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## Landfill Management At Gokhivare Dumping Ground.

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**Abstract :** Solid waste generation is increasing day by day because of rapid urbanization, industrialization and population growth. Handling and disposing of Solid Waste is one of the major problems which is being faced by all over the world. In various metro cities of India mixed waste is directly disposed, without any treatment, to unscientific open dumping sites that increases environmental pollution and also poses risk to human health, ground water and soil quality. Vasai-Virar city is no exception for the unscientific disposal at landfill. The requisite improvement in the condition of the disposal of waste management is not feasible due to lack of awareness among the stakeholders, waste workers, sanitary staff etc. Also, less priority is given to the budget towards solid waste management especially at the disposal sites. In this paper we have studied disposal management at landfill site in Vasai-Virar city. The aim of project is to study and analyse the management system at Gokhivare dumping ground which is the only one landfill site in Vasai-Virar region under controlled of Vasai-Virar City Municipal Corporation. On the basis of obtained data suggest solid recommendations or solutions to minimize the worst impact on socio-economic factors as well as to reduce the waste dumped from vary long time. The paper delivers review on the method of protecting environment from unsanitary, unscientific disposal method i.e., Bio-Remediation. We apply this method at Gokhivare dumping site to check its suitability and feasibility. However accurate planning is required to execute this method on huge scale so the landfill get some relief from reaching to the ultimate capacity at earlier stage.

**Keywords -** Impacts on Socio-Economic and Environmental Factor, Landfill Management, Bio-remediation, Municipal Solid Waste Disposal Management, Unscientific Disposal.

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### I. INTRODUCTION

The population in the cities which are located near metropolitan city like Mumbai has been continuously rise day by day due to increase in the increase in the property values, complexities, rich life-style. Vasai Virar is a part of Thane district located to north of Greater Mumbai. The Vasai-Virar City Municipal Corporation (VVMC) is a local civic authority provides basic services of sanitation and maintaining health regulation through the city. The rapid urbanization and Industrialization in Vasai-Virar City region has led to rapid increase in the production and consumption process resulting in the large huge of waste. Population of the city is around 15 to 20 lacs generates around 800 metric tonnes of waste daily. Out of which around 700-750 metric tons of municipal solid waste is directly sent for disposal at landfill site under VVMC located at the Gokhivare village, Vasai (E).

The landfill site is also known as dumping ground which provides space for the disposal of waste. The landfill is basically of two types, Sanitary landfill for the disposal of non-hazardous, municipal solid waste. Another type is Secured landfill where waste of categories like toxic, contaminated, hazardous coming from various industries, electronic appliances is disposed. At landfill site various methods of disposal of waste are applied like open dumping of waste in form of piles of waste, trenching in trenches or natural depression of ground.

The space for Gokhivare landfill site was acquired by considering the waste quantity of 200-500 metric tonnes of waste daily. But due to rapid growth in generation of waste the load on current solid waste management system is to much increased. The total area provided for dumping purpose is around 48 acres. Some of the area is encroached by the people. Hence, there is serious issue in front of the managing authority about disposal of continuously increasing the waste in a particular accessible area.

At Gokhivare landfill site municipal solid waste is disposed by adopting open dumping method. The waste is directly dumped without any type of segregation. Unscientific dumping on open piece of land creates impacts on various socio-economic, environmental values of that particular area. The points are public health, property value, source of revenue, soil pollution due to leachate generation, air pollution due to greenhouse. gases emission etc.

People residing near the landfill sites having many health-related issues. During rainy season the landfill sites becomes a breeding place for many diseases causing vectors like mosquitoes, Cockroaches, rats etc. Peoples were suffered with many issues related to Respirational tract infection, Asthma (specially new born babies and senior citizens). About half of an area is encroached by the population. They built permanent houses over there under the support of local leaders from various fields, and it became a burden on future expansion of dumping sites and total use of acquired land. Landfill site is become a source of daily livelihood of people mainly of around 130 rag pickers family, kabadiwalas, various dealers, equipment's operators, site operators.

Open dumping disposal in unscientific way causes many adverse effects on surrounding environment. Municipal solid waste is directly dumped without any treatment to it. Leachate generated after decomposition is percolated in ground polluting ground water table, it contaminates soil. During precipitation leachate is flow on the ground and coming on the road, near area. Greenhouse gases emission causes contribution to the greenhouse gases. Methane generation causes continue fire breakdown problem. Fire breakdown degrades the surrounding air quality. Atmosphere is filled with smog and particulate matter.

To protect the surrounding environmental conditions from pollution generated from waste disposal site Bio-remediation, Bio-mining method can be adopted. Bio-remediation is basically a method in which an old waste is reused using principal of composting with help of some bio culture. In Bio-mining old legacy waste is excavated and metal for economical purpose is obtained with help of micro-bacteria.



**Fig -1: - Actual Site situation**

## **II. METHODOLOGY**

### **1. Collection of Primary Data**

- The methods which adopted for data collection are as follows:

#### **a) Survey**

- The survey will be conducted to obtain data regarding various social, economic, and environmental factors affected by landfill sites.

b) Interview

- By interview method information will be collected from personnel engaged in policy making, law enforcing, solid waste management and handling and general public, stake holders regarding waste handling and management and abatement pollution.

c) Observation

- By observing data both quantitative and qualitative will be obtained on present landfill management.

2. Collection of secondary data

It includes the following points: -

- Present social, economic, environmental status
- Map of study area
- For city location, population data, details about landfill sites.

