ISSN: 2278-4632
Vol-10 Issue-6 No. 6 June 2020

A GEOGRAPHICAL ANALYSIS OF SOLID WASTE MANAGEMENTIN SATARA CITY.

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Abstract

The management of solid waste is a major responsibility of the Municipal Corporation or Municipal Council. Solid waste in Satara city is managed by the Municipal Council. Appropriate scientific methods are needed to reduce waste generated in urban areas.Solid waste management is best done in a scientific and eco-friendly way. Various methods are adopted for solid waste management. Solid waste management has to go through various stages like solid waste collection, transportation, segregation, treatment and disposal.Although solid waste management is a complex and intricate process, solid waste management is one of the ways to convert wasted waste into assets using various eco-friendly measures such as reduction reuse, recycle recovery. Solid waste is an important disposable asset.Such assets should be recycled. Solid waste management is a comprehensive process of solid waste disposal. Solid waste is generated by human action. But there is pressure on the council to manage solid waste to create a more sustainable environment.Dumping sites for solid waste disposal are also located near the city, so dumping sites are also causing serious problems. Direct disposal of solid waste is causing many complex problems. Improper solid waste management in urban areas threatens human health, causes economic damage, and degrades the environment.Therefore, waste minimization, zero waste concepts has become a necessity today. Solid waste generation adversely affects the available resources or the health of living organisms. Therefore, solid waste management needs to be done in the right way with the focus on avoiding degradation of environmental resources and protecting the health of living beings.

Keywords: Solid waste management, eco-friendly, waste minimization, sustainable environment, zero waste.

Introduction:

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Proper solid waste management has become essential in modern period. Solid waste in the city is generated in many ways. In general, solid waste generation is increasing due to the growing population of the city, living standard of the people, improved economic condition, chauvinism, comfortable lifestyle. Population growth and solid waste generation are closely linked.Solid waste management has to go through various processes like solid waste generation, collection, transportation, segregation, treatment and waste disposal. It needs proper planning. Solid waste management can be done more efficiently using modern technology and concepts. At the same time it is necessary to manage solid waste while maintaining environmentally friendly conditions.Sometimes incineration is widely used in solid waste disposal, but such methods are anti-environmental. Incineration, open dumping, these methods cause environmental pollution. What's more, the city is littered with piles of rubbish. There is a high risk of soil, water and air pollution in the waste disposal site area. All of this affects human health, including the health of pets and stray animals.Therefore, in recent times, more emphasis has been placed on collecting dour to dour solid waste than using waste bins.

Solid waste management in Satara city is done by Satara Municipal Health Department. The current solid waste situation in the city and future waste planning is needed to be reconciled. It is very important to study the method of solid waste collection, route optimization of waste collection vehicles and proper dumpsite. Sometimes solid waste management systems run at a loss due to lack of planning.Using modern technology has made it possible to manage profitable waste on a low budget. It is possible to take financial advantage by using modern concepts like path optimization, waste minimization, site suitability. For this solid waste management should be done properly using geospatial technology.Ensuring public health and environmental conservation is essential in the solid waste management process. Solid waste is a reclaimed resource. Solid waste management is being done everywhere today using appropriate methods and modern concepts based on modern technology.Ideal solid waste management is being done using environmentally friendly methods of recycling, recycling, and recovery, appropriate solid waste treatment, and disposal. The existing solid waste management system in Satara city is operating on a no-profit no-loss basis.

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Study Area:

