Evaluation of The Urban Solid Waste Management System in Kampala, Uganda

Prof. E. N. Sabiiti
Faculty of Agriculture, Makerere University

Dr. C. B. Katongole
Faculty of Agriculture, Makerere University

Abstract

The problem of waste is a real challenge in the urban areas of developing countries. In Uganda, the menace of urban waste has been further worsened by the ever increasing urban population, and the vast differences in waste composition at the household level owing to differences in culture, standard of living, dietary habits etc. The current generation rate of urban solid waste in Kampala, the capital city of Uganda ranges between 0.5 kg and 1.2 kg/capita/day, with a population of about 2.0 million people. The waste generated is mainly biodegradable, comprised of vegetable matter or crop waste (73.8%); the biggest fraction of which is generated in the markets as a result of the practice of selling food crops in their raw form. The responsibility of solid waste management (SWM) lies with local governments as specified in the Public Health Act of 1964 and the Local Governments Act of 1997. In Kampala SWM is based on two systems: the House-to-House system and the Central Collection Centre system. Both systems are either run by the public sector or by private operators. This paper discusses the strengths and weaknesses of the two systems. The key elements of the two systems are also presented.

1. Introduction

Traditionally, materials that have lost their value in the eyes of the first owner are termed as "waste". For that reason, some people call it "garbage", "rubbish", "refuse", "litter" and "trash". However, Jagannath (2000) maintains that there is nothing like waste in nature, it is only a resource at a wrong place. According to Harris *et al* (2001), a material is only a "waste" if it is useless; as soon as it is usable it becomes a resource. Nonetheless, the European Union (2008) defined waste as any substance or object, which the holder discards, intends to discard or is required to discard.

The term "urban solid waste" or "municipal solid waste" refers to the waste in the solid state generated by human activities in urban or municipal centres. This includes both organic (biodegradable) and inorganic materials (non-biodegradable). The inorganic wastes include soil debris, metal scrap, paper, plastics (such as basins, cups, plates, toys, polyethylene bags, cosmetics and food containers), textiles and leather, broken bottles, dry batteries, glass as well as electrical and electronic equipment (e-waste). Solid waste management is receiving increasing attention world over, particularly in developing countries (Chen *et al*., 2010), where it is a real challenge in the urban areas. In rural areas the waste generated is conveniently and unobstructively disposed of in open land spaces, gardens and open pits.

Various factors amplify the urban solid waste problem in developing countries. Most importantly, there is rapid industrialization and increasing urban population. The scenario is worsened by the fact that many urban authorities in developing countries are characterised by lack of planning and programmes, weak public awareness, weak government policy and laws, insufficiency of qualified personnel, weak institutions or structures, limited community participation, as well as lack of or insufficient utilization of resources. This paper reviews waste management practices and problems in Kampala, the capital city of Uganda.

2. Background Information of Kampala

Kampala is the capital city of the Republic of Uganda. Its history can be traced back in the 1600s when it was established as the capital of Buganda Kingdom. It served as a political and administrative capital until 1893, when the British declared Uganda, their protectorate and transferred the capital to Entebbe. It returned as capital city in 1962 at Uganda's independence. In Uganda's Local Government administrative system, the lowest administrative unit is the village, several villages constitute a parish and the parishes are assembled into sub-counties (for rural districts) or divisions (for urban districts). Correspondingly, Kampala district is divided into five administrative divisions, namely: Central, Kawempe, Lubaga, Makindye and Nakawa. The district covers a total area of 189 square kilometres. The population of Kampala and its suburbs has grown from 1.2 million (2002) to the present estimate of about 2.0 million people (UBOS, 2010). The rapid urban population growth is largely attributed to rural urban migration.

