Special Section 1: Waste Management: Recent Developments in Pakistan

1. Waste Management

Waste, also referred to as garbage or rubbish, is unwanted material that is discarded. Heaps of litter is taken to dumpsites in developed countries. However, in developing countries, waste mostly ends up on road sides and empty plots. Untreated waste bears an economic cost for residents of the area and is also an environmental hazard. Increasing pollution leading to environmental changes and economic cost related to waste in terms of health hazards and negative impact on infrastructure have changed the way authorities view it. Though waste management is a relatively new phenomenon, it has caught the attention of governments all over the globe. Today the term waste management covers collecting, sorting, processing, recycling and reusing materials that would otherwise be considered as useless. It has moved from just being an environmental protection strategy to be an industry contributing to the economy.

Recyclable material markets are developing around the globe. With revenue generation capacity of $160 billion annually, more than 1.5 million people worldwide are employed in this industry. Japan's waste market stood at $67 billion in 2000 and United States at $47 billion in 2003.[1] Waste is mostly exported by developed countries to developing countries where it is used in secondary and recycling industries. Major part of Asia consists of developing countries, which are the potential markets for secondary and recycled material. Some of the Asian countries like China and India are becoming recycling workshops for the West. Similarly, Pakistan's ship breaking provides jobs for tens of thousands of people, as well as cheap raw material for the industry.

This special section discusses the global practices of waste management and its contribution to the economy while providing as insight into developments related to the industry in Pakistan.

2. Global Practices in Waste Management

Each year the world is producing approximately 4 billion tons of waste out of which 1.2 billion tons is municipal waste. According to an estimate only 1 billion ton is used. Out of this 600 million tons of waste is recycled to make 170 million tons of paper, 405 million tons of ferrous scrap, 25 million tons of non-ferrous scrap, and 5 million tons of plastics. Around 200 million tons of waste is used for

[1] Source: Bureau of International Recycling.

energy production, which produces 220 million barrels of oil/600,000 barrels per day of oil.[2]

Waste is treated in various ways; such as, recycling, burning, and burying. In global practices the goal is either to generate power from waste, to produce fertilizer from it, or recycle it for re-use. Currently Europe[3] is recycling 41 percent of its municipal waste and US 32 percent. China is investing US$ 6.3 billion to achieve its target of recycling 30 percent of its waste by 2030.[4] Incineration is a technique which is very popular worldwide and is used to convert waste into energy. At present there are more than 800 incineration plants worldwide of which, around 400 are in Europe, and 236 are in Japan alone.[5]

Waste-to-energy incineration plants are producing more power than all world's wind turbines and solar panels projects. Incineration plants in Europe provide 27 million inhabitants with electricity. Japan's incinerating plants produce energy equivalent to a nuclear power plant. Alexandria, Egypt, has a recycling plant where 120,000 tons of fertilizer is being produced annually. Europe plans to achieve an objective of 12 percent of domestic energy consumption and 22 percent of electricity from waste by 2010. Similarly USA aims to produce 5 percent of its power, 20 percent of its transport fuel, and 25 percent of its chemicals from bio-mass from farm, forest and municipal waste.[6]

Developing countries though late starters, have also started focusing on waste management and its economic value. International organizations, like United Nation Environment Program (UNEP) are working closely with the developing countries to help them in their capacity building to deal with issues related to handling of waste.

3. Waste Generation in Pakistan

While Pakistan's population has increased to more than 160 million, lack of adequate infrastructure is creating environmental hazards. In Pakistan, sources of waste include households, commercial areas, institutions, construction and demolition sites, industrial areas and agricultural disposals. Factors that affect waste generation in the country are size and type of the community and level of

[2] From Waste to Resource: An abstract of"2006 World Waste Survey" by Veolia Environmental Services, and Cyclopes.
[3] It includes 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.
[4] "The Economist" February 21st-28th 2009.
[5] The Worldwide Market for Waste Incineration Plants, by ECOPROG, March 2008.
[6] Source: Same as 4.

communities' income. Solid waste generated mostly ends up in empty plots, place of generation, in drains causing blockages in sewage system or on road sides. Composition of solid waste generally comprises of plastic and rubber, metal, paper and cardboard, textile waste, glass, food waste, animal waste, leaves, grass, straws, fodder, bones, wood and stones. Apart from this, substantial amount of hospital waste is also produced in the country.

