WASTE MANAGEMENT IN THE PIMPRI CHINCHWAD, PUNE, INDIA

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ABSTRACT

Purpose: To create awareness about utilization of waste

Methodology: Survey of utilization of garbage at international level with special reference to Pimpri Chinchwad area of Pune

Findings: Garbage can is utilized for making manure, vermin compost, generating electricity etc.

Social/ Academic Implications: Clean India Green India

Originality/Novelty of article: Recycling of all types of garbage for fruitful utilization.

Beginning of civilization led to development around river banks. Things could be managed during those days as people lived in harmony with the nature. The scenario changed with industrialization which started creating havoc at the end of 19th century when the industrial revolution took the world of consumer by leaps and bounds, which led to concentration of population packets in and around the industrial areas. This rapid change in the development brought forth many challenges before the planning authorities especially the provision of basic amenities and hygienic place of living. The biggest challenge before the administration was and is to manage the waste generated by this large population. The solid waste generation has become a continuous global problem at all levels throughout the world. [1]

Key Words: Types of waste, recycling, waste management, treatment and disposal of waste, Waste hierarchy

TERMINOLOGY

Solid waste: It is the organic and inorganic waste material produced by various activities of the society, which have lost their value to the first user. Improper disposal of solid waste pollutes the environment at all levels i.e. local and global. This problem is more acute in developing countries as compared to developed ones because their economic growth and urbanization is more rapid. India is facing complex problem in this respect as it is one of the fastest, developing nation both economically as well as industrially. This fast pace of urbanization has resulted in creation of excessive waste.[2]

Waste referred as rubbish, trash, garbage or junk, is unwanted or unusable material. Waste if hazardous or toxic can be harbinger of disease and death, not only for living beings but also for everything that sustains life e.g. water, air, soil and food. [2]

Solid Waste can be defined as any solid or semi solid substance or object resulting from human or animal activities, discarded, useless or unwanted. It may be generated by household, industrial, agricultural or commercial activities. [2]

Municipal Solid Waste (MSW) or Urban Solid Waste (USW) predominantly consists of domestic waste along with other wastes like construction, demolition debris etc. They are either in solid or semisolid forms and generally exclude hazardous waste. [2]

Waste management is the sum of all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also includes the legal and regulatory framework that relates to waste management about guidance on recycling etc. The rational and consistent waste management practices give opportunity to reap a range of benefits. Waste management is anticipated to reduce adverse effects of waste on health, environment or aesthetics. [2]

Waste management practices are not consistent among countries (developed and developing nations); regions (urban and rural area), and sectors (residential and industrial). Waste management is governed by Waste Hierarchy, which is based on 3 R’s viz Reduce, Reuse & Recycle sometimes fourth R is also added as Rethink.[7] It is represented as a pyramid in order to retain basic idea of policy to take action first and prevent the generation of waste. The generated waste is reused to avoid its piling and finally recycled into usable by-products. The waste hierarchy represents the development of a product or material through the sequential stages of the pyramid of waste management. The life cycle of each product is represented by hierarchy.
Resource efficiency reflects sustenance of current, global, economic growth and development with the current production and consumption patterns. Globally, more resources are extracted to produce goods than the planet can replenish.

Sustainability is the reduction of the environmental impact from the production and consumption of these goods, from final raw material extraction to final disposal.

The Polluter pays principle is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, the waste generator is required to pay for appropriate disposal of the unrecoverable material.

Eco-Efficiency An eco-efficiency is integration of environmental and economic dimensions of certain developments, activities or processes which encourages the creation of value with less impact (WBCSD, 2000) [18]. Eco-efficiency is not a specific framework or management system which is used to manage waste (WBCSD, 2000).[18] It is measured as the ratio between the (added) value of what has been produced (e.g. GDP) and the (added) environment impacts of the product or service (e.g. SO₂ emissions).[20]

OBJECTIVES OF ECO EFFICIENCY (WBCSD, 2000A).[19]

- Increasing the value of products and services by offering products which meet consumer needs while requiring fewer materials and resources
- Reducing the consumption of resources by minimizing material inputs and ensuring closing materials loops;
- Reducing environmental impact by minimizing pollution and fostering the sustainable use of resources;

Recycling is a resource recovery process which is based on the collection and reuse of waste materials. The materials are sorted out from the collected waste and are reprocessed into new products. This procedure called kerbside collection. At some places, the owner of the waste is required to separate the materials into different bins (e.g. for paper, plastics, metals) prior to its collection while in the other case, all recyclable materials are placed in a single bin for collection and then sorted at centralised facility.. The latter method is known as "single-stream recycling."
In India, the major portion of MSW consists of biodegradable material, mainly due to food and yard waste. Due to rapid urbanization and change in lifestyle and food habits, the amount of municipal solid waste has increased rapidly and its composition has also changed.

