

SOLID WASTE MANAGEMENT IN URBAN CENTERS:  
THE CASE OF KAMPALA CITY - UGANDA.

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ABSTRACT

A deteriorating urban environment is the enemy of sustainable development. Protecting the environment is not an alternative to economic growth - it is a precondition of efficient economic development (UN 1992:25).

Solid waste management is one of the major environmental problems facing city municipalities today. In Kampala City, like other urban centers in Uganda, and in most other developing countries, this important service is based on the local government's centralized collection, transportation and disposal strategy. Currently this approach has proved to be inefficient due to the heavy financial requirements involved. There is an urgent need to provide for the safe disposal of the solid waste generated by urban residents and businesses. The increase in urban, economic and industrial activities, as well as the resultant population increase have led to an increase in the quantity of solid waste generated. One method employed in collecting data included field trips to dump sites which are used by the Kampala City Council (KCC). Monitoring of collection points both in the Central Business District (CBD) and in residential areas was also used. Interviews were conducted on personnel, both in the City Engineering and Health Departments and on residents in high, medium and low density residential areas. The results of the study indicate that alternative means to waste disposal need to be developed with population growth and economic development in mind. The state of solid waste management in Kampala needs immediate attention if the urban environment is to be saved from further deterioration. This study is an attempt to characterize the composition of solid waste in Kampala, and the management options that the KCC has. The study will also suggest ways to alleviate some of the present solid waste management concerns.

Introduction: Background and Significance

Modern metropolitan centers consume a great deal of resources including energy, water, food and raw materials, and they also generate large quantities of waste products. The success with which a city can manage these wastes is one indicator of the ability of the organizations within the city to work together to solve major urban environmental problems (Middleton, 1995). There is no single best solution to waste disposal, but a wide range of possibilities exists. Solid waste is at the core of urban environmental problems. In Uganda, the rapid and often unauthorized growth of the urban areas has in many cases outpaced the ability of the urban authorities to provide adequate housing, roads, water supplies, sewers and collection of solid waste. Although the environmental problems associated with garbage do not disappear with collection, uncollected garbage exacerbates many of the environmental hazards associated with urban centers. Such hazards include fire, pests and disease vectors which create human health problems. Uncontrolled disposal by burning and dumping adds to atmospheric and hydrologic pollution loads, clogs waterways and increases the danger of flooding. This has been experienced in parts of Kampala like Bwaise, Kisenyi, Katwe and Kalerwe. The most pervasive impression of Kampala is that of filth and squalor, unswept streets and lanes, scattered dumps of accumulated trash and refuse whose removal and disposal appear to be beyond the capability of the authorities who are

currently in charge. The status of waste management in Kampala, just like in other urban centers in the country, is unhygienic and unsatisfactory.

Solid waste management in the city is the responsibility of the cleaning section within the Engineering Department. They are charged with the collection, transport and disposition of all solid waste, the cleaning of the streets, collection and disposition of dead animals, cleaning of the alleys, and roadside drain and choke clearing. The section is directly responsible for maintaining a clean environment in the city. However, its share of solid waste collection ranges from 20-30% of the total solid waste generated. Private institutions collect and dispose of some of the solid waste, a few individual households use open incineration, and some private companies and individuals buy recyclable solid waste. But the bulk of the urban solid waste (70-80%) is left to decompose where it is dumped.

Inadequate collection and disposal of municipal solid waste is a persistent urban problem in developing countries. Uncollected wastes end up in neighborhood dumps where disease-carrying insect vectors and rodents proliferate, or in street drains where they can cause flooding and subsequent road damage, and traffic obstructions (Bernstein, 1995, UN, 1987, Douglas, 1986). Even where solid waste is collected, environmentally safe disposal facilities rarely exist. Wastes disposed off in open dumps are major sources of surface and ground water contamination, as well as air pollution (Nyakaana, 1995, Brunn and Williams, 1987, Goudie A, 1986). The attempt in this paper is to elucidate the current solid waste strategies of Kampala, Uganda as a model to other African urban areas in order to point out areas of inefficiency and mismanagement, and then to recommend adaptable strategies to solve the solid waste dilemma.