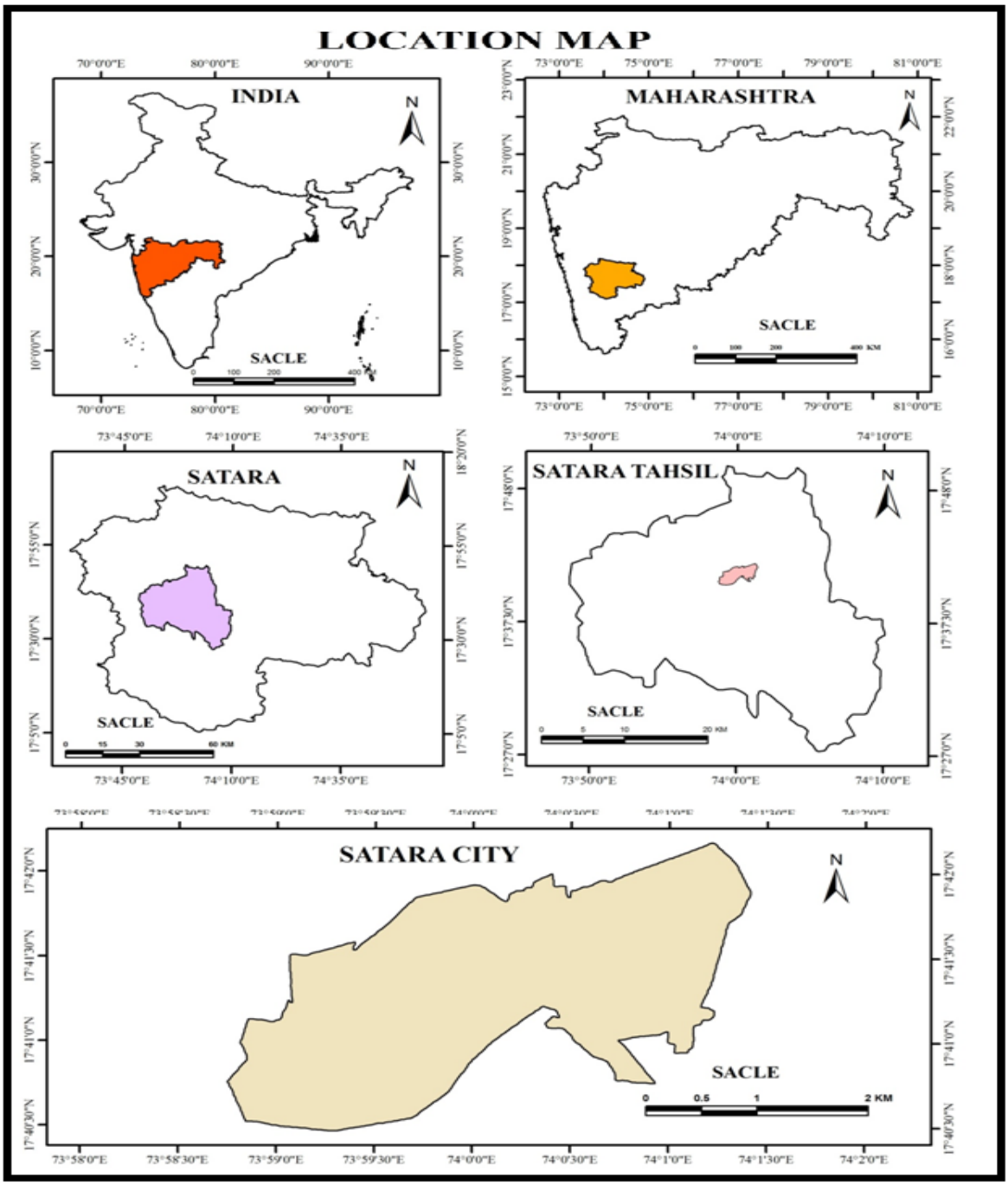

Figure 1.1: Location map of Satara city.

Satara is the location of a major city. The city is of great historical and geographical importance. Satara is a city in Satara district in the Indian state of Maharashtra. The city of Satara was founded by King Chhatrapati Shahu in the 16th century. The city of Satara derives its name from the existence of seven hills (seven-stars). The city of Satara stands at the foot of the historic fort of Ajikyatara. The perfect location of Satara city is between 17^0 39 'to 17^0 42' 30 "north latitude and 73^0 57 'to 74^0 02' east longitude.Satara city location is shown in figure no. 1.1. The city of Satara is present in the plateau region of the Deccan Plateau. The

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geographical background of Satara city is uneven. The western part of Satara city is mountainous and the eastern part is plateau. The city of Satara is situated at an average altitude of 600 meters above sea level. The city of Satara is situated on the banks of Venna and Krishna rivers. At Mahuli, east of Satara city, there is a sacred confluence of two rivers, Vena and Krishna, which is called "Sangam Mahuli".As per the census of India (2011), the Satara city has total population is 120,195.