Around 250,000 tons of medical waste is annually produced from all sorts of health care facilities. Some hospitals and municipalities burn their waste, which results in the production of large amount of highly toxic gases.[7] Open dumps of waste serve as breeding grounds for flies and mosquitoes creating health hazards. In addition, bio-nondegradable solid wastes including hospital and industrial wastes are found lying in heaps.[8] In Pakistan currently there are three primary ways of disposing waste - landfill, size reduction and screening.

According to various studies conducted on waste management in the country, about 54,888 tons of solid waste is generated daily in urban areas of Pakistan and 60 percent of it is collected by the municipal authorities. However, according to official estimates, 30 percent to 50 percent of the solid waste generated within most cities is not collected.

The Ministry of Environment undertook a study during 1996 on "Data Collection for Preparation of National Study on Privatization of Solid Waste Management in Eight Selected Cities of Pakistan". The study revealed that the rate of waste generation on average from all type of municipal controlled areas varies from 0.283 kg/capita/day to 0.613 kg/capita/day or from 1.896 kg/house/day to 4.29 kg/house/day in all selected cities. The projected population of the country for the year 2014 is 197.77 million on the basis of current annual growth rate of 2.6 percent resulting in an estimated projection of solid waste of 71,018 tons per day/ 25.921 m tons per year.

Solid waste generation in major cities of Pakistan on the basis of population in 2004 is given in **Table SS 1.1**:

[7] Hospital Waste Management in Pakistan, Case Study Report Special Waste Fractions: Hospital Waste, Rehan Ahmed, August 1997.

[8] Solid Waste Management in Pakistan by Engr. Muhammad Humayun Khan, 24th WEDC Conference, 1998.

Table SS1.1: Waste Profile of Major Cities in Pakistan

	Population (million) 1998 Census	Population (million) 2004 Census	Solid waste generation rate (kg/C/Day)	Waste generated (tons/day)	Tons/year
Karachi	9.269	10.818	0.613	6,632	2,420,680
Faisalabad	1.977	2.307	0.391	902	329,230
Hyderabad	1.151	1.343	0.563	756	275,940
Gujranwala	1.124	1.312	0.469	615	224,475
Lahore	5.143	6.4	-	5,000	-
Peshawar	0.988	1.153	0.489	564	205,860
Quetta	0.560	0.654	0.378	247	90,155
Bannu	0.046	0.054	0.439	24	8,760
Sibi	0.082	0.095	0.283	27	9,855
Remaining Urban Areas	27.261	31.818	0.453	14,414	5,261,110
Total of Urban Areas	42.458	49.554	4.078	24,181	8,826,065
Rural Areas	88.121	102.853	0.283	29,108	10,624,420
Sub-Total	130.579	152.407	4.361	53,289	19,450,485
Add 3 percent for hazardous waste				1,599	583,635
Grand Total				**54,888**	**20,034,120**

Source: (Draft) Guideline for Solid Waste management Jun 2005, Pakistan Environment Protection Agency.

4. Legal and institutional framework regarding Solid Waste Management in Pakistan:

As in most developing countries, policies and regulations regarding solid waste management in Pakistan are enacted and made in huge data and information vacuum. Despite that there is no dearth of legal framework on solid waste management in the country. Presently the legal rules and institutional framework dealing with solid waste management in the country include:

- Pakistan Environmental Protection Act (PEPA) 1997.
- Section 11 of the Pakistan Environmental Protection Act prohibits discharge of waste in an amount or concentration that violates the National Environmental Quality Standards (NEQS).
- Hazardous Substances Rules of 1999.
- Guidelines for Hospital Waste Management since 1998 prepared by the Environmental Health Unit of the Ministry of Health, Government of Pakistan.
- Hospital Waste Management Rules 2005.

