Solid Waste - Is It a Trash or A Value-Able Resource

Prof. Alpa Pandya
Assistant Professor
Department of Architecture
Sarvajanik College of Engineering and Technology, Surat, Gujarat

Abstract

Managing solid waste is one of biggest challenges of the urban areas, ranging from mega-cities to towns and villages. Managing this solid waste is the most challenging problems for every city managers and authorities. The quality of waste management services is a good indicator of a city's governance, if a city is dirty, the local administration may be considered ineffective or its residents may be accused of littering it. The authorities spend a substantial proportion of their available recurrent budget on managing this solid waste from all the units that is from collection transferring and then treating it as all this put lot of human resource as well as lot of cash flow into it. This particular paper aims to capture waste management trends and draws attention to the importance of waste management, especially regarding its role at an individual level that is at a unit level then at a cluster level then at a neighborhood level and lastly at a city level for leading Clean India. Waste should be handled from a unit that is its segregation and its composting should a mandatory clause for all the citizens. To fulfil this, it is determined the target an individual awareness with training campaigns, penalty etc. So this paper has selected examples of national and international case studies to showcase the good work that is being done on solid waste management by cities around the world, large and smaller, rich and poorer. Under the mission of our honorable prime minister of "Swaach Bharat Abhyan" which has been initiated to be completed by 2nd October 2017 each and every house hold unit should have a moral responsibility about house hold waste management. This mission can be fulfilled only by looking at changes and innovativeness in solid waste management, it would a better to find local solutions rather than global solution which has a famous proverb "think locally act globally". Hence the problem sparked at a unit level can make a vast difference at a global situation. The paper also helps decision-makers, Practitioners and ordinary citizens to understand how a solid waste management system works and to inspire each and every people for treating waste as a resource than a layer of debris and debris and debris.

Keyword- Household, Initiated, Innovative, Substantial, Resource, Value

I. INTRODUCTION

Since the beginning of any civilization human has been generating waste, it is being continuing with the progress of human and with the emergence of Industrial revolution at the end of 19th century due to which there was a rise in the world of consumers, due to increase in population, urbanization which has resulted in the change of lifestyle and the food habits all of these factors are largely answerable for the increase in waste, ranging from solid waste, industrial waste, hazardous waste etc. Wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Waste is defined as "A relative term, commonly defined as anything other than absolute minimum resource of Materials, Machines, Manpower, and Money (inclusive of time) essential to add value to the product." Hence waste is classified as per its forms are: Liquid, solid and gaseous waste Solid wastes is defined as useless, unwanted or discarded materials that arise from people's activities and are not free flowing (WHO Expert Committee, 1971). It encompasses the heterogeneous mass of throwaways from the urban community as well as the more homogeneous accumulation of agricultural, industrial and mineral wastes. Further improper disposal of solid wastes pollutes all the vital components of the living environment (i.e., air, land and water) at local and global levels. This impact is more acute in developing nations than in developed nations, as their economic growths as well as urbanization are more rapid. There has been a significant increase in (MSW) municipal solid waste generation in India in the last few decades. This is largely because of rapid population growth and economic development in the country

House hold Solid Waste or municipal solid waste includes residential wastes generated in a municipal or notified areas and is governed by the Municipality.

KIND/TYPES	*COMPOSITION*	*SOURCES*
Garbage	*Waste from preparations, cooking and serving of food, market wastes, from handling, storage and sale of product.*	*Households, Restaurants, institution stores, markets,*

Rubbish	*Combustible, paper, cartons, boxes, barrels, wood, excelsior, tree branches, yard trimming wood furniture, bedding. Noncombustible, metals tin cans, metal, furniture, dirt, glass, crockery, and minerals.*	*Commercial, Industries*
Ashes	*Residue form fires used, for cooking and heating and from on-site incineration.*	*Residential Industries*
Street Refuse	*Sweeping, dirt, leaves, catches basin, dirt, and contents of litter receptacles.*	*Streets, sidewalks,*
Dead Animals	*Cats, dogs, horses, cow etc.*	*Alloys, vacant plots*
Industrial Wastes	*Food processing wastes, boiler house cinders, humbler scraps metal sharing's.*	*Factories, power plants*
Demolition Wastes	*Lumber, pipes bricks, masonry, and other construction materials from building and other structures.*	*Demolition sites to be used for new buildings, renewal projects, express ways*
Construction Wastes	*Sump timber, pipe, other construction materials*	*New construction remodeling*
Special Wastes	*Hazardous solids and liquids explosive pathological wastes, radioactive materials.*	*Households, hotels, hospital, institution, stores, industry.*