Fig. 3 [21] Composition of MSW in a typical Indian City

The general composition of the solid waste is: Food & garden waste 40%, Glass & Ceramic 5%, Metal 3%, Inert 15%, Plastic/rubber 4%, Textile 6%, Paper 27%

Table 1 [6] Approximate time taken for degeneration of litter

| Type of Litter                      | Approximate time taken for degeneration |
|-------------------------------------|----------------------------------------|
| Organic waste e.g. vegetable fruit peels, leftover food | One or two weeks                        |
| Paper                               | 10-30 days                             |
| Cotton Cloth                        | 2-5 months                             |
| Wood                                | 10-15 years                            |
| Wooden Items                        | 1 year                                 |
| Metals e.g. Tin, Aluminium          | 100-500 years                          |
| Plastic Bags                        | One million years                      |
| Glass Bottles                       | Undetermined                           |

Unmanaged heaps of waste causes adverse effect on environments & human race due to its serious health hazardous implications which leads to spreading of infectious diseases. The unhygienic conditions caused due to this waste also cause air, water and soil pollution along with the general pollution.

**MSW MANAGEMENT IN INDIA [7]**

A typical waste management system in India includes the following elements:

- Waste generation and storage
- Segregation, reuse, and recycling at the household level
- Primary waste collection and transport to a transfer station or community bin
- Street sweeping and cleaning of public places
- Management of the transfer station or community bin
- Secondary collection and transport to the waste disposal site
- Waste disposal in landfills
In most of the Indian cities, the MSW collection, segregation, transportation, processing and disposal is carried out by the respective municipal corporations and the state governments enforce regulatory policies.

**Plastic Waste** means any plastic product such as carry bags, pouches, etc. which has been discarded after use or end-of-life. The recycled plastics are more harmful to the environment due to mixing of colour, additives, stabilizers, flame retardants etc. Further, the virgin plastic material can be recycled for 2-3 time only, due to reduction of the strength of plastic material due to thermal degradation. Around 70% of total plastic consumption is discarded as waste, thus approximately 5.6 million tons per annum (TPA) of plastic waste is generated in country, which is about 15342 tons per day (TPD). [8]

**ENVIRONMENTAL ISSUES ON DISPOSAL OF PLASTIC WASTE [8]**

Indiscriminate littering of unskilled recycling/reprocessing and non-biodegradability of plastic waste gives rise to the following environmental issues:

- Fugitive emissions are released during polymerization process.
- Various types of gases are released during product manufacture.
- Indiscriminate dumping of plastic waste on land makes the land infertile due to its barrier properties.
- Toxic emissions such as Carbon Monoxide, Chlorine, Hydrochloric Acid, Dioxin, Furans, Amines, Nitrides, Styrene, Benzene, 1, 3- butadiene, CCl₄, and Acetaldehyde are generated due to burning of plastics.
- Lead and Cadmium pigments, commonly used in LDPE, HDPE and PP as additives are toxic and are known to leach out.
- Disposal problems are posed by non-recyclable plastic wastes such as multilayer, metallised pouches and other thermo set plastic.
- Sub-standard plastic carry bags, packaging films (<40µ) pose problem in collection and recycling.
- Littered plastics give filthy look to the city.
- Littered plastic choke the drain and may cause flood like situation during monsoon.
- Garbage mixed with plastics interferes in waste processing facilities and also cause problems in land filling operations.
- Recycling industries operating in dissenting areas pose threat to environment.

As per the **PMW (Plastic Waste Management)** rules any (Petro-based) and Compostable Plastic or Material (Renewable) is considered as plastic. Plastic is not easily biodegradable under normal circumstances hence heaps of plastics are found littered all over the space. Government in collusion with the municipal corporations have framed rules for the solid waste management taking into account the biodegradability of all types of wastes. Government has made separate bodies for this purpose, State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) which work along with municipal authorities who look after the
enforcement of Rules relating to use, collection, segregation, transportation & disposal of plastic waste. Each state has formed State Level Advisory (SLA) Body to monitor implementation of Rules framed by the government for MSW.

**MUNICIPAL SOLID WASTE MANAGEMENT IN PCMC AREA**

The government of India has taken many initiatives and implemented new technologies and methods by giving loans for setting up composting plants to encourage proper management of solid waste since the 1960s([MoEF, 2005](#)) [9]. A public litigation was filed in the Supreme Court for the proper management of municipal solid waste, which resulted in the Municipal Solid Wastes (Management and Handling) Rules, 2000 [9]. The city of Pimpri Chinchwad is located in the western part of India with a population of about 21 lakh. The latitude of and longitude of PCMC are 18 37 N, 73 48 E respectively. Due to rapid increase in population and changes in life style, the quantity and quality of MSW in PCMC city has changed. Presently, PCMC is facing major challenges of public awareness, suitable planning, infrastructure and MSW management. PCMC generates approximately 500 ton MSW per day and its disposal is managed by a private organization SWACH [9]. Source separation of waste, Vermin-composting, Mechanical composting & Bio-diesel are the main activities of the SWACH organisation of PCMC in recent years. [9]

