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### AN EFFECTIVE WASTE MANAGEMENT AND DISPOSAL STRATEGY FOR YAVATMAL CITY

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#### Abstract

Yavatmal Municipal Council is spread over the area about 10.74 km<sup>2</sup>. MSW has become a heavy environmental downside in major cities everywhere world. The problem of solid waste is also influencing the urban environment of Yavatmal city. Therefore, the present study was under taken to enlist the causes of solid waste generation and possibilities of associated problems. The study was mainly concentrated to investigate the present status of Municipal Solid Waste Management (MSWM) in Yavatmal city. This study deals with the generation and characteristics of solid waste in Yavatmal city, along with the associated environmental impacts and existing solid waste management practices. Municipal solid waste management has become a serious problem because of rapid urbanization and improved economic activities. Planning for urban solid waste management requires an appraisal of many complex interactions among land use patterns, transportation systems, public health considerations, and urban growth and development. This paper contains the details about waste collection scheme, present status of solid waste management and sanitary landfill in Yavatmal city. The current status, relevant planning figures and the future steps for improvement of MSWM in Yavatmal. It therefore forms a planning document for sustainable Municipal Solid Waste Management in Yavatmal with special reference to 3R strategy – Reduce, Reuse, Recycle.

**Index Terms:** MSW, Waste, Recyclables, Yavatmal, Municipal council.

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#### 1. INTRODUCTION

‘Yavatmal’, the city that Nature has endowed with great beauty.’ On other hand, in the same city, disaster looms are large. Generation of waste is inevitable in each habitation since the dawn of civilization humanity has bit by bit deviated from nature and these days there has been a forceful amendment within the lifestyle of human society. Direct reflection of this change found in the nature and quantity of garbage that a city generates. The waste management consists of, management at waste generation level, storage at the source of generation, primary collection, street cleansing, temporary storage at locality level, regular and periodic transportation of this quickly collected waste to disposing sites and treatment plants.

Yavatmal Municipal Corporation is spread over the area about 10.74 km<sup>2</sup>. As per information of the authority of Yavatmal municipal corporation total population is 1,25,956 and waste generation is 24 tonne/day in Yavatmal city and 36 to 40 metric

tonne waste generates per year. This waste consists of various things such as the skin of fruits and vegetables, stale food, glass pieces, paper, plastic injections and needles, old medicines, chemical things made of rubber batteries etc. This waste generates toxic gases which are inflammable and leads to increase in greenhouse gases. The composition of this waste produce toxic liquid called leachate and also cause many diseases. Historically, highly mixed wastes were collected without any segregation or recovery of recyclables, thereby not only increase in the cost of collection and processing of these wastes, but also losing valuable recyclables from the waste stream.

As per Municipal waste management and Handling rules-2000, waste management is in the obligatory function of local urban bodies, but in actual practice the waste management is given last priority and duties are either not performed or poorly performed consequently the city has to face numerable problems related to environment and sanitation. Planning and management of waste in

Yavatmal city has remained a herculean task due to the unchecked exponential growth of urban population, unplanned urbanisation, lack of training in modern waste management practices, lack of awareness on the dangers of unsustainable waste management practise, poverty, illiteracy, and poor government support amongst other factors and Also lack of data on waste management and little on research on waste management are another factors militating on planning and management of wastes. The various initiatives taken by government, NGOs, private companies, and local public drastically increases in the past few decades. Nonetheless, landfilling is still the dominant waste management option for the town.

Almost all the components of waste have some potential if it is converted or treated in a scientific manner. We can dispose the waste or utilise the waste and might earn cash through correct management. This study looks in brief at the current waste generation, characteristics and management scenario in Yavatmal city, along with the associated environmental impacts and disposal of waste and the purpose is to gain knowledge about various initiatives in the city and to locate an effective improvement in the management of waste for the welfare of the society.

The activities which are involved with the management of waste from the point of view of generation to final disposal can be grouped into the six functional elements.

- Waste generation
- Storage
- Collection
- Transportation
- Segregation and processing
- Disposal.

### 1.1 Aim

To develop waste management system for Yavatmal city and to extract the maximum practical benefits from waste products.