Objectives:

The view "A geographical analysis of solid waste management of Satara city" expected that the outcome result in improvement for solid waste management. The present research work has focuses on the situation of solid waste management system, in the Satara city. The primary aim of research work is identify the system of solid waste management, analyze related problems and planning in the study area. In view of the above proposed work, following main objectives of the research are as follows.

1) To investigate the present situation of solid waste management in the Satara City.
2) To analyze the system of solid waste management of Satara city.
3) Suggestions for better solid waste management of Satara city.

Database :

The proposed geographical research work is based on both primary and secondary data.

Primary Data:

The present researchwork is mostly based on the primary data. Field survey, interview, observation, questionnaires etc. these are the sources of primary data. The field survey has been completed with the help of GPS. More information has been collected through interviews, questionnaires, observations etc. Primary information was collect with questionnaire survey carried out from inspector, vehicle drivers, workers and house holders in the Satara city area. The GPS instrument has been used for ground truth verification and identifies the accurate location of temporary waste bins.

Secondary Data:

The source of secondary data have includes research related published reviews, statistical abstracts, climatic data, base map and imagery data, demographic data, socio economic data and some departmental unpublished records. The secondary data have been collected from Satara Municipal Corporation, Satara jilha parishad, other governmental departments and Internet also. Official records of Satara District Census Hand Book, Gazetteer of Satara

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district, Districts statistical abstracts and relevant literature, solid waste generation and management related reports are getting from Satara Municipal Council and Satara Zilha Parishad. Census records of India, research journals, socio-economic review of Satara district are gets from online source.

Methodology:

The research methodology includes the process of data collection and presentation. The database for the study area is prepared on the basicprimary and secondary information. The outputs of the study depend on basic information of the city level background. Information and data elaborate of the municipal service delivery in the Satara city. Present research work has been carried out with the help of following principal primary and secondary data sources, viz.

1) Maps, Statistics and available written literature.
2) Observations and interviews.
3) Internet based data.
4) Administrative data getting in the region under study.

Existing solid waste management of Satara city:

This solid waste management study is about various functional phases of solid waste management system in Satara city. Solid waste is generated from various human activities. Solid waste generation creates complex problems in the city. In order to carry out solid waste management work successfully, it needs to be thoroughly planned by eliminating the underlying problems.All the work in solid waste management is based on the following major functional stages. The correlation between them is shown in Figure 1.2 below.

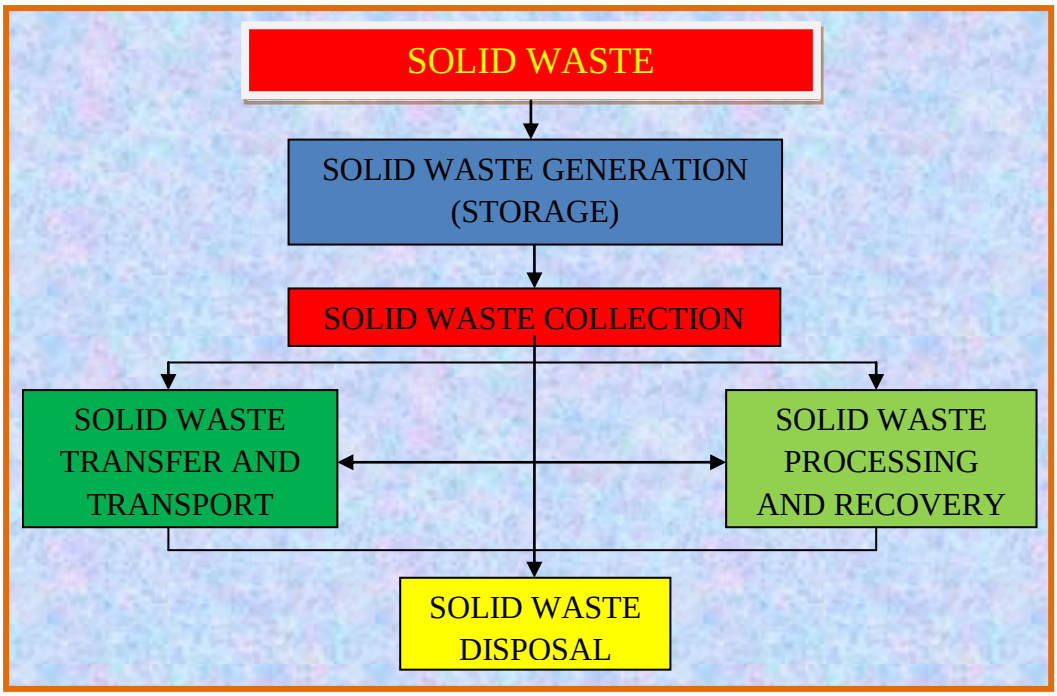

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Figure 1.2: Functional stages of solid waste management.

