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SHRI LAL BAHADUR SHASTRI
DEGREE COLLEGE GONDA

DEPARTMENT OF CHEMISTRY



A One Day Seminar
Under Intellectual Property Rights
Organized

Department of Chemistry

On

Solid Waste Management

(April 15, 2023)

[SEMINAR REPORT]

A one day seminar under intellectual property rights on solid waste management

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The objectives of this seminar were to study the current practices related to the various solid waste management initiatives taken in India for human wellbeing. The other purpose is to provide some suggestions and recommendations to improve the waste management practices in Indian towns. This report is based on secondary research as per the suggestions given by speakers. Existing reports related to waste management and recommendations of planners/NGOs/consultants/government accountability agencies/key industry experts/ for improving the system were discussed. It offers deep knowledge about the various waste management initiatives in India and find out the scope for improvement in the management of waste for the welfare of the society. The seminar attempts to understand the important role students, staff and teachers in HEIs along with the role played by the formal sector engaged in waste management in our country. This work is original and could be further extended.

Introduction “There are few things certain in life – one is death, second is change and the other is waste.” No one can stop these things to take place in our lives. But with better management we can prepare ourselves. Here we will talk about waste and waste management. Each of us has a right to clean air, water and food. This right can be fulfilled by maintaining a clear and healthy environment. Now for the first question, what is waste? Any material which is not needed by the owner, producer or processor is waste. Generally, waste is defined as at the end of the product life cycle and is disposed of in landfills. Most businesses define waste as “anything that does not create value”. In a common man’s eye anything that is unwanted or not useful is garbage or waste. However scientifically speaking there is no waste as such in the world. **Almost all the components of solid waste have some potential if it is converted or treated in a scientific manner.** Hence we can define solid waste as “*Organic or inorganic waste materials produced out of household or commercial activities, that have lost their value in the eyes of the first owner but which may be of great value to somebody else.*” (Robinson, W.D.1986). Generation of waste is inevitable in every habitation howsoever big or small. Since the dawn of civilization humanity has gradually deviated from nature & today there has been a drastic change in the lifestyle of human society. Direct reflection of this change is found in the nature & quantity of garbage that a community generates. We can dispose the waste or reuse the waste and can earn money through proper management. Indian cities which are fast competing with global economies in their drive for fast economic

development have so far failed to effectively manage the huge quantity of waste generated. The projected urban population percentage is 33.4 percent by the year 2026. The quantum of waste generated in Indian towns and cities is increasing day by-day on account of its increasing population and increased GDP. The annual quantity of solid waste generated in Indian cities has increased from six million tons in 1947 to 48 million tons in 1997 with an annual growth rate of 4.25 percent, and it is expected to increase to 300 million tons by 2,047 (CPCB, 1998). Population explosion, coupled with improved life style of people, results in increased generation of solid wastes in urban as well as rural areas of the country. In India like all other sectors there is a marked distinction between the solid waste from urban & rural areas. However, due to ever increasing urbanization, fast adoption of 'use & throw concept' & equally fast communication between urban & rural areas the gap between the two is diminishing. The solid waste from rural areas is more of a biodegradable nature & the same from urban areas contains more non-biodegradable components like plastics & packaging. The repugnant attitude towards solid waste & its management is however, common in both the sectors. Universally 'making garbage out of sight' is the commonly followed practice. In India, the urban local bodies, popularly known as the municipal corporations/councils, are responsible for management of activities related to public health. However, with increasing public and political awareness as well as new possibilities opened by economic growth, solid waste management is starting to receive due attention. The various initiatives taken by government, NGOs, private companies, and local public drastically increased in the past few decades. Nonetheless, land filling is still the dominant solid waste management option for the United States as well as many other countries like India around the world. It is well known that waste management policies, as they exist now, are not sustainable in the long term. Thus, waste management is undergoing drastic change to offer more options that are more sustainable. We look at these options in the hope of offering the waste management industry a more economically viable and socially acceptable solution to our current waste management dilemma. This paper outlines various advances in the area of waste management. It focuses on current practices related to waste management initiatives taken by India. It also highlights some initiatives taken by the US federal government, states and industry groups. The purpose of this paper is to gain knowledge about various initiatives in both countries and locate the scope for improvement in the management of waste.