A. Characteristics of House Hold Solid Waste

Compostable / Bio-degradable (this waste is eco-friendly and recyclable)	*55% - 65% matter (can be converted into manure)*
Inert material	*30% - 35% (to go to landfill or plinth fill)*
Recyclable materials	*5% - 10% (Recycling)*
These percentages vary from city to city depending on food habits	

Treating House hold waste as per standard methods is:

- Landfills (80%) done in major urban areas
- Incineration (20%) done in developed cities or implemented in designed cities
- Source reduction (5%) partially done on individual capability
- Composting (10%) partially done in farms, bungloos etc.
- Recycling (20%) scrap market and paper recycling(pasti)
- Biological Reprocessing Done mostly in developed nations
- Ocean Dumping (10%) cities which have ocean
- Plasma Gasification (10%) partially done

World Scenario in Solid Waste as the world hurtles toward its urban future, the amount of municipal solid waste (MSW), one of the most important by-products of an urban lifestyle, is growing even faster than the rate of urbanization. Ten years ago there were 2.9 billion urban residents who generated about 0.64 kg of MSW per person per day (0.68 billion tonnes per year). It is estimated that today these amounts have increased to about 3 billion residents generating 1.2 kg per person per day (1.3 billion tonnes per year). By 2025 this will likely increase to 4.3 billion urban residents generating about 1.42 kg/capita/day of municipal solid waste (2.2 billion tonnes per year)

Indian Case: As with the growing economy, the country is consuming more and generating more waste only 70% of total solid waste in the country is collected out of which only 12% is rightly treated the world bank has estimated that 243% of waste will be increased but 2012 to 2025 which will create problems for land filled and also give rise to the problem of resource and as all the things govern by government and politics influence it which will create problems to physical city and the people.

B. Surat Data

Name of transfer station	*Zone*	
Bhatar	*South west*	
Katargam	*North and central part*	
Varachha	*East and central part*	
Anjana	*South east and central part*	
Pal	*west*	
Bhestan	*south*	
Zones	*Area (Sq.Km.)*	*Solid Waste Generation (Metric Tones)*

		2001	2011	2021
Central	*8.18*	*150.1*	*139.5*	*116.2*
North	*36.353*	*121.7*	*179.1*	*220.6*
East	*37.525*	*210.7*	*295.9*	*337.7*
South East	*19.492*	*59.2*	*97.15*	*127.7*
South	*51.754*	*177.6*	*291.45*	*383.1*
South West	*111.912*	*73.2*	*108.7*	*139.9*
West	*51.279*	*90.9*	*166.3*	*224.5*
Total	*326.52*	*883.5*	*1278.0*	*1549.0*

C. Solid Waste Management System in Surat

Every day, Surat generates 400gms per capita per day of waste amounting to roughly 1000 metric tons. This is collected by SMC, private contractors and the rag pickers.

About 70 percent of the waste generated every day is contributed by households, shops and other commercial establishments.

Just over 30 percent of the total waste generated is recyclable.

This comprises of paper, plastic, metal, brick stone and glass primarily.

Combustible waste accounts for 22.75 percent of the total and organic waste is nearly 42 percent. Doorstep bins are roadside cradle types and are 314 in number.

II. CASE STUDY 1

A. BOBBILI

1) The Solid Waste Management Initiative in Bobbili Municipality

The door to door solid waste collection was started from 6th June, 2011. In the beginning, the wet and dry solid wastes were separated and then lifted to the transfer station for segregation and then that was taken to Solid Waste Management Park. This park's area is 8.4 acres and it is 4.5 km away from the municipal area.

2) Implementation Strategy

The SWM initiative was carried out in an integrated manner combining all the important aspects coherently viz., banning of the use of polyethene bags, door to door collection covering all the areas, effective transportation, processing of solid wastes, composting, bio-gas production and clean and green program.

The municipality conducted awareness camps involving traders, self-help groups and general public and also organized rallies, songs and dramas by school children in order to motivate people on the ill-effects of polythene usage. The civic body launched a door-to-door campaign and supplied two baskets, one for wet and the other for dry waste, for collection of garbage at the doorsteps. It also imposed fine up to Rs. 500. Two types of bins namely blue and orange each with a capacity of 28 kg were provided. Orange bin were designated for collection of dry wastes and blue bins for wet waste collection. The door to door collection was rationalized on the basis of route map system and well audible siren system.

By proper drain cleaning and debris removal the quantum of waste was reduced from 21 tons per day to 14 tons per day at present. About 80% of the total waste is organic in nature, followed by inorganic waste.