1) Generation of solid Waste:

As per 2019-20 Satara Municipa Council record,generally total solid waste production in the municipal area of Satara city is about 70 metric tons per day.In the Satara city domestic waste, commercial wastes (hotels, restaurants, market, other functions), industrial waste, bio-medical waste, E-waste, hazardous waste this verious types of wastes generated. In general, wards 8, 14, 19 and 39 of Satara city have the highest population and solid waste generation is also on the rise.Waste composition is the different influencing factors or contains includes degradable, non-degradable organic and fossil carbons. Foodwaste, garden and park waste, paper, cardboard, wood, textiles these types of waste contain mostly includes in degradable solid waste. Besides plastics, some textiles, leather, rubber, electronic wastes includes in undegradable solid wastes. Of these, degradable solid waste contains 40 to 85% organic waste matter while non-degradable solid waste contains high availability of plastic components.A review of solid waste generation in Satara city shows that the solid waste generation rate in Satara city is generally 0.46 kg/per capita/per day. This ratio is based on population availability.

2) Collection of Solid Waste:

Solid waste from Satara city is also regularly collected from the citizens' gates six days a week. A total of 40 auto tippers have been arranged to collect this solid waste. An auto tipper is provided for solid waste collection for each ward in the city. Averagely, one auto tipper is collect 1000 households solid wastes per day also. This collected solid waste is collected daily at the dump yard at Songaon. There, the trip made by each auto tipper is recorded in the register. The Satara Municipal Council has awarded contracts to Yashashri Enterprises Satara and Sai-Ganesh Enterprises Satara on a private basis for solid waste collection.As per 2019-20 Satara Municipa Council record, the average solid waste generated in Satara city is 51 MT per day, hazardous waste 9 MT, E-waste 9 MT and Bio-medical waste 390 Kg per day.Analytical frame work is shown in figure no. 1.3 related to solid waste collection. According to modern thinking solid waste management rules 2016, permanent waste bins are not kept in Satara city because of the stench that is generated. However, the temporary waste bin is kept at the market yard in the city as it is a weekly market only on Sundays. Besides some Rag pickers are helping for solid waste collection process.Now a day's Rag pickers are contributing indirectly the municipal service of solid waste

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management. E-waste and Hazardous waste in Satara city is not collected by the Municipal Council.

3) Transportation of Solid Waste:

There are a total of 39 wards in Satara city. A total of 40 auto tippers have been arranged to transport the collected solid waste. Garbage collected from each of these wards is transported to the dumping ground at Songaon with the help of auto tipper. Songaon transfer station of solid waste is away far is 15 km from Satara city. Transfer stations or dumping grounds designed to process solid waste are far from the city.There are many difficulties in transporting solid waste. E.g. Very small roads in the city, traffic jams, bad roads, etc.

