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Research Article

Disposal of Solid Waste and Management: A Comparative Case Study of Jiaganj-Azimganj and Murshidabad Municipality in Murshidabad District, West Bengal, India

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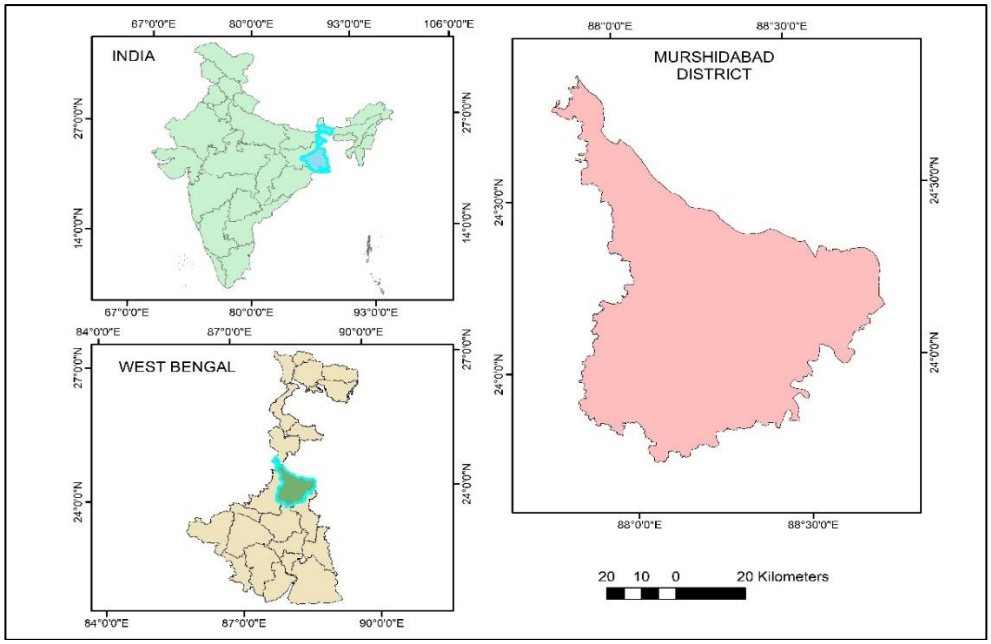
ABSTRACT

Solid was referring any garbage or any rejected material in solid state which have been produced from any sources. A solid waste means the waste which are staying in solid form in normal temperature. This discarded rejected solid materials belongs from a stage where it can be reused or recycled. These materials are also non- biodegradable non-soluble in its nature. Globally huge amount of solid waste has been generated from various sources and its management became global challenging issue. A large amount urbanization and industrialization is the root cost of this problem. Highly urbanized and industrialized area are facing this environmental problem frequently. In accurate management process of solid waste causes different problem like transmission of disease, water pollution, visual pollution, aesthetic nuisance and economic losses. Jiaganj-Azimganj and Murshidabad municipality located side by side with each other. In this paper total solid waste management procedure ofthese two adjacent municipalities are compared thoroughly byanalyzing secondary data. In this both areas maximum of 76% residential and commercial waste and minimum 1% of Industrial waste has been generated. The main purpose of the study is sustainable management procedure of solid waste and to keep environment healthy. Different statistical methods incorporated here to interpret the actual scenario. Some problems associated with solid waste management and suggestion have been given here.

Keywords: Aesthetic nuisance, Disease, Improper management, Urbanization

Introduction

Solid waste terms as useless solid substances. These are newspaper broken glassware various types of cans and bottles polythene packets bags plastic container domestic waste human and animal waste. As Long people have been living in a residential area solid waste became big environmental issue. SWM includes the process such as collection of waste and proper treatment of solid waste which involves the process of recycling or solution of garbage. Waste management incorporate the process by which the waste materials became changed and reused as valuable resource. people from all levels of society should come forward for SWM across the world. Industrialization gives us many good things and bad things also. Generation of large amount of solid waste has an inverse effect of industrialization.



Source: NATMO

According to Britannica, "Solid waste management the collection, treating and disposing of solid materials that is discard because it has served its purpose or are no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease that is disease speed by rodents and insects".
Solid waste management involves the process associated with generation of garbage, storage,collection,transportation and disposal of solid waste as an eco-friendly way. In Murshidabad District there eight municipality are situated.Among them Jiaganj-Azimganj municipality and Murshidabad municipality located next to each other. Both the municipalities were established under British reign. Jiaganj-Azimganj Municipality is situated both side of Bhagirathi River. Murshidabad municipality is situated eastern side of Bhagirathi River. This present paper is concerned with a comparative analysis about solid waste management process, infrastructuralfacilities and problems associated with these recent issues.