### 1.2 Objectives

1. To ensure the protection of the environment through effective waste management measures.
2. To protect the health and wellbeing of people by providing an affordable waste collection system.
3. To promote the recycling process so that it will save energy, conserve resources, reduce pollution, cuts waste disposal costs, save valuable raw materials, reduce trash in landfills.

4. To promote segregation at source itself and to make waste management fully automatic.

### 1.3 Scope of study

1. Waste management in Yavatmal city will be fully automatic.
2. Proper disposal of waste without creating any bad impact on environment or any unhealthy conditions.
3. Management of waste will be easy for the flat schemes in Yavatmal city with the help of this waste management technique.
4. Disposal strategy of waste will limit waste in landfills, reduce consumption of energy, and will save money.

### 1.4 Need of study

The Huge mountain of waste and the garbage and trash are found in Yavatmal city. Due to the urbanization and increase in population waste is major source of environmental pollution. Waste disposal poses a bigger drawback as a result of it ends up in land pollution if overtly drop, pollution if drop in low lands and pollution if burnt. Yavatmal city is facing serious environmental degradation and public health risk due to uncollected disposal of waste on streets and other public areas, clogged drainage system by indiscriminately dumped waste and by contamination of water resources near uncontrolled dumping sites. So there is a need of proper waste management in this city.

## 2. CURRENT SITUATION OF MSW IN YAVATMAL CITY

Total solid waste generation is 24 tonne/day in Yavatmal city and 36 to 40 metric tonne of waste generates per year. From that solid waste generation per person is approximately 200 gm/capita/day.

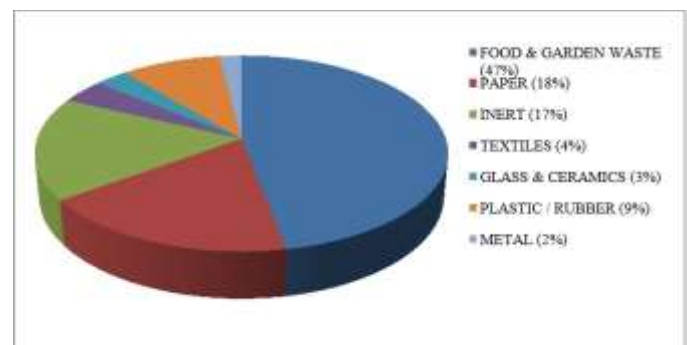


Fig-1: Current analysis of MSW in Yavatmal city.

### 3. METHODOLOGY

1. The solid waste from the different sector of society was collected, mixed and one Kg sample was prepared by using quartering method. The waste was then characterised, and the percentage of each constituent was calculated. Secondary data regarding solid waste generation, collection system and disposal methods were collected from Yavatmal City Corporation.

2. Plastic bricks: the manufacturing of plastic bricks from the plastic waste generated from the Yavatmal city by simply just melting at temperature 280 to 450 c and mixing it to sand for increase of bricks compressive strength.

•Material required:

- a) Plastic waste
- b) River sand
- c) Brick making mould of size 19x9x9cm.

3. Converting the kitchen waste or wet waste to into compost by the method of vermicomposting.

4. Manufacturing of Biomass briquettes a biofuel substitute to coal and charcoal from simply a process of converting agro waste and forestry waste into biomass briquettes/bio coal. The biomass briquetting is that the best renewable supply of energy for healthy surroundings and economy.

### 4. WASTE MANAGEMENT PLAN

This stage deals with the proper waste management plan for the Yavatmal city. In this waste management plan the proper collection and disposal of MSW in Yavatmal city. In this plan is majorly distributed in following units or centre:

- 1. Control station.
- 2. Collection and separation unit.
- 3. Waste separation unit.
- 4. Recycling unit.



Fig-2: Waste Management Plan.

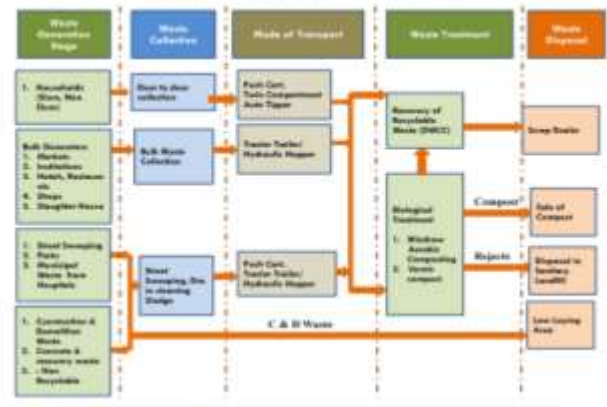


Fig-3: Flow chart of waste management.