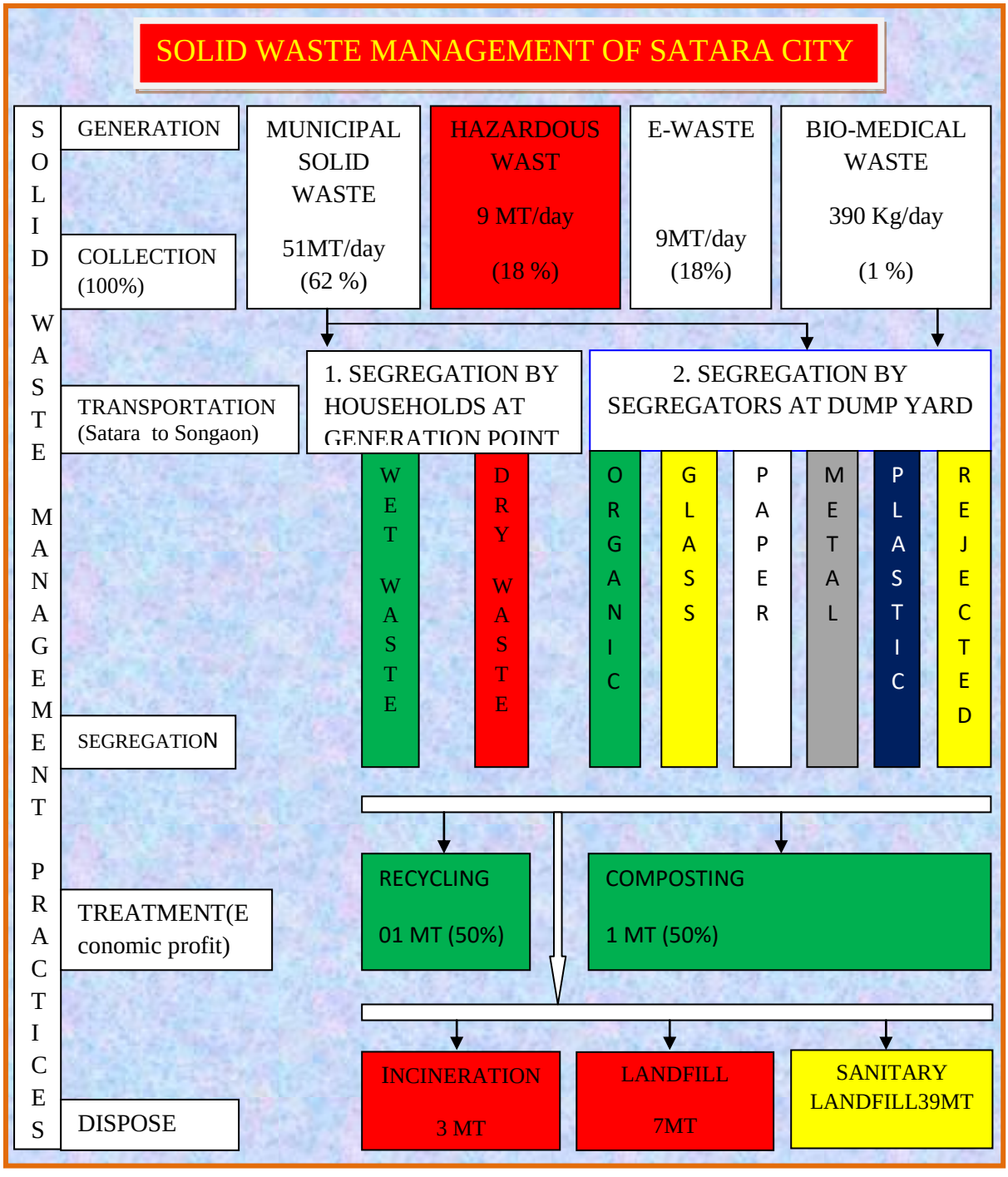

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Figure 1.3: A framework of Solid waste management of Satara city.

4) Segregation of Solid Waste:

Segregation of solid waste is essential process of solid waste management. Waste segregation is called a process of waste dividing into wet and dry. **Paper, cardboard, plastics, metals, textiles, wood, rubber, glass, and other types wastes includes in dry waste.** Some organic waste includes in wet waste. A waste segregation process is divided into two parts. In the **first part** of waste segregation house holders are segregate of waste at the waste generation source. Wet and dry wastes are segregate at home in separate bins provided by Municipal Corporation. Wet waste collected in **green** bin which is includes all type of biodegradable wastes. Dry waste collected in **red** bin which is includes plastics, glass, paper, cardboard, scrap materials etc. Municipal council of Satara city area dustbins has provided some householders by corporation. Householders are waste segregate bins wise. They are helps for the process of waste segregation. Besides, in the **second part** of waste segregation, Municipal Corporation waste segregators are segregate all type of collected solid waste at transfer station or dump yard. There were collected renewable, recyclable, biodegradable and disposal solid waste is segregated dustbin wise. All segregated solid waste is classified into following color coding waste bins.