Objectives:

✓ To understand the present scenario of waste disposal of these two municipal areas.
✓ To identify the major problems in relation to waste disposal.
✓ To suggest alternative strategies for better management of solid waste and to keep environment sustained and healthy.

Methodology:

Different types of secondary data have been collected from two municipalities to satisfy the main objective of the study. Some statistical and cartographic techniques are used to interpret the data and some simple description is done here.Apart from this the map have been prepared using QGIS 2.14 and Arc GIS 10.3 respectively.

Result and Discussion:

An ideal Solid Waste Management includes the following steps: -

Identify the types of solid waste
↓
Identify the sources of solid waste
↓
Storage of waste
↓
Safe waste collection process
↓
Safe transportation of waste
↓
Segregation of waste as per their nature
↓
Safe disposal and management

Solid waste management (SWM) is a critical component of urban planning and environmental sustainability. The rapid growth of urban populations and the increasing generation of solid waste have made SWM a pressing concern worldwide. An ideal SWM system is essential to minimize environmental impacts, conserve resources, and promote sustainable development.

Principles of an Ideal SWM System

An ideal SWM system is based on the following scientific principles:

1. Waste Hierarchy: The waste hierarchy, also known as the "3Rs" (reduce, reuse, recycle), is a fundamental principle of SWM. It emphasizes the importance of reducing waste generation, reusing products, and recycling materials.
2. Source Separation: Source separation is the process of separating waste into different categories at the point of generation. This principle is essential for effective waste management, as it allows for the segregation of recyclable, organic, and hazardous waste.
3. Waste Minimization: Waste minimization involves reducing the amount of waste generated at the source. This principle can be achieved through strategies such as reducing packaging, using reusable products, and promoting sustainable consumption patterns.

Components of an Ideal SWM System

An ideal SWM system consists of the following components:

1. Waste Collection: Waste collection involves the gathering of waste from households, institutions, and commercial establishments. An ideal SWM system should have a efficient waste collection system that ensures the segregation of waste into different categories.
2. Waste Processing: Waste processing involves the treatment of waste to reduce its volume, weight, and environmental impacts. An ideal SWM system should have a waste processing facility that uses technologies such as composting, anaerobic digestion, and recycling.
3. Waste Disposal: Waste disposal involves the final disposal of waste in a environmentally safe manner. An ideal SWM system should have a waste disposal facility that uses technologies such as landfilling, incineration, and gasification.

Technologies for an Ideal SWM System

Several technologies can be used to achieve an ideal SWM system, including:

1. Composting: Composting is a biological process that involves the decomposition of organic waste into a nutrient-rich compost. This technology can be used to manage organic waste, reduce greenhouse gas emissions, and produce a valuable soil amendment.
2. Anaerobic Digestion: Anaerobic digestion is a biological process that involves the decomposition of organic waste into biogas and digestate. This technology can be used to manage organic waste, produce renewable energy, and reduce greenhouse gas emissions.
3. Recycling: Recycling is the process of converting waste materials into new products. This technology can be used to manage recyclable waste, conserve natural resources, and reduce waste disposal costs.

Benefits of an Ideal SWM System

An ideal SWM system offers several benefits, including:

1. Environmental Protection: An ideal SWM system can reduce environmental impacts, such as air and water pollution, and promote sustainable development.
2. Conservation of Resources: An ideal SWM system can conserve natural resources, reduce waste disposal costs, and promote sustainable consumption patterns.
3. Economic Benefits: An ideal SWM system can create jobs, stimulate economic growth, and reduce waste management costs.

Existing Condition of Solid Waste Management (SWM) in Jiaganj-Azimganj and Murshidabad Municipality

- ❑ Waste generation
- ❑ Storage
- ❑ Collection
- ❑ Transportation
- ❑ Segregation and processing
- ❑ Disposal And management

