WASTE MANAGEMENT SYSTEM AND PROBLEMS OF VARANASI MUNICIPAL CORPORATION AREA, VARANSI, UTTARPRADESH

Abstract

Municipal solid waste management is one of the major problems of municipalities. It involves huge costs as well as technical political, legal, socio-cultural, environmental and economic issues. So the waste management system is very complex. Improper management of MSW is a growing concern for cities in developing countries, so proper management is imperative and this is where the importance of sustainable waste management is essential. In India still more than 90% of MSW is directly disposed unscientifically on land (Singh. RS, 2017). This paper deals with the case study of municipal solid waste and its sustainable management in Varanasi city. Varanasi city is the cultural and religious capital of India and a tourist spot of International reputation which needs to develop an appropriate strategy to manage its waste effectively. The main objective of this paper is to give an overview of the phases of waste management, as well as some suggestions for waste minimization, recycling, energy recovery and disposal. Through which sustainable waste management is achieved. Sustainable waste management meaning to the collection, transit, evaluation and disposal of various types of waste, in a manner which is not harmful to the environment, human health or future generations. It creates employment, improves waste management practices, recycles products, uses alternative energy sources, and reduces the negative impact of waste on the environment and people through treatment, thereby improving air and water quality. Sustainable waste management aims to

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keep materials in use as long as possible, reduced the consumptions of natural resource, produce minimal waste of natural resource and minimize the amount of solid waste disposed of through landfills or incineration. It is the duty for all of us to preserve our environment for our future generations. So, we have to maintain the concept of sustainability.

Keywords: Solid Waste, MSW, Circular Economy, Varanasi Municipal Corporation, Sustainable Development

I. INTRODUCTION

Sustainable waste management refers eradicate pollution and waste, circulate goods and commodities, and revitalize the nature. In short it is the concept of the circular economy and offers many possibility and benefits for our environment, economy and society. The generation of municipal solid waste in our country is associated with a proportional relationship with economic development, urbanization and rapid population growth. In India, waste materials are divided into three categories; Municipal solid waste (MSW), bio-medical waste and hazardous waste. According to the Municipal Solid Waste Rules, every municipality authority is to be responsible for gathering, segregation, storage, transportation, processing and disposal of municipal solid waste. Now a days the problem is exacerbated by lack of financial and human resources trained in solid waste management practices in terms of collection, transportation, processing and final disposal. On the other hand subjects like recycling; reuse and recovery of solid waste are mostly unorganized (Rai, V.K 2017). Varanasi city is India‘s oldest city encircled by the three Rivers Ganga in the east, Varuna (Varna) in the north and Assi in the south. Actually the name Varanasi, which was derived from the two tributaries of the holy River Ganga named Varuna (Varna) and Assi. Varanasi city is an important urban area of Varanasi district of eastern Uttar Pradesh. Geographical location of the city in between 25^0 15’ to 25 °23.5’ North latitude, 82°57’ to 83°1’ East longitude and it covers an area more than 83 sq km and divided in to 90 Wards and 14 sanitary Ward. The current estimated population of Varanasi Municipal Corporation is 1,652,000 in 2023. Rapid and unplanned urbanization and economic development, huge tourist influx has put a lot of pressure on the city's dilapidated sanitary infrastructure resulting in dire effects on the city's sewage system infrastructure resulting in unsanitary conditions across the city (Draft City Sanitation Plan- August-2011). Waste quantity of the city is 452 TDP and waste generation rate is kg/c/day (CPHEEO, 2014). City sanitation and MSW collection and disposal manage through the Nagar Nigam, Varanasi. There are 26 depots are available in the city to deposit these waste. From here the waste is later loaded to various disposal sites where the waste is disposed of such as open dumping grounds, some distance from the city and adjacent to the river Ganga. The dumping grounds in Varanasi are not engineered sanitary landfills, which generate foul-smelling gases and leachate and may cause of soil and water related problems.

II. SIGNIFICANCE OF THE STUDY

Municipal solid waste is a heterogeneous in nature and composition as well as varied from place to place. Intensify in population growth as well as Rapid economic growth and jump up in living standard of people accelerated the rate of municipal solid waste. Waste management is essential because it reduced the toxic effects of biodegradable materials and protects us from biohazards and reduced adverse effect on our environment and resource. Its importance is so great that WHO (1950) has been studying environmental consequences and health issues considering aspects like drinking water supply, wastewater treatment, solid waste management, vector borne disease control, etc. (Rai,2017). Solid waste management is an integral part of the urban environment. It is an important issue for promoting sustainable economic growth and ensuring a healthy and safe environment.