3. Solid Waste Situation in Kampala

It is estimated that about 1,000 tonnes of solid waste are generated per day in Kampala. The estimated daily per capita generation ranges between 0.5 kg and 1.2 kg, compared to 0.3 kg for Dar-es-Salaam and 0.8 kg for Nairobi (Ekere, 2009). However, unlike cities in the industrialised countries, which mostly generate waste with low organic material (Hoornweg, 1999); Kampala generates solid waste rich in vegetable matter or else known as crop waste (Table 1). The biggest fraction of which is generated in the several markets as a result of the practice of selling food crops in their raw form (KCC, 2003; Sabiiti *et al*., 2004; Ekere, 2009).

Table 1: Composition of solid waste generated in Kampala compared with London

	Percentage	
Material	**Kampala**	**London**
Vegetable matter	73.8	38.0
Paper	5.4	18.0
Tree cuttings	8.0	5.0
Others	**12.8**	**39.0**
Street debris	5.5	
Metal	3.1	
Saw dust	1.7	
Plastic	1.6	
Glass	0.9	

Source: KCC, 2003 (for Kampala); Parfitt, 2002 (for London)

According to Katongole *et al*. (2008) and Ekere (2009), the waste arising from this practice of selling crops in their raw form is chiefly of two types: the unwanted products or crop parts that are either rejected or cut off during the process of sorting, and the materials used for packaging when transporting crops to Kampala. For easier handling, it is a common practice that traders pack crops (banana fingers, sweet potatoes, potatoes, cassava etc.) in gunny sacks and use materials such as banana leaves, banana pseudo-stem sheaths, grasses (of different types) and sweet potato vines to close-off the openings of the sacks. The pseudo-stem sheaths are also used to wrap bunches of the dessert bananas (Gros Michel - traditionally known as *bogoya*) as a way of protecting their skins from cuts or bruises. The sheaths are also used to pad the bottom and sides of the trucks used in the transportation of bananas. On reaching the markets in Kampala, the sacks are opened and the wrapping materials dumped in the markets as waste. Besides the markets, solid waste in Kampala is also produced by households or residential areas, public areas and streets, as well as construction, agricultural, commercial, institutional and industrial activities.

On average the solid waste collection levels in Kampala are estimated at only about 36% of the total generated (Ekere, 2009). As a result, the uncollected waste is dumped indiscriminately on the streets, in or around garbage bins/skips, and in drains, so contributing to flooding, as well as causing inconvenience and serious environmental and health problems. Due to the increase in the population, there is an increased demand for food in Kampala. In view of the fact that most foodstuffs are marketed in their raw form, the implication is an increased magnitude of crop waste generation, both at the market and household levels. Additionally, the solid waste in Kampala is not separated into fractions like biodegradable, paper, glass, plastic, metal, and so forth at the place where it is generated. This implies that waste quantification and inventorying according to category is practically impossible.

4. Solid Waste Management Policies, Laws and Regulations in Kampala

In Uganda, the responsibility of solid waste management lies with Local Governments as specified in the Public Health Act of 1964 and the Local Governments Act of 1997. Although the Public Health Act of 1964 does not emphasize solid waste management (which was not a major problem then), the Act promoted good health through empowering health workers to prevent and minimize disease transmission resulting from unhygienic practices, and improper environmental management. However, the Local Governments Act of 1997 clearly mandates the city authority (Kampala City Council - KCC) the responsible for all the activities dealing with solid waste; from the point of production through collection to disposal. The law mandates local governments with the overall responsibility of environmental management.

The other law that directly provides for the management of solid waste in Uganda is The National Environment Statute (NES) of 1995. It is this Statute that establishes the National Environment Management Authority (NEMA) as the overall body, charged with the management of environmental issues. In general, the Authority in consultation with Lead Agencies is empowered to issue guidelines and prescribe measures and standards for the management and conservation of natural resources and the environment. The Statute requires that the central government collaborates with the Local Governments in the management of local issues including among others, solid wastes.