- Hazardous Substances Rules 2003.
- National Environment Quality Standards Rules.
- Islamabad Capital Territory Bye Laws, 1968 by Capital Development Authority Islamabad.
- Section 132 of the Cantonment Act 1924 deals with Deposits and disposal of rubbish etc.
- There is also Prime Minister's committee on Climate Change which was established to ensure that Pakistan fulfills requirements of Clean Development Mechanism (CDM) under the Kyoto Protocol. This committee has a sub-divisional level technical committee on Waste Management.
- In 1994 Pakistan joined Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and Their Disposal. The Convention aims at enabling the member countries to initiate "environmentally-sound management" (ESM), the purpose of which is to protect human health and the environment by minimizing hazardous waste production.
- The Pakistan Environmental Protection Act 1997 Section 12 directs that an Initial Environmental Examination (IEE), and wherever the project is likely to cause an adverse environmental effect, an environmental impact assessment be filed with the Environmental Protection Agency (EPA) for review and approval before the initiation of construction at site.
- Currently the World Bank is supporting the Urban Unit of Government of Punjab responsible for reforming the solid waste management practices in the Province.

5. Waste Management in Pakistan

Before promulgation of the local government in 2001, the provincial Public Health Engineering Department (PHED) was responsible for the development and maintenance of water and sanitation services including solid waste management. Under the recently prevailing system of local government, it is the responsibility of Town/Tehsil Municipal Administration (TMAs); however the sighting of disposal facilities is primarily the function of Zila Council. Paid sanitary workers are employed by TMAs to sweep the streets and collect the trash at a specified place from where it is taken to the dumping site by the municipal carrier.

In addition to these there are some private entrepreneurs who have entered the field. Private sector is involved in waste management activities in the country may be divided into formal and informal categories. The formal sector consists of organizations and non-government organizations (NGOs). The informal sector is

significant in size as it consists of thousands of itinerant traders (called *kabarias* or *kabari-wallas*) spread throughout the cities who are engaged in collection of waste material of different kinds.

Private sector firms have initiated projects based on organic and in-organic waste management. Organic waste is used to produce organic fertilizer. Inorganic waste is first sorted into paper, plastic, tin, etc, and it is then sold to respective industries where it is recycled to make products such as; Plastic Wood and Tetra Sheets. Unplanned urbanization, poor sanitation and drainage system, inadequate human and capital resources for collecting waste, unavailability of official dumping sites, absence of weigh bridges for exact measurement of waste coming at sites, and almost negligible presence of recycling processes have negatively impacted waste management in the country.

In Pakistan there is immense potential to convert waste into resource for the economy. In this regard, some NGOs[9] and private firms[10] have already stepped into the industry. These organizations collect waste and reprocess it to produce fertilizer, plastic bottles, and tetra packs. A private firm has established a recycling facility in Lahore where it is engaged to produce a refuse-derived fuel (RDF) based on the concept of waste-to-energy. Similarly an NGO in Karachi encourages people to sell their waste to them and prepares soil-conditioning fertilizer. Another NGO is engaged in collecting urban waste in major cities of the country. It squeezes waste in order to dry it and finally produces waste pellets from it. The extracted liquid from organic waste is sold in market as liquid plant nutrient.

However operations of these organizations are limited in size and scope. Although there has been commitment on part the government to create opportunities of converting waste in to energy and other useful purposes. Lack of adequate infrastructure is inhibiting the industry to grow. The government of Pakistan is aware of the role of waste management industry. However there is a need for a more pro-active approach, likely to be based on public private partnership to help this industry provide a cleaner environment while adding value to the economy.

[9] Gul Bahao and Pakistan Environment Welfare and Waste Recycling Trust (PEWWRPT).
[10] Farooq Compost Fertilizer Corporation and Shanghai Shun Gong Environmental Protection Limited.

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