III. OBJECTIVES OF THE STUDY

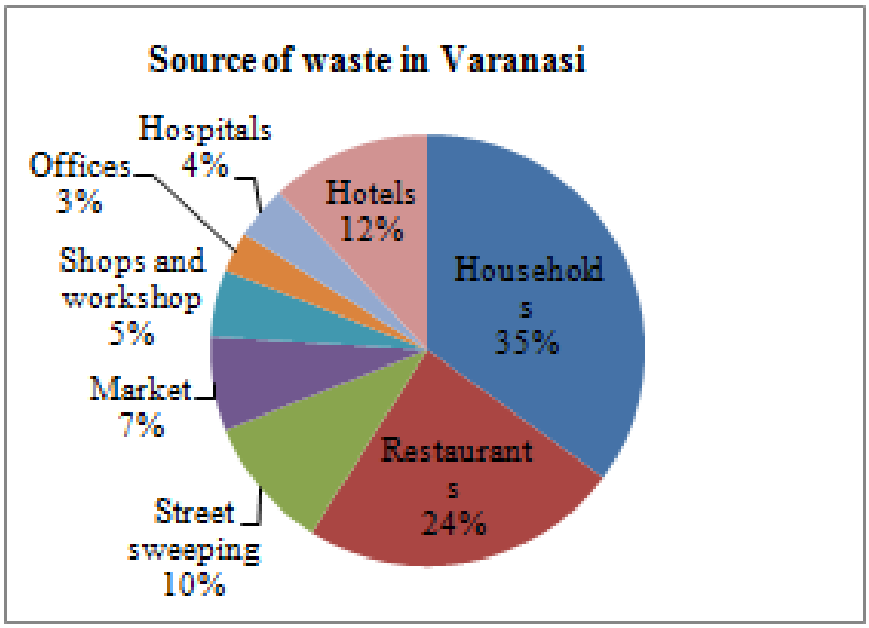
1. Asses quantitative and qualitative characteristics of Varanasi city MSW.
2. Understand the present situation and challenges lying sustainable waste management in Varanasi City.
3. Proposal of solid waste material system for Varanasi city.

IV. SOLID WASTE MANAGEMENT SYSTEM OF VARANASI MUNICIPALITY CORPORATION

Door-to-door waste collection system is not observed in all parts of the city in Varanasi. The public throws their waste on the streets which is then collected by sanitation workers. The total waste generated in the city is 600 MT per day at 0.46 kg per capita (Agarwal.A, 2020).

Sources of waste	Percentage
Households	35
Restaurants	24
Street sweeping	10
Market	7
Shops and workshop	5
Offices	3
Hospitals	4
Hotels	12
Total	100

(**Source:** Singh .S.R,2017)



V. THE COMPOSITION OF WASTE

In Varanasi 51% is biodegradable, 34% includes inert waste and rest 15% is recyclable waste. Among34% of inert waste is coming from construction field. Among the 15% of recyclable waste 33% is paper waste, polythene is 25%, plastic is 17%, metals are 16% and glass is 9%. Biodegradable waste consists of 46% of food waste, 18% of flower waste, leaves are 13% and others are 23 % (kumar.V, 2021)

Type of Composition	Percentage
Biodegradable	51
Recycleable waste	15
Inert waste	34

Source: Kumar.V at al ,2021

From the data of VMC it is clear that Total household served with day to day collection is 0 % and Total waste generation is 600 TPD, Total waste collected 480 TPD, Total number of dustbins 373 5 Total numbers of vehicles 1000 and Frequency of collection (trips/day) 2-3 and No. of sweepers 2800.

VI. COLLECTION WASTE

In Varanasi city, household waste is collected by 2100 permanent sweepers from community bins or collected from roadside areas. Such collection is called primary collection.

Collection of waste materials from designated collection points of the municipality and transport to the final disposal site is called secondary collection. Manually loaded dumpers, fixed containers are used in this phase along with mechanically loaded dumper systems.

VII. STORAGE WASTE

Varanasi has provided 36 depots for temporary storage of MSW waste, which are scattered across the city. Collection vehicles such as tricycles, handcarts and tractors bring the waste collected to the nearest depots. Depots are in some cases three-sided enclosures located along a narrow winding road in a densely populated area. Unfortunately, only 38% of depots are in good condition. The rest of the depots are in very poor condition, with no wall or open depots accounting for around 16% (VMC, 2011).