Classification of waste

There may be different types of waste such as Domestic waste, Factory waste, Waste from oil factory, E-waste, Construction waste, Agricultural waste, Food processing waste, Bio-medical waste, Nuclear waste, Slaughter house waste etc.

We can classify waste as follows:

- Solid waste- vegetable waste, kitchen waste, household waste etc.
- E-waste- discarded electronic devices such as computer, TV, music systems etc.
- Liquid waste- water used for different industries, tanneries, distilleries, thermal power plants
- Plastic waste- plastic bags, bottles, bucket, etc.

- Metal waste- unused metal sheet, metal scraps etc.
- Nuclear waste- unused materials from nuclear power plants Further we can group all these types of waste into wet waste (Biodegradable) and dry waste (Non Biodegradable). Wet waste (Biodegradable) includes the following:
 - Kitchen waste including food waste of all kinds, cooked and uncooked, including eggshells and bones
 - Flower and fruit waste including juice peels and house-plant waste
 - Garden sweeping or yard waste consisting of green/dry leaves
 - Sanitary wastes • Green waste from vegetable & fruit vendors/shops
 - Waste from food & tea stalls/shops etc.

Dry waste (Non-biodegradable) includes the following:

- Paper and plastic, all kinds
- Cardboard and cartons
- Containers of all kinds excluding those containing hazardous material
- Packaging of all kinds
- Glass of all kinds
- Metals of all kinds
- Rags, rubber
- House sweeping (dust etc.)
- Ashes
- Foils, wrappings, pouches, sachets and tetra packs (rinsed)
- Discarded electronic items from offices, colonies viz. cassettes, computer diskettes, printer cartridges and electronic parts.
- Discarded clothing, furniture and equipment.

In addition to the above wastes, another type of waste called “**Domestic Hazardous Waste**” may also be generated at the household level. These include used aerosol cans, batteries, and household kitchen and drain cleaning agents, car batteries and car care products, cosmetic items, chemical-based insecticides/pesticides, light bulbs, tube-lights and compact fluorescent lamps (CFL), paint, oil, lubricant and their empty containers. Waste that is considered hazardous is first required by the EPA to meet the legal definition of solid waste. The EPA incorporates hazardous waste into three categories. The first category are source-specific wastes, the second category is nonspecific wastes, and third, commercial chemical products. Generally, hazardous waste “is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludge. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes (EPA Wastes Website, 2010). Similarly there is “Non Hazardous waste”. There are many definitions of hazardous and non-hazardous waste within the US federal government, states and industry groups.

Disposal vs. Management

There are common practices to dispose waste from ordinary people. But disposal of waste is becoming a serious and vexing problem for any human habitation all over the world. Disposing solid waste out of sight does not solve the problem but indirectly increases the same manifold and at a certain point it goes beyond the control of everybody. The consequences of this practice such as health hazards, pollution of soil, water, air & food, unpleasant surroundings, loss of precious resources that could be obtained from the solid waste, etc. are well known. That's why it is essential to focus on proper management of waste all over the world. Waste management has become a subject of concern globally and nationally. The More advanced the human settlements, the more complex the waste management. There is a continuous search for sound solutions for this problem but it is increasingly realized that solutions based on technological advances without human intervention cannot sustain for long and it in turn results in complicating the matters further. Management of solid waste which generally involves proper segregation and scientific recycling of all the components is in fact the ideal way of dealing with solid waste. Solid waste management (SWM) is a commonly used name and defined as the application of techniques to ensure an orderly execution of the various functions of collection, transport, processing, treatment and disposal of solid waste (Robinson, 1986). It has developed from its early beginnings of mere dumping to a sophisticated range of options including re-use, recycling, incineration with energy recovery, advanced landfill design and engineering and a range of alternative technologies. It aims at an overall waste management system which is the best environmentally, economically sustainable for a particular region and socially acceptable (World Resource Foundation, 1996; McDougall et al., 2001). This not only avoids the above referred consequences but it gives economic or monetary returns in some or the other forms.