### Research Methodology:

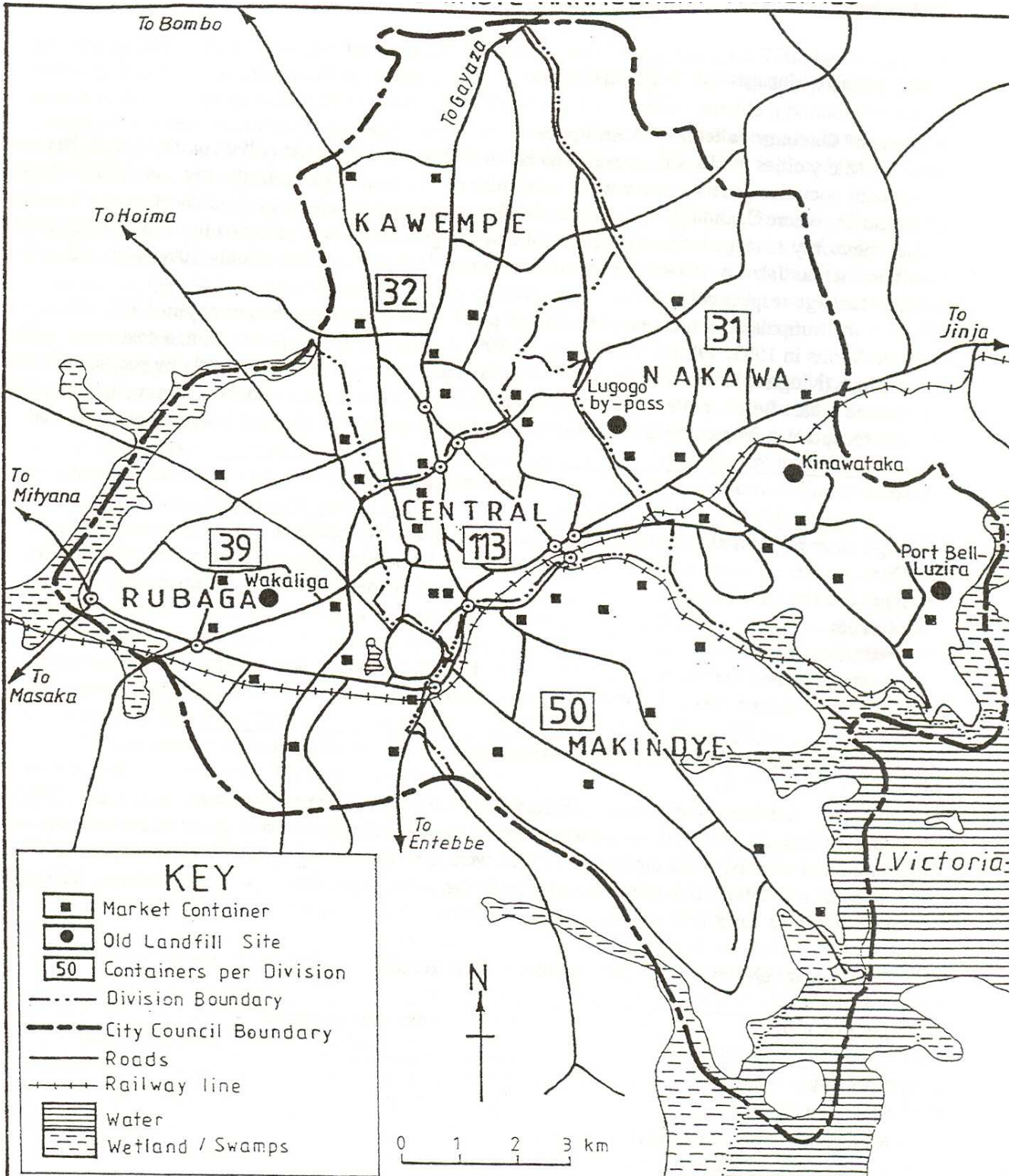
Data (and information) for this paper were obtained by employing different methods. Apart from reviewing the existing documents on Kampala solid waste management obtained from government sources, field trips were made to the various dumping sites used by the Kampala City Council. Residents living around these sites and local council officials (LCs) were interviewed about their relationship with the KCC and about the steps that were taken to alleviate the problems of odor, pests and leachate. Information regarding the capacity and constraints of solid waste management in the city was obtained from the officer in charge of solid waste management within the Engineering Department. Officials of the Health Department provided useful information regarding health hazards associated with improperly managed solid waste.

### Composition of Solid Waste Generated

Solid waste generated in the city is largely composed of vegetable matter (70%) from discarded foods. There are two broad categories of waste: 1. Residential; 2. Commercial. Household waste contains mainly wet organic material (70-80%). Today only about 10% of the households in the city are served by the KCC, while the remaining waste is disposed of by the generating households. Waste from markets is mainly raw vegetable matter, food refuse, some scrap metal and other inorganic materials.

The other forms of solid waste are primarily commercial waste from offices, retail shops, warehouses and hotels. Industrial waste is composed mainly of packaging material, food wastes, metal, plastics, textiles and fuel ash. Street waste is generated from street sweeping and consists of sand, litter, drain cleanings, animal fecal material and actual dead animals. Construction and demolition wastes include lumber, pipes, bricks, masonry and other construction materials from cleared building sites. Abandoned vehicles, as well as special waste generated from hospitals, slaughter houses and cesspool waste are problems of special importance. This type of waste calls for special treatment, handling and disposal strategies that are different from other tasks.

