Study Of Waste Management in India from Waste to Wealth

Dr. Nagegowda P[1] ,Dr Sanjeevrayappa C[2]
[1]*Govt. First Grade College, Channapatna, Bangalore South*
[2]*Govt. First Grade College, Yelahanka, Bangalore*

***Abstract*—Today the environmental problems posed by waste materials are well known to all of us. Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. Waste management is also carried out to recover resources from it and can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each. This paper outlines various advances in the area of waste management. It focuses on current practices related to waste management initiatives taken by Indian also attempts to explain the various options available to meet the twin goals of environmental conservation and sustainable development with respect to our country and brings to light the various ways of converting waste to wealth.**

***Index Terms*—India, Environmental Conservation; Sustainable Development; Waste Management; Recycling;**

I. INTRODUCTION

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). 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. There are about 593 districts and approximately 5,000 towns in India. About 27.8 percent of India's total population of more than 1 billion (as per Census 2001) lives in urban areas. The projected urban population percentage is 33.4 percent by the year 2026. 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

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.

II. 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

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. and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities" (EPA Wastes Website, 2010). The definition of non-hazardous waste can also include financial waste.

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. 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).

III. BASIC PRINCIPLES OF SOLID WASTE MANAGEMENT

I 4Rs: Refuse, Reduce, Reuse & Recycle

a. Refuse: Do not buy anything which we do not really need.

b. Reduce Reduce the amount of garbage generated. Alter our lifestyle so that minimum garbage is generated.

c. Reuse. Reuse everything to its maximum after properly cleaning it. Make secondary use of different articles.

d. 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. Basic principles of Solid Waste Management

II 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

III 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.

IV 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

V Based on the above principles, an ideal Solid Waste Management for a village could be as under.

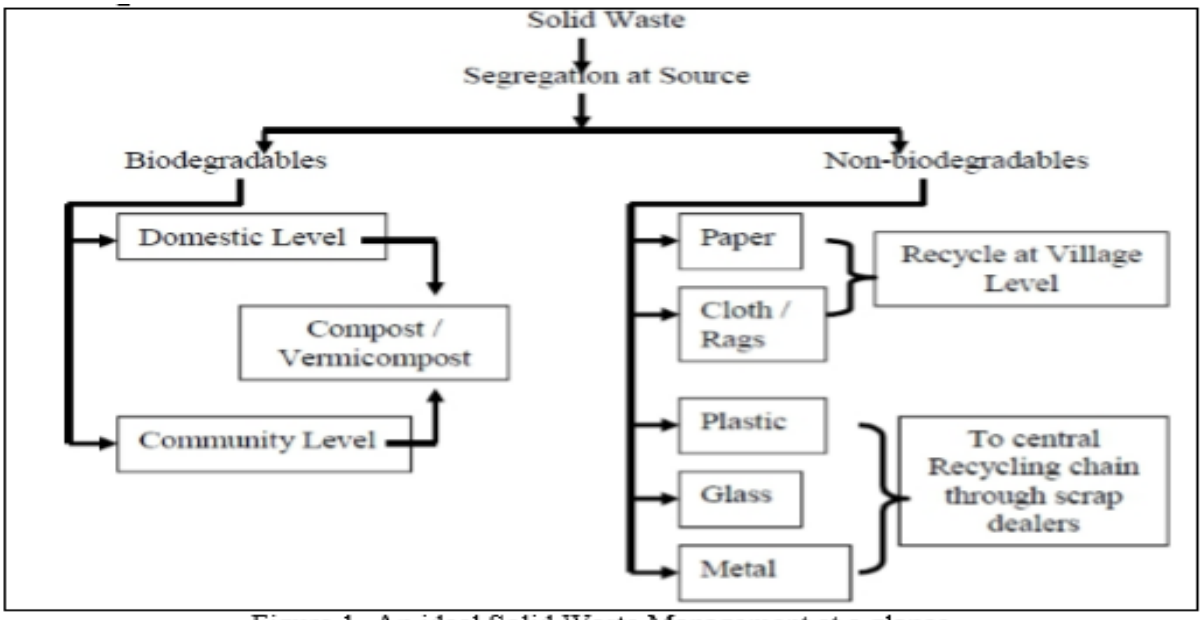

Figure 1- An ideal Solid Waste Management at a glance
Source- Shrikant M.Navrekar, "Sustainable Solid waste Management: Need of the hour"

Wealth from waste: By adopting the proper technology waste can be converted into wealth.
Rice Husk and Silica: Rice husk is traditionally utilized as a fertilizer additive, in stock breeding rugs, as fuel and in landfill or paving applications. Rice husk is a natural reservoir for nano structured silica and its derivatives. Precipitated silica can be used in the rubber industry, as a reinforcing agent, in cosmetics, in tooth pastes as a cleaning agent and in the food industry as an anti-caking agent. Elemental silica has a wide range of traditional applications in metallurgy, synthesis of silicone and in the semiconductor industry. Nanostructure silicon, because of its unique properties and small size finds wide application in nano electronics, photonics, biotechnology, energy harvesting and energy storage.