Solid Waste Generation from Different Sources

SOURCE	MURSHODABAD MUNICIPALITY	JIAGANJ-AZIMGANJ MUNICIPALITY	TYPES WASTE GENERATERS	TYPES OFSOLID WASTE
Residential	✓	✓	Single, Multifamily dwelling	Food waste,Paper, Plastic, Cardboard, Wood, Glass, Batteries, Textiles etc.
Industrial	✓	o	Light Manufacturing	Packing, Housekeeping wastes, Food wastes, Construction and Demolition materials, other metal things etc.
Commercial	✓	✓	Market, stores, hotels, Restaurants, office Buildings.	Plastic, Cardboard, Wood, Paper,Therma Coll plates, Food waste, Glass, Metalsetc.
Institutional	✓	✓	School, Government Centers	Paper, Cardboard, Plastic, Food Waste, Glass etc.
Construction and Demolition	✓	Yet not started	New construction sites, Roadrepair, Demolition of Buildings	Wood, Steel, Concrete, stone chip, Broken bricks, Dirt etc.
Municipal Services	✓	✓	Street Cleaning, House Materials	All garbage from Municipality.

Source: Calculated by author using secondary data received from municipality

PIE DIAGRAMS SHOWING DIFFERENT SOURCES OF SOLID WASTE IN MURSHIDABAD MUNICIPALITY AND JIAGANJ-AZIMGANJ MINICIPALITY

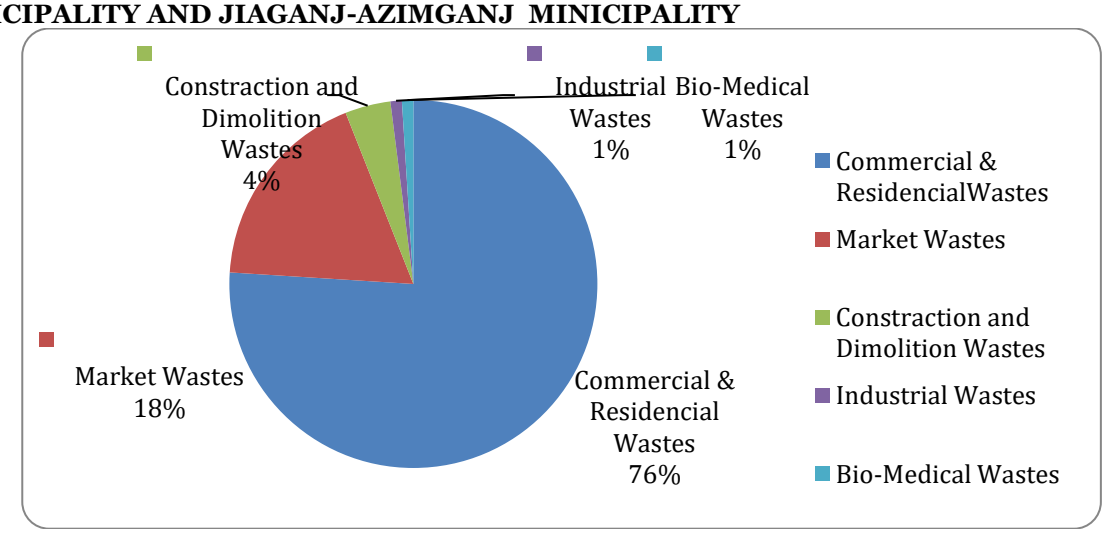


Figure : 1

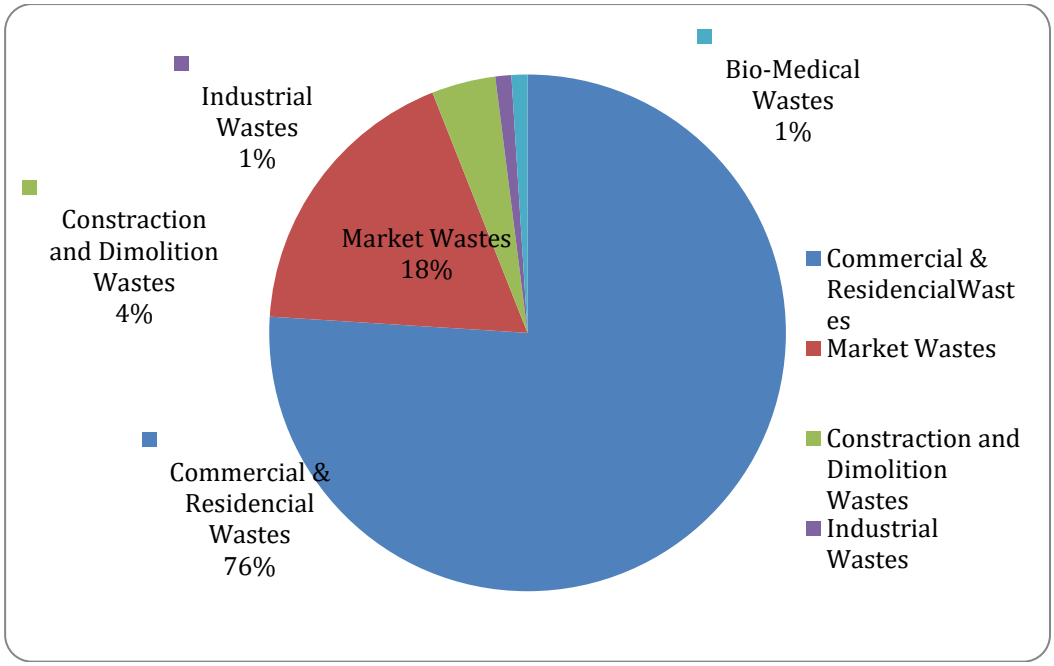


Figure:2

The first figure to show what are the percentage of garbage generated from various sources i.e. commercial 76%, market 18%, construction and demolition waste 4%, industrial 1% and other 1% contributed in Murshidabad municipality. Second figure shows that the percentage of garbage generated from various sources i.e. residential 81%, commercial 17%, institutional 0.49% and 1.5% from other sources in Jiaganj-Azimganj municipality nature of Solid Waste generation in Murshidabad Municipality

Nature of Solid Waste generation in these two municipalities:

