



A Glance at the World



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This column comprises notes and info not subjected to peer-review focusing on waste management issues in different corners of the world. Its aim is to open a window onto the solid waste management situation in any given country, major city or significant geographic area that may be of interest to the scientific and technical community.

Status of solid waste management practices in developing countries – A case study on Lahore, Pakistan

Volumes of municipal solid waste (MSW) are increasing rapidly all over the world as a result of urbanization, industrialization, technical and economic development. Waste management systems in developing countries are less advanced than those in developed countries, mainly due to shortage of resources, expertise and technological capacity, but also in some cases political will. This paper presents an overview of the municipal solid waste management system in Lahore, Pakistan, assessing its weaknesses and making recommendations for improvements in collection, transport and disposal methods. The aim is to identify the best practices among the different technical alternatives available in developed countries, and to apply them within the cultural, social and economic context of Lahore.

In the initial phase, a study was conducted of current and historic documents and data related to the municipal waste management in Lahore, including policies and regulations for Solid Waste Management (SWM) and environmental protection both at federal and provincial level. Available data on population growth and economic planning were also analysed. The next phase involved interviews with waste management personnel and data collection from Lahore Waste Management Company (LWMC). In the final phase of work, the Mehmood Booti landfill site was visited and interviews were carried out with scavengers operating at various dumpsites. A small-scale public survey was also conducted to understand public awareness regarding the effects of waste management on environment and human health.

National environment policy in 2005 (Ministry of Environment, 2005) addressed environmental risks caused by poor waste management, proposing development of proper management plans for municipal, hazardous and hospital waste and increasing public awareness of waste minimisation and recycling. Responsibility is in the hands of the provinces, which devolve implementation to districts, municipalities and union councils. For example SWM byelaws passed in 2005 in Punjab province hold city district governments responsible for cleaning streets and for protecting public health. However, there are currently no standardised laws for the collection and disposal of solid waste. Guidelines exist only for hospital waste management, but due to the ubiquitous presence of illegal medical clinics, medical waste is present in the municipal

solid waste stream as well, posing a serious threat to health and safety of the general public. On the other hand, regulations for the protection of the environment are fairly well developed: the Pakistan Environmental Protection Act, 1997 (PEPA, 1997) laid out principles for protection of air, water and environment in general. However, their implementation is very weak due to inadequate human, administrative, technical and financial resources.

There are therefore shortcomings both in policy for waste management and in enforcement of such regulations. In most cases the relevant authorities lack awareness of the potential hazards, and may handle and dispose of amounts of hazardous waste without any caution. Assessing the magnitude of the problems is also difficult because of lack of data. There is an urgent requirement for introduction of comprehensive-SWM regulations in Lahore, and their efficient implementation.

Lahore case study

Lahore is the capital of Punjab, the second largest province of Pakistan. The area of Lahore is about 1800 km² and the population was estimated by the LWMC at 8.08 million in 2011. The rate of population increase in Lahore is between 3.7% and 7.4% which is very high compared to the average population increase of 1.551%. Lahore has the most rapidly developing economy of all cities of Pakistan. Out of its 150 union councils 130 are urban and 20 are rural. It has been administratively divided in 9 towns.

The SWM system in the city district of Lahore was formalised under the Lahore Urban Project (LUP) in 1978. In 1980, a mission of the World Bank first addressed the issues of SWM in the city. In 2001, the Solid Waste Management Department of CDGL was made responsible for the collection and disposal of solid waste in the Lahore District. The CDGL operates under the Local Government and Community Development Department (LG&CDD) through Punjab Local Government Ordinance, 2005. In 2011 Lahore Waste Management Company (LWMC) was tasked with undertaking waste management in the city by the CDGL.

Municipal solid waste (MSW) includes wastes generated in households, commercial areas, industries, parks and streets. The main constituents are biodegradable waste (66%), textiles (8%), plastic and rubber (6%), paper and cardboard (3%), glass and ceramics (1%). In addition there are small amounts (<1%) of hazardous materials.

LWMC has responsibility for collection, transportation and disposal of waste. The collection procedure involves road sweeping and cleaning of communal places such as gardens, parks, markets, removal of dead animals, bulky waste and grass waste. The effectiveness varies dramatically between different areas. When it operates well there are no problems of litter, infrequent collection, burning of waste or waste dumps within towns. However, residents of low income areas report infrequent collections and in some cases have to pay waste pickers themselves in addition to the regular waste management charges.