Cement from Rice husk: Cement has been successfully produced from the agricultural waste and rice husk ash. For this production, rice husk was pre-carbonized in a pilot-plant and was further decarbonized in an electric furnace to produce rice husk ash. 24.5% rice husk ash was mixed with other raw materials (sourced locally) for producing white Portland cement and the cement produced was used to make a concrete slab. The production of cement from rice husk has been recommended for developing countries since it would help reduce problems of rice husks as farm wastes.

Recycling Paper from Paper Waste: Paper is made from trees, and every single part of the tree is either chopped up to make products or burned to create energy. If we could just recycle one morning newspaper every day, we could save 41,000 trees from being cut down and greatly reduce our carbon footprint. Recycling old paper products uses 60% less energy than manufacturing it from new materials.

Benefits of paper recycling: Waste paper recycling has several advantages. Recycling newspaper saves about 14% of landfill space which can be used to dump other waste materials. It has been estimated that for every ton of newspaper recycled we can save enough energy which can be used to power a television for 31 hours. Through recycling one ton of paper, we can save 17 mature trees. Paper recycling reduces sulfur dioxide emissions with eliminating the use of coal which is used in the paper industry to generate power, hence promoting less use of fossil fuel. When the paper is recycled, it allows more trees to survive and supply us with healthy oxygen to breathe. In India, only about 20% waste paper is being currently recovered annually. In comparison in developed countries the percentage of recovery of waste paper in India is very low. For instance, in Germany, it is 73%, Sweden 69%, Japan 60%, Western Europe 56%, USA 49% and Italy 45 %.

Cow Dung: A Composted fertilizer: India is primarily an agricultural country. Agriculture contributes the major part to the GDP of India. Some of the efficient products derived from agricultural wastes are bioethanol, biocoal briquettes, biodiesel and organic manure. Manure is a derived product from waste produced from cattles like cow, buffalo, goat, and sheep. In India 65% of the total population still lives in the rural areas. If we plan to do this composting at a large or commercial scale it can have future job openings also for people living in rural areas.

Recycling of Lead-Acid Batteries: Recycling of battery is an activity which aims at the safety of the environment by reduction of number of batteries which we dispose of as municipal solid waste dumping sites. Batteries contain a number of heavy metals and toxic chemicals which can hamper the environment and their dumping has raised concern over risks of soil contamination and water pollution. Lead-acid battery recycling has become the most successful recycling programs in the world today other than recycling of aluminium, glass, paper, plastic etc. In the United States 97% of all battery lead was recycled between 1997 and 2001.

Bricks from Fly Ash: Fly ash is non-combustible mineral portion of coal which is generated in combustion, and it primarily comprises of fine particles that rise with the flue gases. Fly ash brick (FAB) are specifically masonry units which are used as building material. Due to the presence of high concentration of calcium oxide in class C fly ash, the brick can be described as "self-cementing" because when it is mixed with lime it combines to form cementitious compounds

Fly ash bricks: The compressive strength of fly ash blocks is so high that it eliminates breakages/wastage during handling and gives a neat finish, with lower thickness of joints and plaster. Though these bricks are abundantly and widely available closer to thermal power plants all over the country for obvious reasons, finding dealers in all major cities and towns wouldn't be a problem. In India about 100 million tons of fly ash is produced annually by the numerous thermal power plants, which could cause serious contamination of land, groundwater and air but due to practice of fly ash bricks now it is safe and sound.

IV. BIOCOAL FROM VEGETABLE WASTE

Indian conditions offer wide range of potential among the non-conventional forms of energy like agricultural/industrial waste and municipal solid waste. 'Biocoals' are solid fuels mainly non-conventional/renewable source of energy, having higher energy efficiency, low moisture and ash content and having zero potential of elimination of harmful gases like SO_2 & NO_2 other than conventional sources of energy. Pellets/briquettes of biocoal are made from processed agricultural refuse and process of converting agricultural waste to solid fuel is also nonpolluting.