Nature	**Waste**
Organic Waste	Kitchen waste, Vegetables, Flowers.
Toxic Waste	Old medicines,Paints, Chemicals, Bulbs, Spray cans, Paints, Batteries, Shoe Polish
Recyclable Waste	Paper, Glass, Plastic, Metals.
Soiled Waste	Cloth soiled, Pathological lab waste, Blood and other body fluids.

Source: Calculated by author

Storage

In Murshidabad municipality, there is no systematic way to store the waste materials for these generated wastes from household sometimes stored in a plastic bucket (served by the municipality) and in the municipal dustbins. But most of time solid wastes of different sources are thrown away in streets, beside the drains and also in the vacant land. But in Jiaganj-Azimganj municipality a systematic storage system has been found. Here solid waste is stored in domestic, commercial and institutional bins. Moreabout 95% people are habituated to store waste in domestic bins. Only 5% household dispose or throw their waste on open streets. Herecommercial and instructional bins are used to waste storage 50%. Somewhere solid waste is stored in a segregated form at source.

Collection of Waste Materials

The collection of waste in these two municipalities comprises of a number of steps.

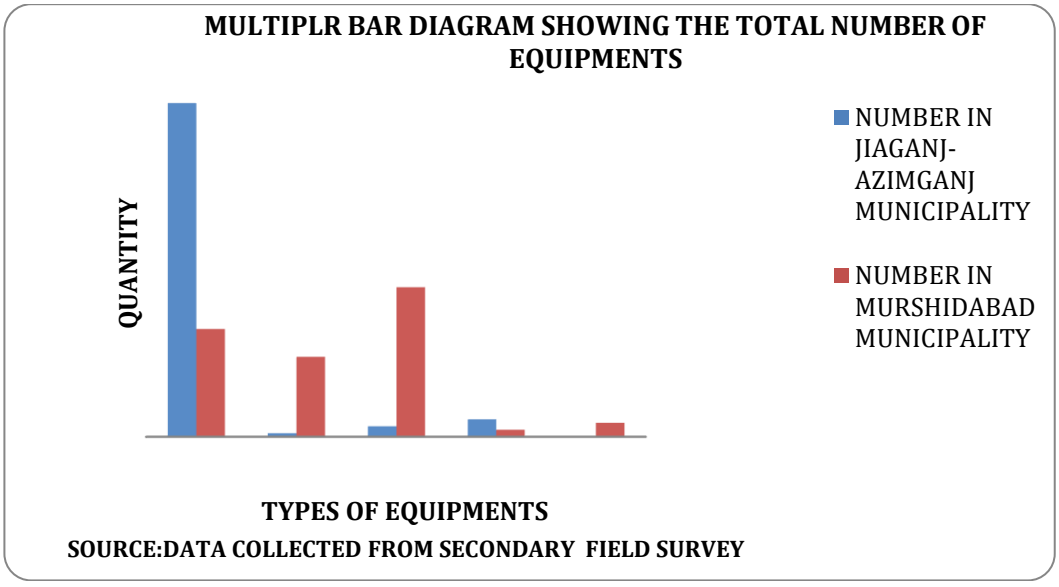
- The first step involves door to door collection with the help of Containerized Tricycle& Handcarts.
- Finally, the waste is collected from street container or opened place with the help of tractor van and trailer.
- Solid waste is collected manually by 200(approximate) worker appointed by Municipality and 243 in Jiaganj Azimganj Municipality, they are sap-safai workers-permanent and temporary, casual, driver, supervisor staff (locally named as Nirmal sathi in Jiaganj-Azimganj municipality).