### 5. DESIRED OUTCOMES

#### 5.1 Collection of data:

The daily data of collection of MSW in Yavatmal city has been uploaded automatically to the website of Solid waste management department Yavatmal.



Fig-4: Website of MSWD Yavatmal.

#### 5.2 Design of pneumatic waste collection system for flat scheme:

Pneumatic waste collection system is the system which works on the principal of vacuum. This study deals with the installation and implementation of modern waste collection system for multi-storey building.



**Fig-6 Compost farming by-product**



**Fig-5: pneumatic waste collection.**

**5.3 Convert the waste into recyclables:**

Recycling may be a key part of recent waste reduction and is that the third part of the "Reduce, Reuse, and Recycle" waste hierarchy.

Thus, utilization aims at environmental property by work stuff inputs into and redirecting waste outputs out of the national economy.

Following are the recyclables products obtained:

**5.3.1 Convert wet waste into vermicomposting:**

Vermicompost is that the product or method of composting mistreatment numerous worms, sometimes red wigglers, white worms and different earthworms to form a heterogeneous mixture of mouldering vegetable or refuse, bedding materials and vermicast. Vermicast, conjointly known as worm castings, worm humus or worm manure, is that the end-product of the breakdown of organic matter by an angleworm. These casting have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting.

**5.3.2 Convert plastic waste into constructional products:**

Plastic utilization refers to the method of ill waste or scrap plastic and reprocessing it into helpful product. Due to the actual fact that plastic is non-biodegradable, it's essential that it's recycled as a part of the worldwide efforts to reducing plastic and alternative solid waste in the environment.

The products such as plastic bricks, plastic pavement blocks, plastic aggregates are manufactured.

Following stages involved in recycling of plastic waste:

- Collection
- Sorting
- Shredding
- Cleaning.
- Making of products



**Fig-7: Sample of cut plastic waste**



**Fig-8: Plastic waste cutting machine.**

### 5.3.3 Converting dry waste to bio briquettes:

The agro briquette functions as a combustible fuel and it may possess some colour depending upon the raw material used as input. It is also known as white coal. It can be efficiently and effectively and eco-friendly used to replace coal, fire wood, furnace oil or any such fuel in heat processing plants.

Materials required for the manufacturing of bio briquettes are forest leaves, cotton flower, cotton Salk, groundnut shell, bagasse, castor seed shells, cumin waste, almond shell, jute waste, saw dust, bittlenut shell, and cow dung.



**Fig-9: Briquetting press machine.**

## 6. CONCLUSION

- Proper Segregation at source - Due to awareness, the waste is segregated properly at its point of generation which affects its treatment at a later stage.
- The data and information regarding the waste collection is automatically uploaded to site.
- The conversion of waste into recyclables is possible through this system.
- The position of collection vehicle is seen on website.

## 7. REFERENCES

- [1]. Shikhar Shrimali, "Bricks from waste plastic", IJAR, 3079, 2017
- [2]. Mr.N.Thirugnanasambantham<sup>1</sup>, P.Tharun Kumar<sup>2</sup>, .R.Sujithra<sup>3</sup>, R.Selvaraman<sup>4</sup>, P.Bharathi<sup>5</sup>, "Manufacturing and Testing of Plastic Sand Bricks" International Journal of Science and Engineering Research, (IJOSER) Vol 5 Issue 4, April -2017.
- [3]. Stream automated waste collection system manual, "Pneumatic waste collection system".
- [4]. Lusail development company manual "Pneumatic waste collection system"
- [5]. B.L.Chavan<sup>1</sup>, N.S. Zambare<sup>2</sup>, "A Case Study on Municipal Solid Waste Management in Solapur City, Maharashtra, India" International Journal of Research in Civil Engineering, Architecture & Design Volume 1, Issue 2, October-December, 2013.

