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## Assessment of Municipal Solid Waste Management System in Agra City

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### Abstract:

*Municipal solid waste management (MSWM) is one of the major environmental problems of Indian cities. The present investigation is a case study of Agra, the main metropolis in Northern India, which succumbs to a major problem of municipal solid waste and its management. An solid waste management is defined as the discipline associated with the control of generation, storage, collection, transfer, transport processing and disposal of solid waste in a manner that is in accord with best principles of public health, economic engineering, conservation, aesthetic and other environmental consideration that is also responsible to public attitude. The fact sheet seeks to assess the solid waste disposal (SWD) situation in Agra and to identify prospect for improvement focusing on remediation of dump sites and sanitary land filled. Problem with in discriminate dumping increasing difficulty with acquiring suitable disposal sites. Solid waste management demonstrates self-sustaining modern management of municipal solid waste through maximum collection, landfill designing and cost estimation.*

**Keyword:** Municipal solid waste, environmental, management, self-sustaining, landfill designing.

## INTRODUCTION

The environmental pollutions of any urban center is the logical outgrowth and management of solid waste generations and its proper disposal. With the rapid increase of population, the magnitude of solid waste generations has been witnessed in all the cities, if it is properly disposed of with a scientific mechanism, the degree of environmental pollution is insignificantly realized and vice versa. Solid Waste is derived from the discarded material, modern, business, mining, or farming tasks and from community exercises. It's nothing new, but another marvel and dates back to the initiation of human progress itself. The issue has come to a disturbing dimension because even by practicing recycling procedures, recovery and reuse can't cope up with the ever-increasing generation of solid waste. Due to the improper disposal, solid waste has become a severe urban environmental issue, as it is affected by our day to day activities. In urban areas it has become the cause of various diseases and has pose threat to human health (Somani et al., 2019). Due to the ill management of urban waste, it could be seen at every nook and corner and thus harms the environment (Sharholy et al., 2008). It has been seen that 90 per cent of municipal solid waste is left accumulated due to unscientific disposal methods creating a menace to the inhabitants (Sharholy et al., 2008). Non-liquid material comes under the category of solid waste; it arises from commercial, domestic, industrial, agricultural, trade, and industrial activities. It is known by various names such as refuse, rubbish or trash, and garbage. Waste could be inert or biodegradable, highly combustible, or compostable based on the percentage of the contents (Biswas, 2018). As reported by the WHO, waste is the substance discarded from the houses and streets due to sweeping and other activities.

## OBJECTIVES

The objectives of the present research are to assess the solid wastegeneration, collection, and disposal by identifying the disposal sites.

## METHODOLOGY

The methodological principles adopted for the analysis of solid waste generation, management, collection, and disposal is based on qualitative and quantitative techniques. The primary and secondary sources of data have been used. Secondary data has been collected from the Environment Department of Nagar Nigam Agra. Primary data has been collected from a field survey through interviews with the help of questionnaires. The field survey has been done in the year 2017-2018. Obtained data from secondary and primary sources were analyzed through the

statistical technique using percentage and collection efficiency. Visual presentations of the data has been shown by the charts, graphs, and maps.

### **SOURCES OF SOLID WASTE GENERATION IN AGRA CITY**

Solid waste is generated in the city from different sources; these include residential, commercial, industrial, etc. It has been seen that city generates about 924 Metric Tons of waste every day or 337,260 metric tons of solid waste per year (ANN, 2017) but it is tough to demarcate residential and commercial areas from each other as they are found to be mixed in their urban land use; hence the measurement of generated waste becomes quite tricky. The primary sources of waste generation could be summarized in the following categories:

**Domestic Waste:** comprises trash from houses like cooking material, Vegetable and fruit peels, other organic matter, rubbish, and garbage.