Collection of Solid Waste using Tricycle in Jiaganj-Azimganj Municipality

➢ This service of Murshidabad municipality in every household is one day later. Another side daily door to door collection is available in Jiaganj – Azimganj Municipality

Availability of Equipment's:

Jiaganj –Azimganj Municipality		**Murshidabad Municipality**	
Equipment's	**number**	**Equipment's**	**number**
Tricycle	96	Tricycle	31
Handcart	1(only for drainage waste)	Handcart	23
Tractor van	3	Tractor van	43
Tractor	5	Tractor	2
Trailer	0	Trailer	4
Data collected from secondary field survey			



Transportation of Waste

Open trucks, tractors and 137 cars are used to transport garbage from source to disposal site ward no 16 in Murshidabad district. In Jiaganj-Azimganj municipality 95% solid waste are transported by open truck. In this municipality per capita waste generation is 308 gm /day. A huge amount of waste is transported from household, community bins to disposal sites. There are 5 non tipping truck and 4 tractors in used to secondary waste transportation in Jiaganj –Azimganj municipality. Other equipment's like Dumper placers (1), Refusecollectors (1), JCB/loader (1) are used to execute this huge work. In both municipalities the garbage transporting trucks are not covered and some waste fall in the road during transportation and create dirty environment.100% waste is lifted manually into the vehicles in these two municipalities in absence of sophisticated methods.

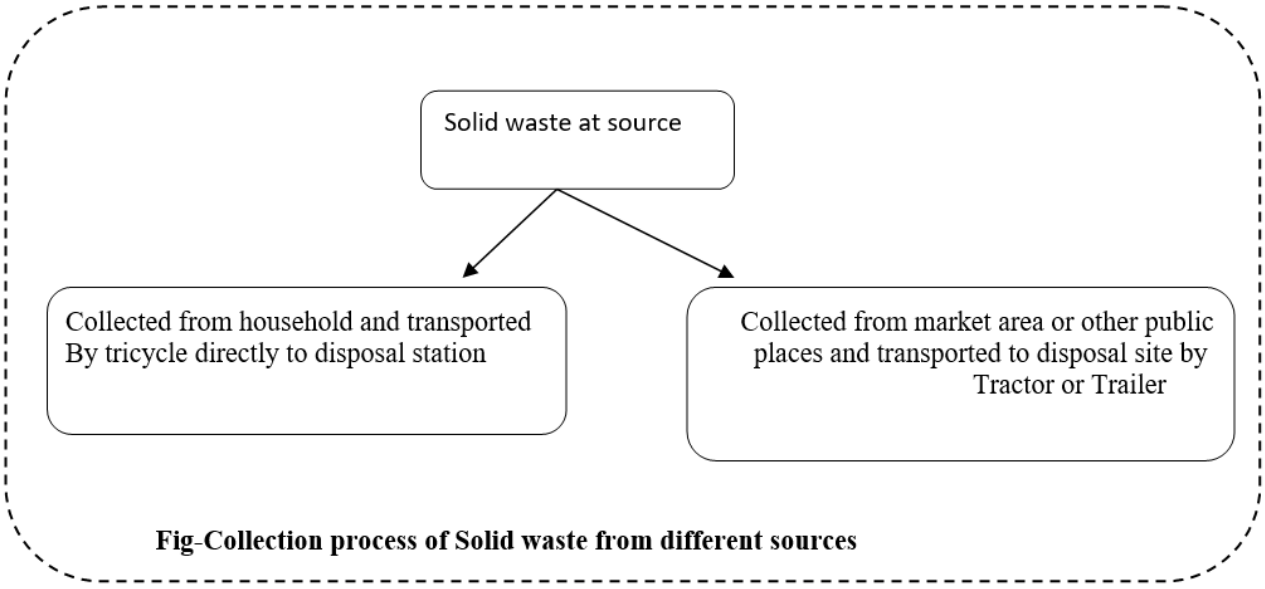


Fig-Collection process of Solid waste from different sources

Processing

In Murshidabad Municipality solid waste are not segregate properly as biodegradable, non-biodegradable, hazardous, toxic (Kumar, S. 2009). But in Jiaganj-Azimganj municipality total collected waster are separated into two broad categories like-Dry waste and Wet waste. Like Lalbagh municipality, Jiaganj-Azimganj municipality has not adopted any methods to separate this waste materials as per their nature The unscientific generation or solid wastes causes a lot of problems. Recycling of solid wastes is not done by this both municipalauthorities.