Sr. No.	Waste Bin Color	Waste materials
1	Green	Organic materials
2	Yellow	Glass
3	White	Paper
4	Grey	Metal
5	Blue	Plastic waste
6	Red	Hazard waste

Some biodegradable solid waste is can be dispose for composting. Paper, plastic metal, glass, wood, food wastes are recycling wastes. Some reusable or recycled waste is useful for recreation. Recycling waste makes to energy activities. Some discarded waste is useful for land filling. So, the process of waste segregation is essential for solid waste management.Only municipal solid waste and bio-medical waste can be segregated at Songaon waste dumping ground.

5) Treatment of Solid Waste:

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A dumping ground has been set up at Songaon to process solid waste. A total of 204 workers are involved in this dumping ground for solid waste management. The solid waste that comes after the segregation process is processed here. The solid waste management work at Songaon is carried out by a private operator. Currently, the total bio-medical waste collection in the city is 390 kg per day.There is also a bio-medical waste treatment plant. This plant is completely detached.The operation capacity of this treatment plant is 1000 kg per day.Recyclable and bio-digradable solid waste is used for recycling. Plastic, paper, metals etc. are processed by Recover and Recycling. Generally 1 MT of recyclable solid waste is segregated per day. So compost is made from bio-digradable solid waste. Total of 1 MT of solid waste is used for composting daily.

6) Dispose of Solid Waste:

Rejected solid waste is disposed of in a scientific manner. Generally, various methods like land filling, incineration, open dump are used for disposal of solid waste. Incenration methods are used for disposal of rejected and hazardous solid waste in Satara city. However, since the incenration method is defective, it should not be used excessively. This causes more air pollution. Generally 3 metric tons of solid waste is incinerated daily. Today, the scientific method of sanitary landfill is being used more and more for the disposal of solid waste.The rest of the rejected solid waste is disposed of through Sanitary landfill. Sanitary landfill is a modern engineered method used for disposal of solid waste without any nuisances and safety for living health and ground water. Apart from this, land filling and open dumping methods are used for solid waste disposal. Municipal solid waste is used to preferably treat because this waste is basically bio-degradable.E-waste is sent to Maharashtra Pollution Control Board authorized preprocessor. Hazardous waste is scientifically disposed through CHWTSDF-Maharashtra Enviro Power Ltd., MIDC Ranjangaon, Pune.

Suggestions for better solid waste management of Satara city:

Satara Municipal Council is successfully fulfilling its responsibility of managing the entire solid waste in Satara city. Although the solid waste management system seems to be operating at full capacity, some important suggestions need to be followed to make the waste management system more robust in the future.

- It is necessary to formulate a plan of action to solve the problem of solid waste management in Satara city permanently. Such long term plan should be prepared by Satara Municipal Council and its implementation should be done.

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- Awareness about the consequences of solid waste should be created among the citizens of Satara city. Feelings of helplessness among most residents need to be addressed.
- Satara Municipal Council should handle the problem of solid waste management in the city in a good manner, for which strong planning should be done. At present, work is being done on the principle of 'no profit no loss'. Every effort should be made to ensure that the solid waste management system works to its advantage in the future.
- Modern technology should be used to make solid waste management ideal. Assistance should be sought to create a sustainable urban environment through GIS. Environmentally friendly solid waste management needs to be done using scientific methods.
- Municipal officials should have in-depth knowledge about how the solid waste management system works responsibly. There needs to be a participatory discussion to solve the waste problem in the city as well as to have a holistic discussion on the related issue.
- A special inspector should be appointed to coordinate the solid waste management process.
- The incinration method is most commonly used for solid waste disposal. So the environmental situation can be endangered. Therefore, most of the scientific methods need to be used in solid waste management processes. Eg. Sanitary landfill.

Conclusion:

In modern times the city generates solid waste in a variety of ways. The process of solid waste generation and its management is more complicated.Solid waste management in urban areas requires various operational stages such as solid waste generation, collection, transportation, segregation, treatment and its disposal.Today, solid waste management needs to be done in a scientific manner to create a sustainable urban environment. A thorough review of the solid waste management system in Satara city shows that the solid waste management system in Satara is being carried out at full efficiency. But there are still some important issues to be aware of. Effective planning needs to be done keeping in view the future situation to overcome the problems arising in the solid waste management system.There is no doubt that solid waste management in Satara city will be more robust based on modern technology.

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