**Commercial waste:** recyclable matter like paper, plastic, packaging waste, etc.

**Hospital Waste:** needles, syringes, cotton gauzes, plaster, waste from the wards, etc.

**Construction and building wastes:** concrete, dust, bricks, stones, wood, earth, asphalt, glass, stones, etc.

**Street Sweeping:** leaves, litters, fine dust, ash, silt, fine earth, etc.

**Industrial waste:** chemical waste, including toxic waste, leather waste, oil- soaked rags, thermoplastic waste, etc.

### **STATUS OF SOLID WASTE IN AGRA CITY**

Excessive Solid waste generation in Agra city is the result of the rapid growth of the population. The primary sources of solid waste generation in the city are domestic, commercial, industrial, and hospitals, i.e., an essential source of bio-medical wastes. The nature of solid waste varies with the areas, i.e., in residential areas; food material, vegetable waste, house sweeping, paper, plastic, polythene bags, ashes, packaging material, etc. are found in considerable amount. Industrial areas comprise of main chemicals, rubber, leather, glass, metals, etc. and in commercial areas, the main concentration is of food matter, demolition and construction material, papers and packaging materials, bottles, and plastic. So the diverse kind of solid wastes has been generated

in the city. Agra Nagar Nigam is responsible for managing the collection, transportation, and disposal of solid waste within the city municipal boundaries. Solid Waste Management comes under the supervision of the city Executive Officer. The health department takes up the responsibility to develop civil infrastructure and implementation of the solid waste management plan. The Nagar Swasth Adhikari assists the city executive officer in the daily functioning of the organization. The divided sanitary wards have their respective sanitary inspectors to look after the management of fleet routes, collection procedures, street sweepings, and work allocation of safai-karamcharis.

#### Quantity of Solid Waste Generation in Different Zones of Agra City (2017)

S.No	Zones	No. of Wards	Population (in thousands)	Density	Generation (MT/day)	Disposal (MT/day)	Remnant Solid at the sites
1	I	19	374717	13513	182.27	142.43	39.84
2	II	15	276284	11868	164.95	125.35	39.6
3	III	28	573705	18425	303.68	233.58	70.1
4	IV	28	554733	12606	273.25	212.59	60.66

Source: Environment Engineer, Agra Nagar Nigam, 2017 and Personal Field Survey

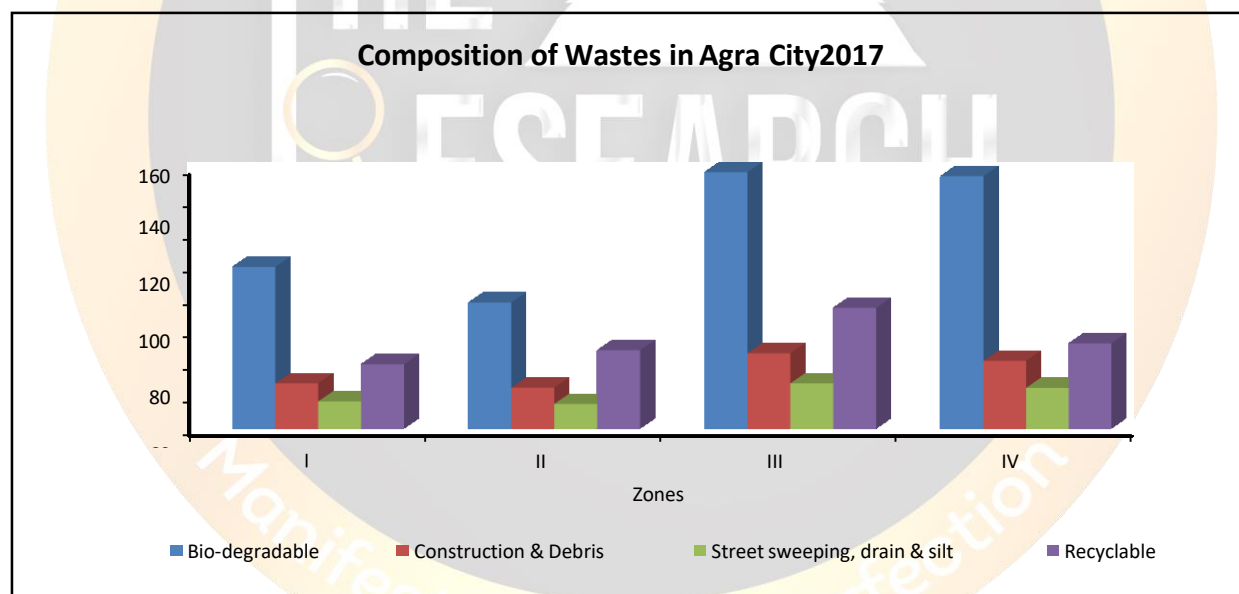
#### CHARACTERISTICS OF SOLID WASTE IN AGRA CITY

The given Table & Fig. shows the characteristics of waste in different zones of the city, such as zone III have generated the highest and zone II the lowest Bio-degradable waste, and likewise, the least bio-degradable waste has been generated in zone II, showing more prominence of high-income groups having less population density. Similarly, Zone III observes the highest concentration of generated waste in each category, while zone II observes the least generated waste regarding each category. It has been found that around 700 MT/day is municipal solid waste out of the total 924 MT/day.