Apart from this, sanitary disposal is processed under the guidance of Murshidabad Municipality in association with Greenery Bio-Compost and Bio-Fertilizer is produced (Asnani, P.U. 2004). The project is known as "Bio- Compost Project".

Disposal and management

The most common methods used for Municipal Solid Waste (MSW) management in Jiaganj-Azimganj Municipality and Murshidabad Municipality are- open dumping, landfill, Incineration.

- **Open Dumping**

Open dumping has been applied to manage MSW for many years and it can manage a huge quantity of MSW generated per day. Open dumping ground is situated in ward no.18 of Murshidabad municipality. In Jiaganj-Azimganj municipality there are two open dumping sites are situated in ward no. 12 and ward no. 01 respectively. But the municipal disposed the waste street side vacant land also. This makes visual pollution.

Photo –I -This photos are captured by the author showing open dumping area along Bhagirathi river bank in Jiaganj-Azimganj Municipality

- **Landfill**

Landfill process is another method of MSW management of Murshidabad Municipality. Most of the wastes that collected from ward 04, 07, 06, 03, 02, 08 and 09 are disposed in Bhagirathi River side near hospital (ward no.12) and also disposed in the both side River Bhagirathi. Even in the street side pond or low land also used as solid waste disposal points (Mitra, B. 2015). It can cause the water pollution especially in the river Bhagirathi. Anotherside in Jiaganj-Azimganj municipality most of solid wastes are collected from ward no.03,04, 12,13,14,15,17 respectively. Here municipality proposed a landfill site near "Burning Ghat" in ward no. 01.

Photo-II: This figure was captured by author that shows to landfill materials are deposited in Bhagirathi River side which is accumulated from near hospital i.e. Lalbagh Hospital.

- **Incineration**

Incineration is one of the methods for MSW management in Murshidabad Municipality. This method is used landfill is not enough for disposed MSW (Priyadarshi, H. 2018). In Jiaganj-Azimganj municipality incineration is done into open dumping site in ward no. 01 and ward no.12. Even though the incineration can rapidly reduce the amount of waste, it can cause an air pollution as well as odor pollution concern especially in the residential area.

Photo III: Incineration picture was captured by author that is implies air pollution concern in residential area. (Fig 1-Murshidabad Municipality, Fig-2 Jiaganj-Azimganj Municipality)

Flow chart of Solid Waste Management(SWM)