## METHODOLOGY FOR BIO-REMEDIATION

1) Selection of waste: -

We excavated the waste sample from old waste hills with help of JCB at Gokhivare dumping ground. The waste we selected was having old legacy.

2) Removal of very large particles: -

We spread the waste on the ground and picking the very large particles like large clothes, boulders, glass bottles, metal pieces etc. and kept it aside.

3) Spraying of Bio-culture: -

After removal of large particles which may causes injury to us while handling, we sprayed a Bio-culture on the spread waste. We prepared bio-culture using 5% cow dung in 1 litre of water. We can use various bio-chemicals, micro bacterial solutions to enhance decomposing activity.

4) Making windrows: -

We made a windrow of spread waste of size 2 m using shovel and JCB.

5) Turning of windrows: -

We turned the windrows after every 3 to 4 days interval to introduce aerobic activity in the bio-remediation waste. During every turning we sprayed the bio-culture on it.

6) Segregation of waste: -

After span of 20 days, complete heat was going out from the windrows. We segregated the waste heap with help of trommel machine. In trommel machine there are many screens of varying sizes like 100mm, 75mm, 25mm etc. Trommel machine separates plastic from waste, large particle (including coconut shells, cloths, aggregates, tiles, wooden pieces, leather, glass pieces etc.). Remaining residue contain earth like inert material having fine composition with dark brownish black colour.

7) Reuse of materials: -

Plastic that we obtained from the old waste heap was sold out to the local kabadiwalas who are linked with many constructions material, bitumen and other types of industries. Other source that we obtained was coconut shell and glass bottles, glass pieces which both were sold out to the kabadiwalas. Coconut shell and wooden pieces were used as fuel in furnaces of glass and other industries. Boulders, aggregates and other construction debris material that we obtained were given to the nearly construction sites where they used it as filling material. The major source having composition like soil contains semi compost (inert materials) which can be used for public gardens, ground. It can be used as manure if it is not contaminated (i.e., heavy toxic elements within limits).

8) Tests on semi compost materials: -

- i) NPK test to determine its composition like Nitrogen, Phosphorous, Potassium, PH, and total organic content which helps to determine is it worth to use it for gardening purpose.
- ii) Test to determine heavy elements like Mercury, Lead, Boron, Arsenic which will helps to determine is it safe or not to use as manure.

### III. RESULTS

Observations table: -

Sr. No.	Days	Observations
1	1 <sup>st</sup>	Waste sample is characterised by bad odour, major quantity is of light brown-greyish colour
2	4 <sup>th</sup>	No remarkable changes, experiences putrescible odour
3	8 <sup>th</sup>	No remarkable changes, experiences less odour as compared to previous one.
4	13 <sup>th</sup>	Decomposition of organic matter like dried leaves, wooden pieces, coconut husk is started.
5	18 <sup>th</sup>	Windrows are free from bad smell, some volume of it getting reduced
6	24 <sup>th</sup>	Light brown colour of waste sample is turns to slight darker shed. Inorganic materials start too visible
7	32 <sup>th</sup>	Volume of waste is getting reduced slightly. Most of the part of waste is turned into dark brown colour

Table 2: - Calculation of cost involved

Sr. No.	Description of items	Cost involved (RS.)
1	Expenses	50
	1) Excavation, transportation and windrow formation	
	2) Manpower Cost	20
	3) Transportation and screening	20
	4) Removal of C&D, inert material	30

2	Income	
	1) Selling of plastic, polymer materials (20 Rs per kg)	50
	2) Glass bottles, metals (2 Rs per unit)	8
	Total (Income- Expenses)	-62

Table 3: -Contaminants tests result: - (Heavy metals in semi-compost material)

Parameters	Observed Value (mg/kg)	Range (IS Code) (mg/Kg)
Lead	3.3	2-100
Arsenic	0.5	< 3.6
Mercury	0.013	0.01-0.3
Cadmium	0.03	0.01-0.7

Table 4: - NPK test result

Element	Symbol	Requirement by plant (mg/ Kg)	Required percentage	Observed value (percentage)
Nitrogen	N	15000	1.5	1.8
Phosphorous	P	2000	0.2	0.2
Potassium	K	10000	1.0	1.2

### III. CONCLUSION

The whole disposal management of solid waste management is studied through various socio-economic, environmental point of view. The entire conclusion is made on the basis of the field visit and discussion with the people who are directly attached to the disposal unit at Gokhivare dumping ground. The municipal solid waste which is collected through dumpers, tippers and compactor unit is directly emptied at dumping site without any segregation. Waste is dumped without any treatment in unscientific manner causes adverse effect on various socio-economic, environmental values of that place. Landfill site is required to convert into engineered landfill. Also, management authority facing problem like lack of space due to public encroachment. To protect the socio-economic factors from adverse effects of pollution due to landfill bio-remediation is the best method. From results

that we obtained from practical performed on small scale at Gokhivare dumping ground, it is feasible and suitable to the old legacy waste. The semi compost of inert characteristics is safe for disposed at any place and can be used for soil conditioner in public gardens, soil cover, even in agricultural field (inspection about heavy metals is necessary when it use in agricultural farms). This method generates some revenue also. By following Bio-remediation on large scale with proper planning and careful management the issue of unsegregated old waste from Gokhivare site can be minimised. Indirectly, it will help to reduce worst effect on socio-economic, environmental factors due to unscientific dumping.

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