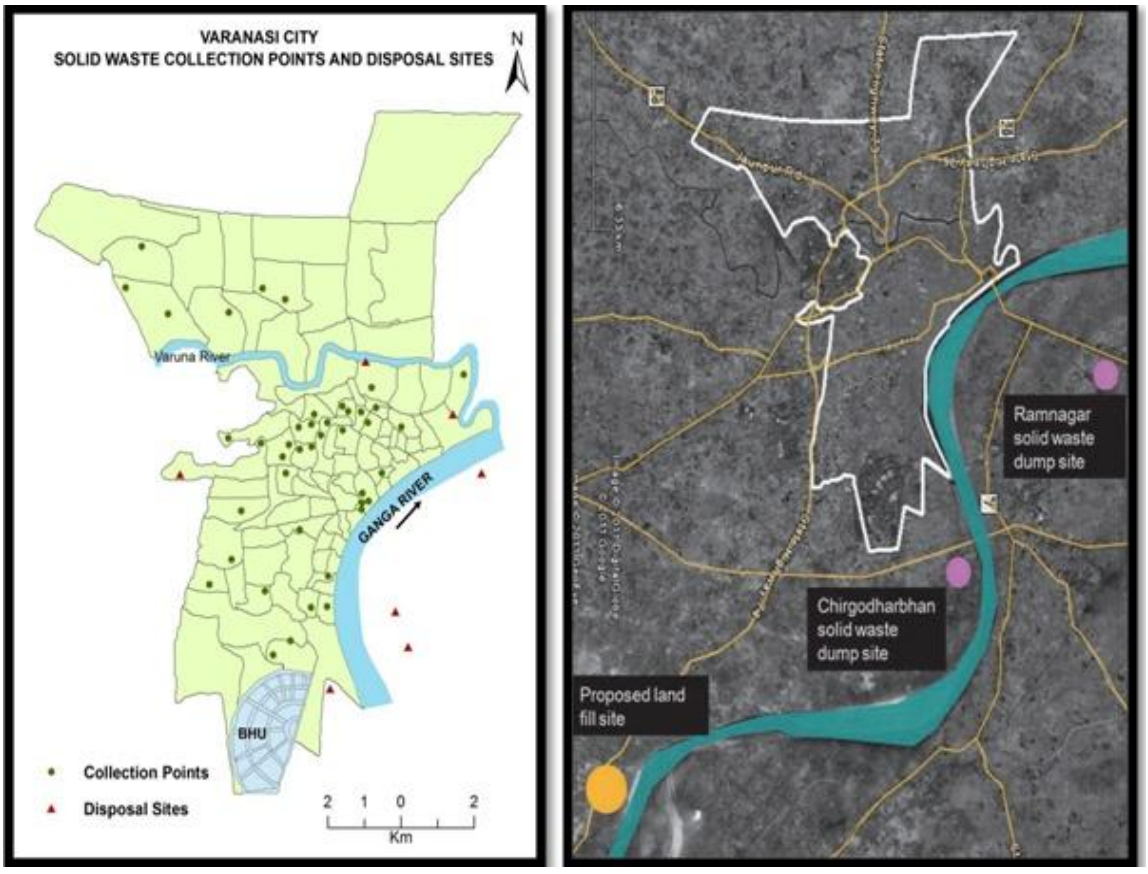
VIII. DISPOSAL WASTE

Municipal solid waste is sent to Karsada and Bhawania sewage treatment plants (City sanitation plane 2015). Where solid waste is disposed of through engineered methods designed with modern technology in a strictly scientific manner. But according to city sanitation 2011 plane there is no waste disposal site that has been used by VMC for more than 10 years. VMC continues to dump waste whenever it finds an empty space. There were