5. Solid Waste Management System in Kampala

For long, solid waste management in Kampala was the sole responsibility the city authority (KCC); right from the point of production through collection to disposal. Due to lack of resources, KCC was unable to handle waste collection and disposal. This resulted into the privatization of waste management following the Kampala City Council (Solid Waste Management) Ordinance of 2000. However, in spite of that, privatizing waste collection has proved to be inadequate for the solid waste problem in Kampala; the private collectors only collect waste from areas where people can afford to pay for their services (Ekere, 2009).

Solid waste management in Kampala is based on two systems: the House-to-House system and the Central Collection Centre system. Both systems are either run by the public sector or by private operators. The House-to-House system is mainly used in rich and some middle income areas, while the Central Collection Centre system is dominantly applied in low income areas. In some areas both systems are used concurrently. Each area is served exclusively by one service provider, who is expected to collect and transport the waste to the official designated waste landfill (Kiteezi). In the Central Collection Centre system, the Local Authority normally provides the containers and bears all the costs. In the House-to-House system, residents are obliged to register with the accredited contractor and required to pay a user fee that varies between 5,000 and 20,000 Uganda Shilling (2.5 – 10 US$) per month depending on the amount of waste generated and frequency of collection.

Although the waste management hierarchy usually places waste reduction (minimization and avoidance) at the top followed by reusing and recycling with disposal at the bottom (Wilson, 1996), solid waste management is based on collection and disposal at landfills in many developing countries (Asomani-Boateng and Haight, 1999). Correspondingly, the solid waste management system in Kampala is based on collection and disposal at the Kiteezi landfill. Waste reduction is very difficult to promote because its realization usually requires a significant

adjustment in life style (Price and Joseph, 2000) and active participation of the general public (Yau, 2010), hence making the promotion of recycling not an easy task.

Landfilling is preferred by developing countries because it is a low-cost method. However, the method has limitations. According to Messineo and Panno (2008), landfills should be utilized as a last resort method for waste management. For instance, the Kiteezi landfill site is located within the human settlement community where it has caused social discomfort and environmental pollution. During the process of land landfilling, the waste is subjected to aerobic decomposition. This process has been reported to create social tensions among the communities near the landfill, particularly with respect to odour pollution, flies as well as vermin and pests. Basing on the prevailing waste generation rates, it is imperative to extend the Kiteezi landfill site or create a new one. However, it is extremely costly to find new land. The landfill has a leachate treatment facility, which operates by means of mechanical aeration to reduce the biological oxygen demand of the leachate.

Furthermore, although Uganda has local guidelines for the management of toxic and harzadous products (Environment Statute, 1995), the country is not adequately addressing its obligations, such as establishing a special facility where such waste can be dumped. For instance, the National Referral Hospital (Mulago) and Uganda Batteries Limited (a private automotive Lead – Acid batteries manufacturer) have incinerators which they use to burn medical and battery hazardous solid wastes, respectively, but the ashes from the incinerated wastes are also disposed of at the Kiteeze landfill. This practice has greatly contributed to the high levels of toxicity of the leachate due to dissolution of some of the toxic elements. The result of this practice is the high cost of treating the leachate that the operators of the leachate treatment facility have to incur in order to meet the standards set by the National Environment Management Authority (NEMA).

6. Elements of The Waste Management System in Kampala

Like in any other developing country, the key elements that describe a waste management system are: household waste generation and storage; waste reuse and recycling at the household level; primary waste collection and transportation to transfer stations or community waste heaps; management of the transfer station or community waste heaps; secondary collection and transport to the waste disposal site; and waste disposal in landfills.

6.1. Household Waste generation and Storage

In Kampala, the use of specialized waste containers is limited to the high class households. Some private waste collection agencies provide waste collection bins to their clients at a fee. This is mostly in the affluent residential areas (only 20% of the urban population in Kampala enjoys this service). The resource constrained households improvise with various alternatives of storing garbage, which include plastic (polyethylene) bags, old metallic tins, paper boxes, broken plastic basins, gunny bags etc. The majority of the households use plastic bags and gunny bags as their major storage facilities. The plastic shopping bags (either provided free of charge or purchased by consumers) that are used to carry goods from retail shops and supermarkets are kept for use as trash storage bags. In one way or another, the lack of proper waste storage facilities makes it difficult to do waste separation at source. The failure to separate wastes makes it practically

impossible to inventory and correctly quantify urban solid waste in Kampala, hence leading to unreliable waste management requirements and policy measures.