# KAMPALA CITY SOLID WASTE MANAGEMENT FACILITIES



## Solid Waste Management in Urban Centers

### State of Garbage collection in Kampala

Many cities world wide generate more solid waste than they can collect or dispose of. The most affluent societies generate more waste than their poorer counterparts. In the low and middle income countries, where Uganda falls, management of municipal wastes consume 20-50% of the city's budget, but they only manage a fraction of the solid waste generated. According to the World Bank. (1992) cities such as Jakarta, Dar-es Salam and Kampala collect and dispose of only 10%,34% and 20% of their garbage respectively.

In Kampala an estimated 1,000 tons of solid waste was generated per day in 1996, which is up from 8 tons in 1993. Of this waste, only 20-30% is collected and disposed of, at a cost of 5.6 million shillings (Mugisa, 1996). The rest is either put into gardens or composted, mostly by people in the high income areas. Before collection, refuse is stored in locally manufactured steel communal containers. The receptacles for storage and transportation of solid waste are indicated below.by area and size

Area	Type of Receptacle
High class residential areas	4 and 5 cubic meters 4
Civic centers	and 5 cubic meters 15
High density Block/Flats	cubic meters
Markets	4,5, and 15 cubic meters 15
Institutions	cubic meters
Slaughter houses	15 cubic meters
Some low income areas	4 cubic meters

(Source: Kampala City Council, Cleansing section).

The distribution of these containers varies. The central division has the highest number (113) and Nakawa has the least (31), as shown on the map. This distribution, to a great extent depends on the population density. Concrete bunkers which were used for collecting solid waste in National Housing Flats and institutions like Makerere University are falling apart due to poor maintenance. The communal containers have replaced the concrete bunkers.

The types of vehicles used in the transportation of the solid waste are as follows

Type of Vehicle	Number of Trucks
Tata - Skip vehicle	16
	2
Mercedes Benz Atlas	2
Mercedes Benz Skip vehicle	1
Tractor trailer Deuz	21
Total	

(Ref. - Kampala City Council - Cleansing section)

### Frequency of Collection and Disposal

In Kampala city, the frequency of collection ranges from a daily basis from the markets, twice weekly for the high income residential areas and from other places it is once a week. The garbage collected is disposed of at landfills or open dumps. The KCC used to own three landfills near the

Lugogo bypass, 3-4 km from the city center; Port Bell/Luzira 12 km to the East; Wakaliga 7 km to the west and Kinawataka (Mbuya) 10 km to the east as shown on the map. These waste disposal sites were closed at different times before 1993. Today the KCC owns two landfills outside its boundaries, one at Lweza off Entebbe road where a disused murrum pit is being filled up, and another one is at Lusanja 4 km from Mpererwe on Gayaza road. This landfill is still under construction, but is already being used. It lies within KCC jurisdiction on a valley slope overlooking a stream bed.

This method of garbage disposal is common in all cities and is not free from side effects. This method is successful as long as it removes the refuse without creating a health hazard and does not affect aesthetic values too greatly (Goudie, 1986). However, the side effects on human health, the atmosphere, the soil, water bodies and on the appearance of the landscape may be considerable. Especially in terms of pests, smoke, dust, odors, blowing paper and polyethylene (kavera), water pollution and increased traffic.

In Kampala, the limited garbage which is taken to the landfills does considerable harm to the environment as it is neither treated nor sorted before disposal. The main environmental hazards are related to soil and water pollution through leachate as the landfills are usually close to swamps or valleys with streams (like the new landfill being constructed in Lusanja). Other environmental hazards are the odors and flies which are a public nuisance. This causes the residents surrounding the landfills to constantly complain to KCC with very little help. For instance it was reported in the press " ... the area 200 meters from the dumping site, including homesteads, gardens and bushes was covered by swarms of flies. An acrid smell coming from the site was heavy a kilometer away. Residents invited the KCC to discuss the matter, "but they have simply ignored us" (Ndyakira, 1996a). In another related incident, the City Engineer had the audacity to say, "I agree that the garbage is dangerous to the area. I agree we are polluting the place, but we are fighting a difficult situation. We are in a tight corner as to where we should dump the garbage, and we cannot simply leave it on the streets ... dumping garbage on the edge of the lake is better than leaving it on the city streets" (Ndyakira, 1996b). However, dumping of waste in wetlands is illegal as it is environmentally unfriendly (Mukanga, 1996).