**Fig 6 Collection of Household, Industrial and Municipal Waste [16]**

**Fig 7 Flow chart for collection & disposal of garbage [15]**
Fig 8: Flow Chart of Waste Management [16]

Fig 9 Flow chart for collection & disposal of garbage [16]
TREATMENT AND DISPOSAL

After the collection the waste is dumped at Moshi site for seven day to remove leach ate and odour. After deodorisation it is sent for segregation. The segregated waste is treated in various ways like land fill, composting, recycling and fuel generating. [9]

To encourage citizens to segregate wet and dry waste, the municipal corporation in Pimpri Chinchwad has distributed garbage bins to its citizens. This will create awareness about the importance of segregation of garbage amongst them which will facilitate the government to implement the waste disposal rules.

For collection and disposal of garbage municipal corporation sends garbage collecting vehicles known as ‘Hopper Auto Rickshaws’ everyday to each locality. These rickshaws have two separate compartment one each for dry and wet waste and are suppose to collect segregated garbage.

Besides being environment friendly, it will help to reduce garbage transportation costs as lesser quantities of waste will have to be disposed at the Moshi garbage depot. Moshi depot has facilities for vermin composting as well as for mechanical composting. Rag pickers will also benefit from it because they will be able to collect dry waste and will be able to recycle some of these items. At present, rag pickers find it difficult to separate recyclable items from mixed waste.
FUTURE PLANS

Corporation is planning to get approval of the government for the segregation of garbage and disposal of wet garbage at source by bulk generators in order to make it cost effective and environmental friendly. For this purpose the civic body has started the work of framing the by-laws under Section 458 of Maharashtra Municipal Corporation Act. A nine-member committee, comprising civic officials and representatives of non-governmental organisations are working on the draft. The by-laws point out the responsibilities of the garbage generators and the civic body. Every garbage generator (individual/organization, traders and others) must classify the garbage and separately store it. Organisations generating waste in large quantities like hotels and halls must create a separate system to process wet waste. Burning or throwing garbage elsewhere is totally banned. The by-laws also mention the responsibility to form ward level, zone level and city-level committees for effective enforcement of the rules and by-laws. [13]

Segregation of garbage at the household-level is not done on a large scale. It is useful only if the garbage is scientifically processed. The municipal corporation is concentrating on scientific processing garbage and treatment of vegetable waste separately. [13]

Municipal Corporation also intends to carry out mechanical composting of all the 500 metric tonnes of garbage generated daily, for which necessary work is in progress. Besides employing vermin composting, trials are on for converting plastics to fuel. [13]

In the next two to three months, a complete foolproof system of solid waste management is expected to begin. It would be one of its kinds and Pimpri-Chinchwad would become an example for others on how to carry out solid waste management. [13]

BIBLIOGRAPHY

[1] Non-hazardous Waste U.S. Environmental Protection Agency, Municipal Solid Waste
[2] http://www.unep.or.jp/ietc/estdir/pub/msw/
[3] http://www.cpcb.nic.in
[4] http://www.mcgm.gov.in/
[5] http://edugreen.teri.res.in/
[6] http://en.wikipedia.org/wiki/waste_management
[7] Concordia University, n.d.; FNQLSDL, 2008; UC Davis, 2008; U of T, 2008
[8] www.cpcb.nic.in/.../pcp/management_plasticwaste.pdf
[9] NOVATEUR PUBLICATIONS INTERNATIONAL JOURNAL OF INNOVATIONS IN
[10] ENGINEERING RESEARCH AND TECHNOLOGY [IJERT] VOLUME 2, ISSUE 9, SEP
[11] City development plan 2006-2012
[12] www.ebay.com
[13] http://timesofindia.indiatimes.com/city/pune/Pimpri-Chinchwad-Municipal-Corporation- to- give-free- bins-for-better-waste-management/articleshow/22529960.cms
[14] TNN | May 15, 2009, 04.04 AM IST
[15] Plastic waste management images.
[16] IIED 1999, Informal Waste management Recovery Process in India
[17] www.lucid chart.com
[18] Assessing the Eco-Efficiency of End-of-Pipe Technologies with the Environmental Cost Efficiency Indicator: A Case Study of Solid Waste Management Stefanie Hellweg1,* , Gabor Doka2 , Göran Finnveden3 , and Konrad Hungerbühler 1 1
[19] WBCSD (2000). Eco-Efficiency: Creating more value with less impact. World Business Council for Sustainable Development. ISBN 2-940240-17-5.
[20] WBCSD (2000). Measuring Eco-Efficiency: A guide to reporting company performance. World Business Council for Sustainable Development. ISBN 2-940240-14-0.
[21] Yadong, Y (2013). "Eco-efficiency trends in china, 1978-2010:decoupling environmental pressure from economic growth". Ecological Indicators. 24: 177–184.
[22] www.alibaba.com