6.2. Waste Reuse and Recycling at Household Level

According to Zurbrugg (2002), waste recovering and recycling in developing countries usually takes place in all elements of the waste management system and is widely practiced by the informal sector. In Kampala, waste reuse and recycling at household level is mainly represented by urban agricultural activities and "waste pickers or waste scavengers". Urban agriculture is a recognized informal urban waste management practice in many developing countries (Richardson and Whitney, 1995; Allison *et al*., 1998; Harris *et al*., 2001), given the fact that the conventional municipal solid waste management approach based on collection and disposal has failed to provide efficient and effective services to all urban residents (Asomani-Boateng and Haight, 1999). The role of urban agriculture in urban waste management in developing countries like Uganda is boosted by the occurrence of a much larger portion of organic material than in the first world countries (Harris *et al*., 2001). Farmers in Kampala often use this organic matter both as animal feed (Katongole *et al*., 2011) and for improving the soil nutrient status (compost).

Besides urban agricultural activities, some people move from place to place collecting beverage and beer bottles, which they re-sale to manufacturers. Their main clients are house keepers, house wives and children who pick the bottles from any place including waste containers of business places such as bars and retail shops. Also there are people (especially the medium to high income areas) who buy broken bottles and glass for fixing on top of their perimeter walls to deter would-be thieves and robbers form accessing their homes. The scavenging of waste heaps by street children is also on the increase in Kampala. The street children do it particularly in search of food leftovers and packaging materials, which they use as beddings (Ekere, 2009).

6.3. Primary Waste Collection and Transportation to Transfer Stations or Community Waste Heaps

In Kampala, the waste generated from different households is kept at a common or central point from where collection vehicles (private collectors and urban authorities) pick it. Storage facilities at this level include stationary bunkers or masonry bins, and movable metallic garbage skips. These storage facilities are provided by the urban authorities.

Currently, garbage skips are exclusively used in market places. The reasons behind this management decision were: illicit dumping especially around the skips; long distance between the location of the skip and the sources of the waste in that residents ended up dumping the waste along the way, especially at night; the agreement between the private collectors and the urban authorities requires that the companies provide primary storage facilities to all clients in their areas of operation (because of this, it was deemed not necessary for the urban authorities to continue providing secondary storage facilities); under the agreements, the urban authorities retained the mandate to collect waste from all the markets.

6.4. Management of The Transfer Station or Community Waste Heaps

The waste generated from households and commercial facilities is usually stored in various types of storage containers before being transferred to community heaps or storage bins, which are provided by the city authority.

7. Conclusions

- A sustainable solid waste management approach requires an increased awareness among citizens on the importance of source separation and minimize contamination.
- Recognition of the role played by the informal waste collection methods is a must if a a sustainable waste management system is to be realized.

References

Allison, M., Harris, P.J.C., Hofny-Collins, A.H. and Stephens, W. 1998. A review of the use of urban waste in peri-urban interface production systems. The Henry Doubleday Research Association, Coventry, UK.

Asomani-Boateng, R. and Haight, M. 1999. Reusing organic solid waste in urban farming in African cities: A challenge for urban planners. In: Olanrewaju B. Smith (Ed.), Urban Agriculture in West Africa / Contributing to Food Security and Urban Sanitation. International Development Research Centre. National Library of Canada, pp 138-154.

Chen, X., Geng, Y. and Fujita, T. 2010. An overview of municipal solid waste management in China. Waste Management. 30: 716 – 724.