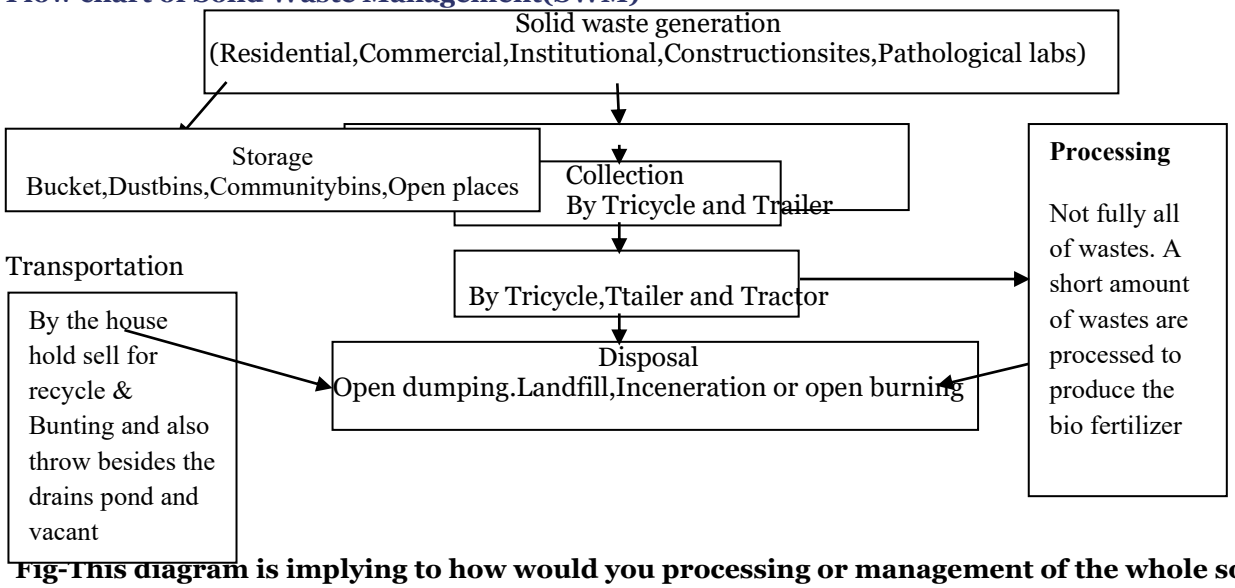


Fig-This diagram is implying to how would you processing or management of the whole solid waste.

- Another solid waste disposal techniques applied in Jiaganj –Azimganj municipality named Bio-Methanation. Organicwaste, municipal solid waste are processed by bio-methanation once in every year. It is a modern techniques of waste disposal used in semi urban Jiaganj –Azimganj area.

Major problems

❖ In household, all type of waste put in a same bucket. Buckets of two different colours for dry waste and wet waste are rarely used by local residents of both municipalities.
❖ Transporting vehicles are inadequate to collect waste.
❖ Soil and water pollution occurs due to unplanned and unscientific manners.
❖ Sometimes inflammable materials of wastes are brunt which creates toxic gases and cause air pollution. Unscientific burning contaminates the surroundings of open dumping area.
❖ Disposal of solid wastes in the river Bhagirathi reduces its silting capacity and also effect on inhabitants. Many aquatic animals are dying from being trapped in plastic
❖ Health hazards occurs due to birth of harmful insects like mosquitoes, flies etc.
❖ People indiscriminately throws solid wastes into drains. At the results the sewers get blocked.

Major Findings

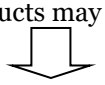
✓ Maximum solid waste generates from households in both of the Municipalities.
✓ Peoples are quite satisfied for the service of waste collection.
✓ Solid waste are collected in regular basis.
✓ Murshidabad Municipality do not use permanent place for garbage disposal.
✓ There is less tendency to throw away garbage in everywhere in Jiaganj-Azimganj municipality.
✓ Most of the workers who are involves in solid waste management, they don't use any protection during working times.
✓ Least amount of solid waste is use to produced bio-fertilizer in Murshidabad municipality.
✓ Bio-methanation, a modern technique is used in Jiaganj-Azimganj municipality only once time in every year. Frequency of using the techniques is very low.
✓ Peoples of the both municipalities do not give any importance about to reduce solid waste generation, refuse of hazardous material and reuse old material.

Suggestions

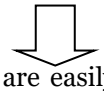
➢ Recyclable and bio-degradable wastes could be segregated and collect in separate containers at the homes, offices, commercial establishment etc.
➢ Organic waste materials which are plate materials, food wastes, paper products can be recycled using biological composting and digestion processes to decompose the organic matter and effectively utilized for production of methane biogas.
➢ Public participation from all levels of the society in the entire process need to be ensured through the formation of ward committees, resident associations and other local bodies.
➢ Local print and visual media could be used in an effective manner to educate the masses, spreading awareness and providing messages regarding Solid Waste Management.

The principal of 4 Rs – Refusal, Reuse, Recycle and Reduce need to be followed for waste management.

- Refusal to buy unnecessary products may reduce waste generation.



- Reuse of various products like paper, plastic bags, shopping bags etc.



- Recycle, non-perishable wastes are easily collected and taken for recycling. Dig a small pit to compost your organic wastes like kitchen wastes at your home.

- Reduce the generation of unnecessary waste, e.g. carry your own shopping bag when you go to the market

Conclusion

There are several policies for the solid waste management but most them are confined only in the paper or written documents. These two municipal authorities could not maintain these policies properly in their premises.in this paper some executable possible solutions are given. These can help for the better management of solid waste. If these policies are properly maintained then the environment of these two municipalities would be healthy for long life. An ideal SWM system is essential for minimizing environmental impacts, conserving resources, and promoting sustainable development. By adopting scientific principles, such as the waste hierarchy, source separation, and waste minimization, and using technologies such as

composting, anaerobic digestion, and recycling, we can achieve an ideal SWM system. This system offers several benefits, including environmental protection, conservation of resources, and economic benefits.