Basic principles of Solid Waste Management

- 1) 4Rs: Refuse, Reduce, Reuse & Recycle
 - Refuse: Do not buy anything which we do not really need.
 - Reduce - Reduce the amount of garbage generated. Alter our lifestyle so that minimum garbage is generated.
 - Reuse - Reuse everything to its maximum after properly cleaning it. Make secondary use of different articles.
 - Recycle – Keep things which can be recycled to be given to rag pickers or waste pickers (Kabadiwallahs). Convert the recyclable garbage into manures or other useful products.
- 2) Segregation at source: Store organic or biodegradable and inorganic or non biodegradable solid waste in different bins. Recycle of all the components with minimum labor and cost.
- 3) Different treatments for different types of solid wastes: One must apply the techniques which are suitable to the given type of garbage. For example the technique suitable for general market waste may not be suitable for slaughter house waste.
- 4) Treatment at nearest possible point: The solid waste should be treated in as decentralized manner as possible. The garbage generated should be treated preferably at the site of

generation i.e. every house. Based on the above principles, an ideal Solid Waste Management for a village could be as under.

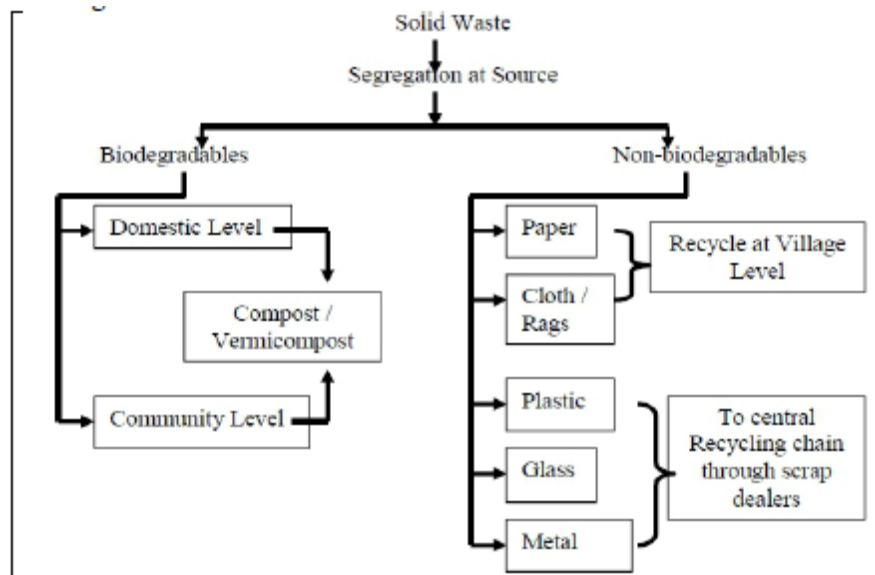


Figure 1- An ideal Solid Waste Management at a glance
Source- Shrikant M.Navrekar, "Sustainable Solid waste Management: Need of the hour"

Waste Management System in India

Waste management market comprises of four segments – Municipal Waste, Industrial Waste, Bio-Medical Waste and Electronic Waste Market. All these four types of waste are governed by different laws and policies as is the nature of the waste. In India waste management practice depend upon actual waste generation, primary storage, primary collection, secondary collection and transportation, recycling activity, Treatment and disposal.