Ekere, W. 2009. Assessment of waste situation and potential for reuse in urban and peri urban areas of Lake Victoria crescent. PhD. Thesis, Makerere University, Uganda.

European Union. 2008. Directive 2008/98/EC of the European Parliament and of the Council of November 2009 on waste and repealing certain Directives. Official Journal of the European Union. L 312/3 – 30.

Harris, P.J.C., Allison, M., Smith, H.G., Kindness, H.M. and Kelley, J. 2001. The potential use of waste-stream products for soil amelioration in peri-urban interface agricultural production systems. In: Drechsel, P., Kunze, D. (Eds.), Waste Composting for Urban and Peri-Urban Agriculture: Closing the Rural-Urban Nutrient Cycle in Sub-Saharan Africa. International Water Management Institute (IWMI) and Food and Agriculture Organization (FAO) of the United Nations. CABI Publishing: 1-28.

Harris, P.J.C., Allison, M., Smith, H.G., Kindness, H.M. and Kelley, J. 2001. The potential use of waste-stream products for soil amelioration in peri-urban interface agricultural production systems. In: Drechsel, P., Kunze, D. (Eds.), Waste Composting for Urban and Peri-Urban Agriculture: Closing the Rural-Urban Nutrient Cycle in Sub-Saharan Africa. International Water Management Institute (IWMI) and Food and Agriculture Organization (FAO) of the United Nations. CABI Publishing: 1-28.

Hoornweg, D.T.L. 1999. What a Waste: Solid Waste Management in Asia. The International Bank for Reconstruction and Development. The World Bank.

Jagannath Er.V. 2000. Validation of Micro treatment plants for community solid waste using Environmental Sound Technology criterion. Internet Conference on Material Flow Analysis of Integrated Bio-Systems (march-October 2000). www.earthplatform.com/environmental/sound/technology.

Katongole, C.B., Bareeba, F.B., Sabiiti, E.N. and Ledin, I. 2008. Nutritional characterization of some tropical urban market crop wastes. Animal Feed Science and Technology. 142: 275-291.

Katongole, C.B., E. Sabiiti, F. Bareeba, and I. Ledin. 2011. The utilization of market crop wastes as animal feed in urban and peri-urban livestock production in Uganda. Journal of Sustainable Agriculture. 35(3): 1 - 14.

KCC. 2003. City Development Strategy, Kampala Development Plan. 2003/2004. Kampala City Council.

Messineo, A. and Panno, D. 2008. Municipal waste management in Sicily: practices and challenges. Waste Management. 28: 1201 - 1208.

Mugagga, F. 2006. The Public - Private Sector Approach to Municipal Solid Waste Management. How does it Work in Makindye Division, Kampala District, Uganda? Master of Philosophy Thesis, Norwegian University of Science and technology, Norway.

Parfitt, J. 2002. Analysis of household waste composition and factors driving waste increases, WRAP, Banbury, UK.

Price, J.L. and Joseph, J.B. 2000. Demand management: a basis for waste policy: a critical review of the applicability of the waste hierarchy in terms of achieving sustainable waste management. Sustainable Development. 8: 96 - 105.

Richardson, G.M. and Whitney, J.B.R. 1995. Goats and garbage in Khartoum, Sudan: A study of the urban ecology of animal keeping. Human Ecology. 23(4): 455-475.

Sabiiti, E.N., Bareeba, F., Sporndly, E., Tenywa, J.S., Ledin, S., Ottabong, E., Kyamanywa, S., Ekbom, B., Mugisha, J. and Drake, L. 2004. Urban market garbage: a hidden resource for sustainable Urban/Peri-urban agriculture and the environment in Uganda. The Uganda Journal. 50: 102 – 109.

Zurbrugg, C. 2002. Urban solid waste management in low-income countries of Asia. How to cope with the garbage crisis. Presented for: Scientific Committee on Problems of the Environment (SCOPE). Urban Solid Waste Management Review Session, Durban, South Africa, November 2002.