One of the major components of a successful waste management system is the characterisation of waste. Waste may either be characterised by constituent material type or by source (e.g. domestic, industrial). In the SWM system of Lahore, waste is characterised by its source rather than type and there is no sorting at source. The survey conducted in Lahore as part of the present research revealed that even hazardous waste such as lead batteries, paints and used oil is stored with household waste. The exception is medical waste from the hospitals, which is treated under the guidelines for hospital waste management in the three incinerator facilities available at designated hospitals in the city.

Three different methods of primary collection are found in the city (Batool and Chaudhary, 2009):

- Door-to-door waste official collection service provided to households (for payment) by private contractors, using carts or (more commonly for housing complexes) trucks. The waste is taken to large storage containers or skips;
- disposal of waste in communal containers or skips by businesses and households;
- individual (unofficial) waste pickers, scavengers, collecting waste from door-to-door, for payment. They will sort out materials of recyclable value and dispose of the remainder, either responsibly (to skips) or by uncontrolled dumping or burning.

Skips are sources of problems: they are a focus for unregulated waste dumping, and are associated with vermin together with gaseous and liquid emissions. Secondary collection of waste from

skips involves collection by trucks or other large vehicles and transportation to final disposal sites, nominally on a daily basis although this is rarely achieved. The three sites are Mehmood Booti Landfill site, Saggian Dumpsite and Bagrian/Tibba Dumpsite. All are just open dumping grounds, with uncontrolled public access, no control of gaseous or liquid emissions, and no daily cover to reduce effects of vermin, prevent rubbish blowing away and to reduce run-off from rainwater. Two classes of materials (recyclable solids and putrescibles which can be used to make compost) have the possibility of creating revenue, which could be used for financing improved waste management systems. Recyclable materials (glass, plastic bottles, paper and metals) are gathered at various stages in the waste management process, mainly by individuals, although a few private waste management companies are trying to incorporate recycling into their practices. Door-to-door waste pickers will sort recyclates from what they collect from households. Scavengers will collect recyclates from skips. There are whole communities of scavengers living close to dump sites making a livelihood from gathering recyclates. Materials are sold to local junk shops and collectors who sell them on to the major junk dealers in the city. A composting facility has been introduced by a private sector partner in one of the dump sites. Lahore Compost (Pvt) Limited (LCL) is responsible for processing up to 1000 tons of waste from Mehmood Booti dumpsite every day, using a windrow composting method.

Problems and proposed solutions are summarised in the table, including the nature of the mechanism by which interventions could be achieved. Two major innovations to the existing system are proposed. First, the introduction of transfer stations following primary collection. This will enable sorting of waste, solve the problems to be found around skips and open up the possibility of improvements to the revenue-creating aspects of waste management. Second, linking of the formal and informal waste management sectors is proposed by legalising and validating some of the activities of the scavengers. Currently there is conflict between the two, but with the proper structures in place their activities could be complementary rather than adversarial. The livelihoods of scavengers may be secured by restructuring the way in which recyclates are sold to junk dealers, putting in place co-operatives

Table 1

Problem	Primary cause							Operational solution	Primary mechanism
	Administrative weaknesses	Lack of regulations	Lack of financial resources	Lack of technical facilities	Lack of technical knowledge	Lack of public awareness	Lack of political will		
Litter	X	X				X		Impose fines	SP, Leg, Enf, Pub
Inefficient collection	X	X					X	Enforce current operations; plan more rational collections	SP, Enf
Inefficient waste logistics	X	X		X	X			Short-term: improve route planning; improve vehicle maintenance. Long-term: Introduce transfer stations	SP, leg, Enf
No formal recycling system		X	X	X	X	X		Introduce scavenger co-operatives. Legalise activities.	SP, Priv
Open dumping	X	X				X		Create and enforce legislation.	Leg, Enf, Pub
Open burning of waste	X				X			Enforce existing legislation	Enf, Pub
Unsanitary landfill sites	X	X	X	X	X			Short-term: Improve operational management	SP, Leg, Enf, Pub, Fin, Priv, Tech.
								Long-term: build sanitary landfill sites	

Problems and proposed solutions for waste management in Lahore. Primary mechanisms are: Strategic planning (SP); Legislation (Leg.); Enforcement of policies and legislation (Enf.); Public education and participation (Pub.); Financial resources (Fin); Participation by private sector (Priv.); Technical knowledge (Tech).

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