A Review on Integrated Solid Waste Management in Visakhapatnam City

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Abstract

Solid waste management (SWM) is a great concern for public health and environment of rural as well as urban parts of cities. With rapid population expansion and constant economic development, waste generation both in residential as well as commercial/industrial areas continues to grow rapidly, putting pressure on society's ability to process and dispose of this material. Greater Visakhapatnam Municipal Corporation (GVMC) is facing lot of hardship in day to day management and maintenance of solid waste management. Therefore in this project, A detailed investigation was made regarding the methods of practices associated with sources, quantity generated, collection, transportation, storage, treatment and disposal of Municipal solid waste in Visakhapatnam city. The data concerning to SWM in Visakhapatnam was obtained through various field visits to transfer stations and dump yard locations, questionnaire, and authentic record of municipal corporation. Photographic evidences were also made about all phases of MSW management. Study reveals that focus should be towards an integrated approach which implies a sophisticated system of waste management including a complete waste reduction, collection, composting, recycling, and disposal system. An efficient Integrated Solid Waste Management (ISWM) system considers how to reduce, reuse, recycle (3R Principle) and manage waste to protect human health and the natural environment.

Keywords: Integrated solid waste management, 3R Technique, GVMC.

1. Introduction

Solid waste is the unwanted or useless solid materials generated from combined residential, industrial and commercial activities in a given area. It may be categorised according to its origin (domestic, industrial, commercial, construction or institutional) according to its contents (organic material, glass, metal, plastic paper etc) or according to hazard potential (toxic, non-toxin, flammable, radioactive, infectious etc). Cities are facing an increasing growth in population increasing quantities of waste being generated. Due to rapid increase in the production and consumption processes, societies generate as well as reject solid materials regularly from various sectors agricultural, commercial, domestic, industrial and institutional.

Visakhapatnam is the second biggest city in undivided Andhra Pradesh after Hyderabad. Once a small fishing village has evolved into major port city in south India over the decades and considered as the fastest growing city in India. The total area of the city is 540 sq.km (GVMC, 2012) and with a growing population of more than 30.82 lakhs. The city is the biggest economic hub with both public and private sector undertaking like Visakhapatnam Steel Plant, Visakhapatnam Port, National Thermal Power Corporation, Hindustan Petroleum Corporation, Hindustan Zinc, Hindustan Shipyard, Bharat heavy Plates and Vessels and any more private companies are located in and around the city generating huge amounts of waste. The Public Health and Sanitation Department of GVMC is responsible for collection, transportation and disposal of solid waste generated in Visakhapatnam City. The present study is carried out in the Greater Visakhapatnam Municipal Corporation area in the Academic year 2017-18 to understand the solid waste management scenario in GVMC area.

2. Salient features of solid waste management in Visakhapatnam

The city has been divided into majorly six zones for managing municipal solid waste generated throughout the areas of Visakhapatnam. The Public Health and Sanitation Department of GVMC is responsible for collection, transportation and disposal of solid waste generated in Visakhapatnam City. For operational purposes the entire area of the corporation is divided into 6 zones comprising 72 wards. Sanitary Supervisors heads each of the zones and the sanitary inspector heads each of the wards.

Table 1: Municipal Ward Division

Zone Number	Wards Included
I	01 TO 06
II	07 TO 18
III	19 TO 33
IV	34 TO 51
V	52 TO 65
VI	66 TO 72
(additionally included for dump yard purpose)	+Anakapalle +Bheemunipatnam

The salient features of the city is mentioned in the paragraph below along with source of generation is depicted in the pie chart.

- The area of the city : 540 Km^2.
- Population : 30.82 Lakhs
- Estimated House Holds : 4 Lakhs
- Wards : 72 Wards
- Waste Generation : 1000 to 1050MT/day
  - a. Domestic waste : 450 Tons/day
  - b. Commercial, Drain silt and others : 550-600 Tons/day