References

1. District Human Development Report: Murshidabad (2007): HDRCC, Development and Planning Department, Government of West Bengal.
2. Kumar, V., Pandit, R.K.: Problems of solid waste management in Indian cities. Int. J. Sci. Res. Publ. 3(3), 1–9 (2013)
3. Mitra, B. 2015. Disposal an Management of Solid Waste – Barrack pore Municipality, Practicing Geographer, Vol -19, No. -1, pp - 89 – 98.
4. Parsons, T. and Knight, P. G.(2005), How to do your Dissertation in Geography and Related Discipline, Rout ledge (Taylor and Francis Group), London and New York.
5. Paul, S. 2012, Location allocation for urban waste disposal site using multi-criteria analysis: A study on Nabadwip Municipality, West Bengal, India, INTERNATIONAL JOURNAL OF GEOMATICS AND GEOSCIENCES
6. Paul, s. 2013. Disposal & Management of Solid Waste at Raipur- Sonarpur Municipality. Practising Geographer, Vol -17, No. -1, pp - 313 -330.
7. Rajput, R., Prasad,G. and Chopra, A.K. 2009, Scenario of solid waste management in present Indian context, Caspian Journal of Environmental Sciences, *Vol. 7 No.1 pp. 45~53*.
8. Shee, p. 2015. The status of solid waste & its management: a study of Tarakeswar Town. Practicing Geographer, Vol -19, No. -1, pp - 117 -128.
9. Sharma, S., Shah, K.W.: Generation and disposal of solid waste in Hoshangabad. In: Book of Proceedings of the Second International Congress of Chemistry and Environment, Indore, India, pp. 749–751 (2005)
10. (2006), Detail Project Report on Solid Waste Management on Rajkot Municipal Corporation, Gujarat.
11. Rathi, S.: Alternative approaches for better municipal solid waste management in Mumbai. India J. Waste Manage. 26(10), 1192–1200 (2006).
12. Kumar, S., et al.: Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: an insight. Waste Manage. 29(2), 883–895 (2009).
13. Joseph, K.: Perspectives of solid waste management in India. In: International Symposium on the Technology and Management of the Treatment and Reuse of the Municipal Solid Waste (2002).
14. Ravi, D.: Solid waste management issues and challenges in Asia, Asian Productivity Organization (2007).
15. Lavee, A., Vievek, : Is municipal solid waste recycling economically efficient. Environ. Manag. 40, 926–943 (2009).
16. Asnani, P.U.: United States Asia Environmental Partnership Report, United States Agency for International Development, Centre for Environmental Planning and Technology, Ahmedabad (2004).
17. Central Pollution Control Board (CPCB): Management of Municipal Solid Waste. Ministry of Environment and Forests, New Delhi, India (2004).
18. Gupta, S., Krishna, M., Prasad, R.K., Gupta, S., Kansal, A.: Solid waste management in India: options and opportunities. Resour. Conserv. Recycl. 24, 137–154 (1998).
19. Priyadarshi, H., Jain, A.: Municipal solid waste management study and strategy in Aligarh City, Uttar Pradesh India. Int. J. Eng. Sci. Invent. (IJESI) 7(5), 29–40 (2018). Ver. III.
20. Schubeler, P.: NEERI Report "Strategy Paper on Solid Waste Management in India", pp. 1–7 (1996).
21. Rajput, R., Prasad, G., Chopra, A.K.: Scenario of solid waste management in present Indian context. Caspian J. Environ. Sci. 7(1), 45–53 (2009).
22. Khan, R.R.: Environmental management of municipal solid wastes. Indian J. Environ. Prot. 14(1), 26–30 (1994).
23. Siddiqui, T.Z., Siddiqui, F.Z., Khan, E.: Sustainable development through integrated municipal solid waste management (MSWM) approach – a case study of Aligarh District. In: Proceedings of National Conference of Advanced in Mechanical Engineering (AIME-2006), Jamia Millia Islamia, New Delhi, India, pp. 1168–1175 (2006).
24. ShwataChoudhury :A research paper on Solid Waste Management,JETIR March 2019,Vol-6,Issue 3
25. Shailesh Kumar Dewangan: Theoritical study on Solid Waste Management.
26. United Nations Environment Programme (UNEP). (2019). Global Waste Management Outlook.
27. World Bank. (2018). What a Waste 2.0: A Global Update on Waste Management.
28. Environmental Protection Agency (EPA). (2020). Sustainable Materials Management: 2019 Data Highlights.