### Characteristics of generated waste in different zones of Agra city (2017-18)

Zone No.	Types of Wastes (MT/day)			
	Bio-degradable	Construction & Debris	Street sweeping, drain & silt	Recyclable
I	98.836	27.62	16.57	39.248
II	77.082	24.99	15.00	47.88
III	156.741	46.01	27.61	73.82
IV	154.34	41.40	24.84	52.02
Total	487	140.02	84.02	212.968

Source: Agra Nagar Nigam, field survey 2017-18



### SOLID WASTE MANAGEMENT IN AGRA CITY

Civic authorities look after the responsibility of the collection of solid waste generated in the city. But all these amenities depend on the available funds; in the absence there would be a large gap between the disposal and generation hence creating various health problems. The Municipal Solid Waste collection in Agra city is not well organized due to lack of awareness among the citizens as well as ignorance of the civic bodies, which are responsible for the collection of waste. However,

collection in the city is conducted in two stages. In the first stage, the waste picked up from door to door is transported to dustbins and open dumps. Even in this stage, the collection is not very well-organized, though large numbers of private sweepers are engaged in the waste collection from door to door at a nominal charge.

House to house collection of waste from the community bins either by the inhabitant themselves or by the sanitary workers is regarded as the primary collection of waste. No organized arrangement for a house to house collection of waste can be observed in the almost whole city except for some part which has improved condition. Even the community bins are also not present at convenient locations for dumping the waste. As studied rigorously, there has been a mixed pattern of primary waste collection from households such that private sweepers collect garbage in handcarts and transport to the nearby open dumps or dustbins from the high-income group and medium-income groups as they have wide roads and literate population which make the municipal authorities to work efficiently.

### **SOLID WASTE PROCESSING AND DISPOSAL MECHANISMS**

At present, Agra Nagar Nigam does not possess any waste processing facility. The unsegregated waste is disposed of at the Shahdara dumpsite located at Agra – Tundla bypass road. Apart from this, waste has also been dumped at various low lying and vacant private plots. Particular recyclable waste is segregated and sold by the rag-picking community.

The recyclable wastes are segregated manually by kabadiwalas and rag-pickers estimated around 6000 approximately. The kabadiwalas purchase recyclable waste from residential and commercial areas while rag-pickers collect recyclables from market places, dustbins, and dumping sites, and sort them before selling off. They play a vital role in the segregation of waste. The majority of such groups are located at Ravidas Nagar, Budh Vihar, North Idgah, Police line, Idgah (also on the back of Idgah Nallah), Kathghar, Mohanpura, Chipitola behind puranimandi, Rakabganj near the police station, etc. However, these recyclables are still not segregated to the maximum extent; thereby, they become a part of the landfill waste.

### **CONCLUSION:**

After the foregoing analysis, it may be concluded that the city once that was known for its clean environment has been dirtied, and nowadays, the garbage collection and disposal system within the municipal board is inadequate and insufficient. Agra lacks in respect of well-planned dumping sites, and the wastes are dumped as such on any site. No proper procedure is being adopted in the

disposal of municipal solid waste; even the basic concept of the sanitary landfill is not followed. Most of the vehicles, including wheel-barrows, collection, and transportation equipment, engaged in the municipal solid waste management operation are old, and their capacities are not adequate to meet the demand; also, their maintenance is not as per required norms. The construction and demolition waste is not disposed of properly and thrown on the public places at the roadside, which are creating a lot of problems, thus giving an unsightly look to the city. In the rainy season, the garbage lying on the streets emits foul smell and are seen floating on the roads, lanes & even in front of most of the houses in the region. Inadequacy & improper management to clean the environment timely and accurately creates severe health problems. The existing site, i.e., Kuberpur, has been used for solid waste disposal although it does not have scientific disposal of garbage and follows no proper plan for solid waste management. Kuberpur site has the capacity of disposing of 750 TPD of the waste, but still, there is a lag between the disposal and generation, as the generation is 924 MT/day while the disposal is just 713.95 as per Agra Nagar Nigam officials. Thus it shows poor collection efficiency and improper disposal.

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