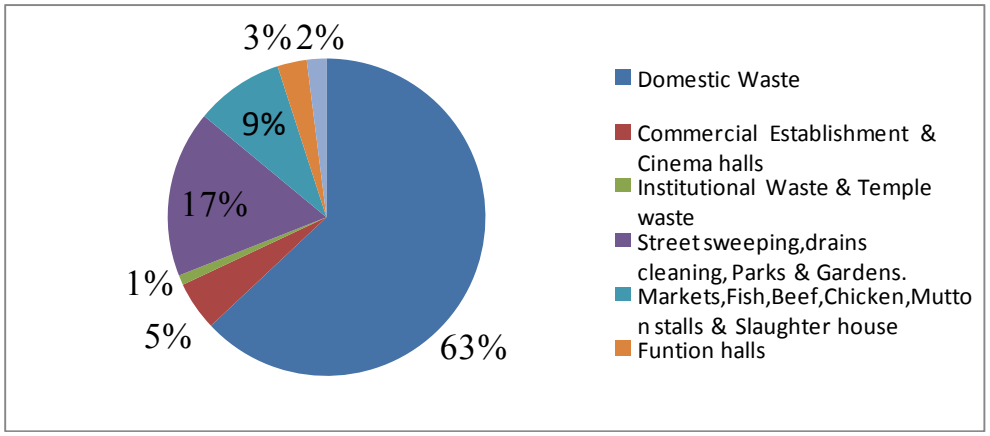

Figure 1: Source of Waste Generation

3. Methodology

The methodology followed in the study represented as below

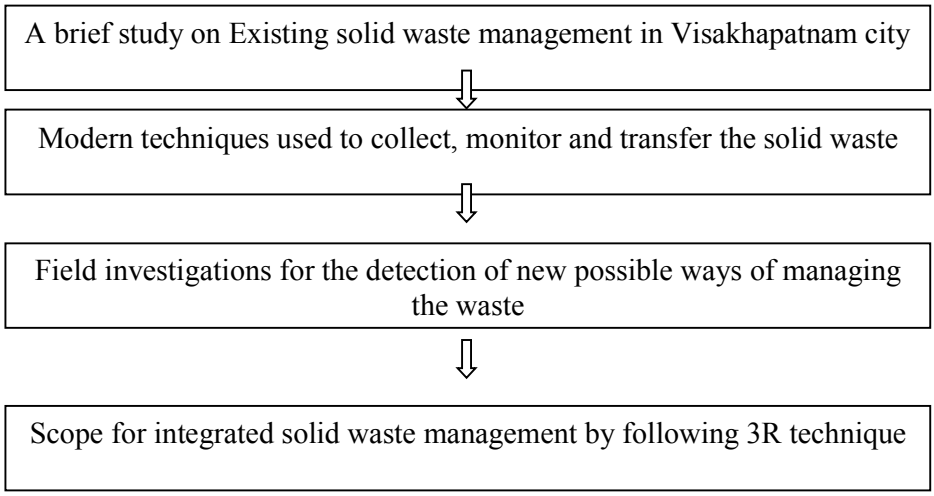

Figure 2: Flow of Methodology

4. Results and discussion

Solid waste Management system of GVMC

Collection and Transportation:-

The collection and transportation of solid waste in Visakhapatnam is done in two shifts. That first shift starts at 6 AM in the morning, the conservancy workers sweep the streets, clean he drains and collect the waste from small open points and transport the waste by 6 container wheel barrows or push cars or tricycles to nearest dumper bins or secondary open collection points. The waste from dumper bins and secondary open collection points is being transported to transfer stations by dumper placers or tippers or tractors than from transfer station the waste is being collected and transported to the disposal site by 20 tonners and open trucks.

Transfer station:-

A transfer station is a building or processing site for the temporary deposition of waste. Transfer stations are often used as places where local waste collection vehicles will deposit their waste cargo

prior to loading into larger vehicles. These larger vehicles will transport the waste to the end point of disposal in an incinerator, landfill, or hazardous waste facility, or for recycling. To manage the huge amounts of waste being generated and to transfer to the dump yard which is placed far away from the city, transfer stations are located at various places for different zones.

1. Arilova -Zone I&II
2. Town kotha road(sewage farm) -Zone III&IV
3. Gajuwaka (Y-junction) -Zone V&VI

Transportation:-

Transportation of waste stored at waste storage depots at regular intervals is essential. The collection and transportation of waste is practiced on all the days of the year including public holidays. In GVMC, waste stored in open spaces is either loaded manually or with the help of loaders in trucks. The vehicles used for collection in GVMC are given in table 2.

Table 2: Vehicles used for collection

S.No	Vehicle	no
1	Tri cycles	1050
2	Mini Tippers (3.5 Cum)	166
3	Wheel Barrows	800
4	Big Tippers (10 MTs)	23
5	6 Tub Wheel Barrows	420
6	JCB's	09
7	Plastic Wheel Barrows	150
8	Tractors	04
9	Dumper Bins	1596
10	Sweeping Machine	01
11	Bob-Cat machines	03

Characterization of Solid Waste:-

The quantity and characteristics of solid waste vary from place to place. Factors that influence the quantity and composition are the sources of generation, population intensity, social behaviour and climate. The study showed the waste generated in Visakhapatnam is heterogeneous in nature. The major constitutions of solid waste generated in Visakhapatnam are organic waste.

Wet waste, typically refers to organic waste usually generated by eating establishments and are heavy in weight due to dampness.The wet waste segregated at transfer stations is sent to Gajuwaka transfer station which also serves as wet waste disposal yard. Here the waste is composted normally and also by vermi-composting. Area is 3 acres. Period of composting is 60 days. After composting; it is dried and pulverized into powder by machines.

Dry mixed waste consists of waste that doesn't decay. It is free of organic material such as food. It is also known as non-biodegradable waste. The dry waste from all the transfer stations is sent to Kapuluppada dump yard. For the past 30 years, the waste has been dumped as landfill.

Table 3: Characterization of Solid Waste

	WET WASTE	DRY WASTE
Matter	Bio degradable	Non-bio degradable
Examples	Vegetable, kitchen waste etc.	Plastic, metal, papers etc.
Disposal method	Composting	Landfill and others
Location	Gajuwaka	Kapuluppada

Processing and disposal:-

GVMC is not practicing any scientific processing in disposal of solid waste. The solid waste collected is being transported to the Kapulapadu disposal site where it is disposed indiscriminately. Presently GVMC is practicing open crude indiscriminate disposal of solid waste. The site approximately is of 90 acres. The existing waste disposal site is a dump site with no leachate collection and treatment system and does not meet the current requirements of the Municipal Solid Waste Management 2016 rules. Recently the focus is been shifted to process the dumped waste of past 30 years and to Recover energy from the waste which is coming daily by collaborating with Jindal company.

Conclusions:-

The practices followed by GVMC appear to be not sufficient enough and need some improvements for effective management of waste generated. An integrated approach can be made to effectively manage the waste by encompassing source segregation and by adopting recovery and reuse principles. More emphasis should be laid on scientific waste processing and disposal strategies for the city including effective utilization of the organic waste and recyclables and the development of land fill facility catering to the next 25-30 years period in line with the Municipal Solid Waste (Handling &Management) Rules 2000.

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