- Achievements and Impact
- 100 % door to door Collection and segregation
- Efficient transportation
- SWM Park - a unique facility for processing waste
- Bio Composting for purposeful solid waste processing
- Vermi-composting
- Bio gas production
- Livestock utilization at solid waste management park
- Green belt at solid waste management park

III. CASE STUDY 2

Pune, which generates about1,500 tonnes per day of municipal solid waste, aims to become zero-landfill city by 2015. Municipal corporation suggested residents to segregate dry and wet solid waste and has installed 20 biogas plant that decomposes organic waste into methane and then further used to produce electricity. Composting has been decentralized in many areas as those who opt for decentralized composting would receive a rebate on property tax.

IV. CASE STUDY 3

Delhi, generates about 8,000tonnes of waste a day. Three of its four landfills have long been exhausted. Certain localities in Delhi seem to have found a smarter solution to the problem they have set up decentralized waste management plants at defense colony in south delhi which has been running a simple pit composting plant which manages 50%of the waste generated in the locality by converting it into rich compost, it has diverted 50%of the waste from landfills. And has aimed in churning wealth out of waste.

V. CASE STUDY 4

A. Netherlands

Compared to other European states, the volume of waste flows in The Netherlands is enormous. The volume of solid waste is still increasing. This should be a matter of great concern, because the primary objective of Dutch waste policy is source reduction and recycling the second.

Solid waste is an issue because of emissions to water, soil and air, the space needed for disposal facilities and the loss in terms of resources and energy. The aim of the Dutch national policy on waste management is to minimize the quantity of waste that has to be incinerated or dumped. So they practice as:

The curbside collection systems for recyclates employed vary across the Netherlands:

- Green Bin - the biodegradable waste "GFT" ("Groente-, Fruit-, en Tuinafval") box or Green bin Red box - household chemicals, batteries, TL, etc.
- White bag - clothing.
- Blue box - plastics
- paper collection (generally without boxes, population is expected to provide carton boxed packages). May be collected through local organizations such as sports groups.

VI. CONCLUSIONS

All the cities are unable to handle its waste despite of having technologies and policies

So all the cities should have Implementation policy of 4 R's

- Refuse: Refuse to buy new items though you may think they are prettier than the ones you already have.
- Reuse: Do not throw away the cans or the bottles; cover them with homemade paper or paint on them and use them as pencil stands or small vases.
- Recycle: Use shopping bags made of cloth or jute, which can be used over and over again. Segregate waste to make sure that it is collected and taken for recycling.
- Reduce: the generation of unnecessary waste, e.g. carry your own shopping bag when you go to the market and put all your purchases directly into it.

Whatever waste is created it should be separated at house hold level and further waste should be converted e to various forms of energy

A. Suggestion/ Remarks/

Looking at an example of Bobbili, Guwahati, Netherlands, pune, Delhi and T2 terminal Mumbai all the citizen of cities should be trained firstly for segregation of waste at house hold level and then disposing it in a right manner and at a right place. If segregation is not done properly there should be penalty and to promote this segregation of waste, there should be credit system which they can be utilized at water tax and house hold tax or any other whichever is applicable.

Further, the suggestive measures also convey that at any municipality level there should be segregation of waste which leads to three possibilities

- Composting centre
- Landfill/incineration etc.
- Energy Production (biogas, green gas etc.)

House hold should be segregated at house hold first

The segregated waste should be treated at right place

Vegetable waste should be fed to animals (to goats and cow shades)

According to the type of unit there should be composting pit like, every bungalow will have their individual pit, apartments will have it at a collective level and so on.

The urban local bodies will recycle the non-biodegradable waste or produce energy from this type of waste.

All the above measures are only possible conducting awareness camps involving traders, by taking initiative of training the local people and through school and college education organize rallies, songs and dramas at city level auditoriums and by putting banners in the city for waste segregation.

The sensitivity of producing waste should in inherited in all Indians so that they think twice before producing it.

"If solid waste management is implemented locally it will solve the problem globally" (If the entire problem of solid waste is treated in bits and place it will not be solved but it should be treated from its source which will cause a major change in all.)

REFERENCES

[1] Journal "A Down to Earth Manual" State of Indias environment 2015 'urbanisation'.
[2] http://www.cpcb.nic.in/divisionsofheadoffice/pcp/MSW_Report.pdf
[3] http://www.unep.org/ietc/Portals/136/SWM-Vol1-Part1-Chapters1to3.pdf
[4] http://www.cyen.org/innovaeditor/assets/Solid%20waste%20management.pdf
[5] 5.http://www.indiaenvironmentportal.org.in/files/file/municipal%20solid%20waste%20management.pdf