Waste Collection in India:

Primarily by the city municipality

- No gradation of waste product eg bio-degradable, glasses, poly bags, paper shreds etc.
- Dumps these wastes to the city outskirts Local raddiwala / kabadiwala (Rag pickers)
- Collecting small iron pieces by magnets
- Collecting glass bottles
- Collecting paper for recycling

Waste Management Initiatives in India

During the recent past, the management of solid waste has received considerable attention from the Central and State Governments and local (municipal) authorities in India. A number of partnerships/alliances are found to exist in the field of solid waste management in Indian cities. These alliances are public-private, community-public and private-private arrangements.

Legal Framework	<ul style="list-style-type: none"> • 74th Constitutional Amendment Act, 1992 • Management and Handling Rules • Environment (Protection) Act, 1986 • National Environment Tribunal Act, 1995 • National Environment Appellate Authority Act, 1997 • Water (Prevention & Control of Pollution) Act, 1974 • Water (Prevention & Control of Pollution) Cess Act, 1977
Policy Initiatives	<ul style="list-style-type: none"> • National Urban Sanitation Policy, 2008 • National Environment Policy, 2006 • Policy Statement for Abatement of Pollution, 1992 • National Conservation Strategy and Policy Statement on Environment and Development, 1992 • Law Commission Recommendation • Ecomark Scheme, 1991
Key Government Programmes	<ul style="list-style-type: none"> • JNNURM • Total Sanitation Campaign • MNRE's Waste-to-Energy • Integrated Low Cost Sanitation Scheme • National Biogas and Manure Management Programme • Latest: Swachh Bharat Abhiyan

Challenges in India

Key issues and challenges include lack of collection and segregation at source, scarcity of land, dumping of e-waste, lack of awareness, etc. Simple dumping of mixed waste is the practice followed practically everywhere and especially in the developing countries as they cannot mobilize financial resources for applying expensive technology propounded by the developed countries. In India, “The new Municipal Solid Waste Management Rules 2000”, which came into effect from January 2004, fail, even to manage waste in a cyclic process. Waste management still is a linear system of collection and disposal, creating health and environmental hazards. Urban India is likely to face a massive waste disposal problem in the coming years. Until now, the problem of waste has been seen as one of cleaning and disposing as rubbish. But a closer look at the current and future scenario reveals that waste needs to be treated holistically, recognizing its natural resource roots as well as health impacts. Waste can be wealth, which has tremendous potential not only for

generating livelihoods for the urban poor but can also enrich the earth through composting and recycling rather than spreading pollution as has been the case. Increasing urban migration and a high density of population will make waste management a difficult issue to handle in the near future, if a new paradigm for approaching it is not created.

Suggestions for future improvement

The political will is the first priority. Generally Government bodies and municipalities give priority to present problems which they face but do not think for future problems due to environmental decay. Their view is that, they will solve problems when they will face it but not now. Because doing something for environment does not provide political gains or assure next time seat. Now questions is that how can we change this mentality? We believe there should be a positive approach for a long time planning and implementation. Legislation and its effective enforcement is a key to sustainability for which the framework requires to be established. Efforts to improve waste storage and collection are required. This can be done when each household and locality are provided standard bins that are placed outside for ease of collection. In areas where this is not appropriate, centrally located waste collection points should be established that are shared by a number of households. Wastes need to be increasingly sorted at the source, to separate materials that can be recycled and to reduce the amount of wastes requiring collection and disposal. Co-operation is required among communities, the informal sector, the formal waste collectors and the authorities. An effective Solid Waste Management system should aim at minimizing manual handling and 100 % collection & transportation of solid wastes should be achieved.

In solid waste management, one thing became very clear that segregation at source is to be practiced. There are lots of initiatives to manage wastes but goes in vein because of not identifying wealth in wastes. In India, we cannot afford sanitary land filling as land is precious here and there are lot of municipalities who do not have land as trenching ground. The source segregation needs lot of study on human behavior against waste littering. A continuous sensitization programme is to be planned according to the sentiments of the residents towards their city and ultimately it will work as wonders. If waste segregation is practiced, the potential threats can be minimized directly. Besides, the quality of materials retrieved will be better due to absence of mixing. The pickers can thus, fetch better money on the materials retrieved besides having lesser threats of catching diseases, cuts and wounds encountered in the usual practice of waste picking.

