilities.
- Transportation system has to be designed efficiently. Transportation during night time must be worked in Siliguri where there is serious traffic congestion during daytime, it obstructs waste management operation. Beside of this the selection of vehicles may be done considering the quality of waste to be transported.
- It is urgent to remove dumping yard from adjacent areas of educational institutions.
- Siliguri Municipal Corporation should charge for those who will dispose solid waste improperly. It would help conservancy workers keep the town pollution free and prevent the spreading of diseases.

- Disposal sites should be selected outside of the main town of Siliguri and bulldozers must be used for compaction of wastes of those sites.

Conclusion: The study indicated that the solid waste management is the backbone of the sound environment development. Therefore, it is necessary to manage solid waste in aneco-friendly way. It is important to strengthen segregation of waste at source, proper investment in disposal arrangements and make the most effective use of transport arrangements. It is also necessary to develop solid waste management from the primary level. Full-fledged implementation of solid waste management in all 47 wards of Siliguri municipality must be prioritised.

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