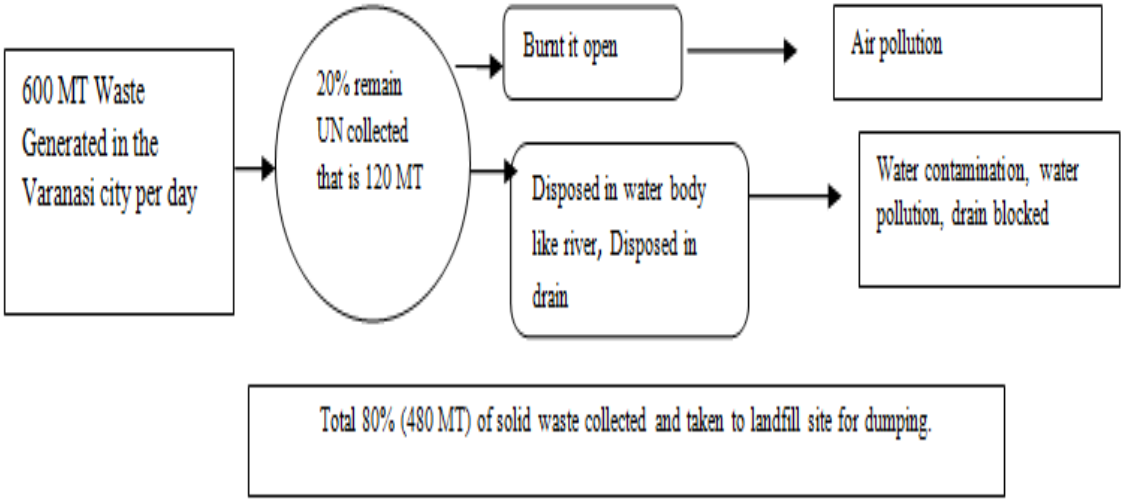
three final waste disposal sites, which are now abandoned. These sites were located near Palang Shaheed (10 acres), Nakki Ghat (2 acres) and near Kabir Math (1 acre). The two existing waste disposal sites are one at Ramnagar Road near Mughal Sarai and the other at Sear Govardhan south of Varanasi.

IX. MSW COLLECTION VEHICLES VNN

Particular	Numbers
Truck tippers	12
compactor	35
Tricycle	800
JCB	13
Tata Ace	150
Hand carts	1000



Map Source:
1. Rai, V. K.1017, PP97. 2. Source: City Development Plan for Varanasi 2041



Waste generation is compounded on the day after certain festivals. Morning after Dev Diwali 1081.2 T, Mahashivratri-763.2 T, Ram Leela-655.08 T, Holi-763.2 T, Sankranti on the occasion of Makar-699.6 T, Shravan month 826.8 T, 699T, Rangvari Ekadashi-699.6 T, , Diwali-795 T , Buddha Mohotsava-667.8 T, and Ganga Dussehra-826.8 T(Kumar. V,2021).

X. FINDINGS

The current status of SWM in Varanasi is considered unsatisfactory as the best and most applicable methods from waste collection to disposal are yet to be used. Qualified and trained waste management professional staff is limited and lack of SWM training is also evident among the public. An important negative point here is that bio-medical waste along with municipal solid waste is also disposed of at this site. There is also no monitoring process at the dumping site

1. Ordinary local residents are somewhat apathetic towards waste material and they are not fully cooperating with the responsible authorities. Such situations arise due to lack of awareness and no strict punitive penal laws against waste.

2. On the other hand municipal workers are also not aware of the specific waste management guidelines issued by the government in many cases irresponsibility among workers lack of accountability and willpower is one of the major concerns.

3. Inadequate funding to update data is also a problem which hinders proper planning. Due to lack of budget it is difficult to cover the cost of developing systemic wastes management. Within the tight budget waste collection, storage, treatment and disposal impossible in many cases. The vehicles are not covered resulting in spread of foul smell.

4. Open dumping along roadsides and in populated areas causes' environmental and visual pollution. Due to lack of segregation system, 80% of domestic hazardous waste is biodegradable waste

XI. SOLUTIONS AND SUGGESTION

A day to day collection and home composter can be introduced with segregation at household level or at source with dual bin systems. To create social awareness among people about the importance of waste source segregation.

Introduction of decentralized waste management system. Leadership for waste management systems requires from local community and participation and expert advice.

Recycling of flower waste within the temple complex and plastic bags may be banned within the city.SWM requires integration of rag pickers and community participation with expert advice.

To move towards zero waste management, the first step is to reduce, minimize (i.e. reduce) the discharge of waste as well as maximize the reuse, recycling and recovery of waste to maximize resource recovery from waste. Zero-waste means 10% waste reduction will contribute towards sustainability. Cycle of use, reuse, repair and recycling it ends when it is destroyed.

Municipalities need to organize regular training for SWM staff and create awareness among the public.

XII. CONCLUDING REMARKS

The main problem in Varanasi city was lack of public participation and awareness about waste and its recycling management. Lack of development of engineered landfills and lack of availability of appropriately trained personnel limits the use of waste-to-energy, fertilizer production or resource recycling. Ensuring maximum resource extraction from mass waste, ensuring safe disposal of residual waste. Varanasi's current solid waste management system has room for improvement although finding gaps and inefficiencies in SWM planning is a difficult task in a dynamic religious city.

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