The adoption and transfer of the technologies from the developed countries without adapting them to the local or regional perspective would be fallacious on the part of the developing countries. Therefore, the technical aspects for a waste management would have to take into account many points for planning and implementation of strategies according to situation of the country. It would call for the strengthening of the management sector which has to go hand in hand with technical planning. General public can play a very important role. Public participation is necessary for a proper waste management system. Changes in the habits of segregation, littering, can change the approach towards wastes. For example in a heritage town of West Bengal, there was a movement

related to waste management. Within a span of two years it successfully sensitized residents for segregation at source and not littering in open areas. Now the city is really becoming clean and other people are also participating in the movement.

In order to improve the system efficiency and increase the coverage to 100 percent in each city, it is recommended to explore alternative arrangements for collection of waste like involving private operators. A mechanism to generate revenue from the citizens should also be developed.

However, the approach to public-private partnerships pursued in the developed countries cannot be replicated for Indian towns in general. This approach can only be implemented after some modifications taking into account the local conditions.

Plastics waste is a significant portion of the total municipal solid waste (MSW). Recycling of plastics should be carried in such a manner to minimize the pollution level during the process and as a result to enhance the efficiency of the process and conserve the energy. Newer techniques related to recycling and reuse of plastic can be adopted.

Conclusion

In order to make proper waste management activity sustain in true sense, following other points need to be given attention to –

- 1) Region specific planning: Looking at the geographical, topographical and cultural diversity of the country it can be divided into five regions such as Northern region, Eastern region, Western region, Central region and Southern region. Each of these regions has different structure. Hence all the activities should be planned & implemented on regional basis.
- 2) Planning from below: To make Solid Waste Management a success in true sense, the planning as well as implementation should start from general public level planning followed by block level planning, district level planning and state level planning.
- 3) Involvement of self help groups, youth groups and small entrepreneurs: The general public level waste management units can be run by self help groups, youth groups or small entrepreneurs. This will help in making the programme self supportive and sustainable.
- 4) Well planned and effective training policy: Technical training at all levels (General public to state) forms the backbone of a successful waste management programme. Adequate training must be given to all those concerned prior to actual launching of the programme in the field.

Recommendations

1. Keep our self informed: It is important that we are in the know about what is happening on the environment front. Read about how untreated sewage is thrown into the rivers, attend public lectures about air pollution, & keep in touch with new policies that affect our environment. The more informed we are, the better equipped we are to fight such issues.
2. Consume less: Motto: Refuse.....Reduce....Reuse... Recycle .This means consuming fewer resources, reusing whatever we can and finally recycling what cannot be reused. This process greatly reduces the garbage.
3. **Say 'No' to plastic bags:** One of the biggest sources of pollution in Indian cities is the ubiquitous plastic bag. Refuse to accept one. Instead, carry a cloth shopping bag with us.

4. Separate our garbage: India has one of the world's most efficient recycling mechanisms. Use the service of our raddiwalla. Newspapers, bottle cans and other such recyclables can fetch us money and in the process we can help to save the environment. Rag pickers, too, perform a vital function for the city. Kitchen garbage (biodegradable) should be separated from non-biodegradable waste.
5. Compost our organic waste: Start a vermiculture bin. We can convince our neighbors to start a vermiculture bin also to produce manure.
6. Stop burning garbage: Ask our neighbors to desist from burning solid wastes. It may seem harmless but smoke emitted from leaves contributes to air pollution. Also, when there are plastic in the heap, it emits dangerous toxic fumes. Leaves can be converted to fertilizer through composting & plastic can be recycled.



SHRI LAL BHADUR SHASTRI DEGREE COLLEGE, GONDA

श्री लाल बहादुर शास्त्री डिग्री कॉलेज, गोण्डा

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