Advantages of Recycling Plastic: Conservation of energy resources Recycling is a very efficient process that helps in the conservation of energy resources. Various resources are used for making plastic from the virgin materials that is why converting the old products into new ones really helps in saving a hugeamount of energy. Recycling is a process that requires the least amount of resourcesand energy that is available.

Waste Collection in India: Primarily by the city municipality

- No gradation of waste product e.g. 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

In Delhi - MCD- Sophisticated DWM (Delhi Waste Management) vehicle

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. To identify the status of existing alliances in the study area, it is first necessary to identify the various actors working in the field of waste management.

These factors can be grouped as under

- Public sector: this comprises of local authority and local public departments at city level; • Private-formal sector: this constitutes large and small registered enterprises doing collection, transport, treatment, and disposal and recycling;
- Private-informal sector: this constitutes the small-scale, non-recognized private sector and comprises of waste-pickers, dump pickers, itinerant-waste buyers, traders and non-registered small-scale enterprises; and
- Community representatives in the form of NGOs, etc.

National Solid Waste Association of India (NSWAI) is the only leading professional non-profit organization in the field of Solid Waste Management including Toxic and Hazardous Waste and also Biomedical Waste in India.

Suggestions for future improvements in India 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 are 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 are a key to sustainability for which the framework requires to be established. Efforts to improve waste storage and collection are required.

V. CONCLUSION

To achieve financial sustainability, socio-economic and environmental goals in the field of waste management, there is a need to systematically analyze the strengths and weaknesses of the community as well as the municipal corporation, based on which an effective waste management system can be evolved with the participation of various stakeholders in India. The public apathy can be altered by awareness building campaigns and educational measures. Sensitization of the community is also essential to achieve the above objectives and we need to act and act fast as every city in India is already a hotbed of many contagious diseases, most of which are caused by ineffective waste management. All these above said suggestions are given in relation to India and will be effective only when we individually feel the responsibility of making environment clean. Here are a few tips to achieve this goal.

I Keep ourself 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.

II Consume less: Motto: Refuse. Reduc. Reuse Recycle. This means consuming fewer resources, reusing whatever we can and finally recycling what cannot be reused. This process greatly reduces the garbage.

III 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.

IV 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 nonbiodegradable waste

V Compost our organic waste: Start a vermiculture bin. We can convince our neighbors to start a vermiculture bin also to produce manure.

VI 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 is plastic in the heap, it emits dangerous toxic fumes. Leaves can be converted to fertilizer through composting & plastic can be recycled.

REFERENCES

[1] “The Executive Order on Improper Payments: A Practical Look at What Government Agencies Can Do to Address This Presidential Call for.

Action", KPMG LLP. World Business Council for Sustainable Development (WBCSD) (1996).

[2] 2) "Eco-Efficient Leadership for Improved Economic and Environmental Performance. World Resource Foundation (1996)

[3] 3)Business for Social Responsibility (BSR) (2010). "The New Frontier in Sustainability"

[4] 4)The Business Opportunity in Tackling Sustainable Consumption. Central Pollution Control Board of India (CPCB) (1998), "Status of solid waste management in metro cities" CPCB. Gibbs and Soell (2010).

[5] 5. "Sense and Sustainability Among Consumers and Fortune 1000 Executives, Gibbs and Soell, Inc. Municipal Solid Waste (Management and Handling) Rules 2000, Ministry of Environment and Forests, Government of India, issues on 25 September 2000 National Archives and Records Administration Federal Register (2007).

[6] 6)"Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management", The President, Part II. National Archives and Records Administration Federal Register (2009).

[7] 7) "Executive Order 13514 – Federal Leadership in Environmental, Energy, and Economic Performance", The President, Part VII.

[8] 8) "Sustainable Solid waste Management: Need of the hour", Nirmal Gram Nirman Kendra, Govardhan (Gangapur) Nashik the KPMG Government Institute (2010).

[9] 9) "The Executive Order on Improper Payments: A Practical Look at What Government Agencies Can Do to Address This Presidential Call for Action", KPMG LLP. World Business Council for Sustainable Development (WBCSD) (1996).

[10] 10)"Eco-Efficient Leadership for Improved Economic and Environmental Performance. World Resource Foundation (1996), "So what is integrated waste management? Warmer Bulleting: Journal of the World Resource Foundation, No. 49.