In Kampala, as a result of uncollected garbage, rats and the marabou storks have become adapted to the urban environment. The latter not only feed on the garbage but also on the smaller pests. The KCC has failed to control the population growth of these rodents which have become a public nuisance. In an effort to discourage the marabou storks from settling in some areas (high class streets) the KCC authorities resorted to cutting down the trees which are their breeding grounds. This was the wrong way of trying to rid the city of these unwelcome residents, and it has been condemned by many (New Vision newspaper; 19:3 and 26:5 Feb.; 4:5 March 1996). The best solution is to clear the city of the garbage and when these birds fail to get enough food they will migrate to other places. The best way to avoid the problems associated with these scavengers is to dispose of the garbage properly.

Today, the KCC is assisted by private companies like Bin-it (started in 1992) which collect garbage for disposal from individual households on a private arrangement. Bin-it operates in Najjanankumbi, Makindye, Bunga/Gaba, Bugolobi, Mbuya and Muyenga. They charge a fee for their service depending on the size of the house and use pick-ups to collect the garbage which is kept in polyethylene bags provided by the company. The garbage is not sorted except at the garbage heap before it is going to be burnt. The garbage is then dumped on private lands and the owner is paid a fee. They have plans underway to process the garbage into compost to sell. Like the KCC, their dumping is environmentally unfriendly since no precautions are taken to safeguard the soil and water from the pollution by leachate. Thus odor, pests, and flies are not taken care of and residents in the surrounding areas are always complaining.

### Recyclable solid Waste

In Kampala, just like in most other urban centers in developing countries, material considered refuse by western standards is re-used (Sharon, 1993; Douglas, 1986). For example, old tires are made into sandals (lugabire), old tin containers into paraffin candle holders (tadoba), plastic containers into feeding troughs for chicken and scrap metal is fabricated into household utensils like charcoal stoves (sigiri) metal doors and windows. Paper is recycled into toilet tissue and wrapping paper. In Kyebando (Kawempe Division), the Young Women's Christian Association (YWCA) began a project of recycling used paper to make envelopes and plain paper, and they design greeting cards in their appropriate technology program (Basemera, 1996). A lot of scrap metal is recycled industrially at the Jinja steel rolling mills and the Nakawa scrap metal facility. Today, green vegetable matter, like banana peels, pineapple and cabbage stems, and food leftovers are collected to sell to farmers, especially those keeping pigs and cattle. This has created considerable employment opportunities for the young.

Employment generation through recycling of solid waste is not only found in Kampala, but in many cities of developing countries. In Cairo, the Zabbalean religious sect dominates the garbage collection market. They use scavenging and recycling and feed the edible portions to their animals. In Mexico, Beijing and many cities in S.E. Asia solid waste collecting, recycling and scavenging is a traditional norm and is associated with the low income groups, many of whom survive on it directly or indirectly (Sharon, 1993; Brunn and Williams 1987).

Even in cities where an adequate budget is available, safe disposal of solid waste is still a problem. Open dumping and uncontrolled disposal methods remain the dominant means of solid waste management.

### Problems faced by KCC in managing municipal solid waste

The main constraint faced by the KCC in carrying out the noble task of solid waste management is the lack of adequate transport receptacles and vehicles. The vehicles that are used are not only few in number but not all of them are always in good working condition. This adds enormously to repair burdens, due to the lack of available spare parts. This inadequacy results in irregular collection at best and over accumulation at transfer sites, which contributes to aesthetic and scavenging problems. At times, the few vehicles available are diverted to other uses not related to garbage collection. As the containers are not corrosion proof, the large content of organic matter in the waste stream causes them to corrode and leak, thereby decreasing their life span.

### Special Wastes

Waste from hospitals and industries is disposed of as untreated waste, and this is environmentally unfriendly as standards and safety precautions are neither maintained nor adhered to. Industrial establishments are required to submit Environmental Impact Assessment (EIA) reports defining how their waste is to be disposed of. Often the Uganda Investment Authority (UIA) does not enforce any of the regulations within the EIA. Due to this weakness municipal solid waste sites often receive industrial and hazardous wastes which could then easily seep into water sources.

Management of landfills both not in use, and those currently in use, leaves a lot to be desired. Landfills not in use are supposed to be covered with soil, but many times this is either not done or done inadequately. Landfills are located in areas of human settlement and water sources with no protection from contamination by leachate from the waste. The new landfill at Lusanja is being constructed by Sogea under the KCC. This urban project is on a slope and the stream down the valley is bound to be contaminated through underground seepage. Gases produced (methane and carbon dioxide) by decomposing waste are not monitored to prevent any undesired occurrences of fire or explosions. Gases released into the atmosphere when the garbage is burnt can be environmentally dangerous since they

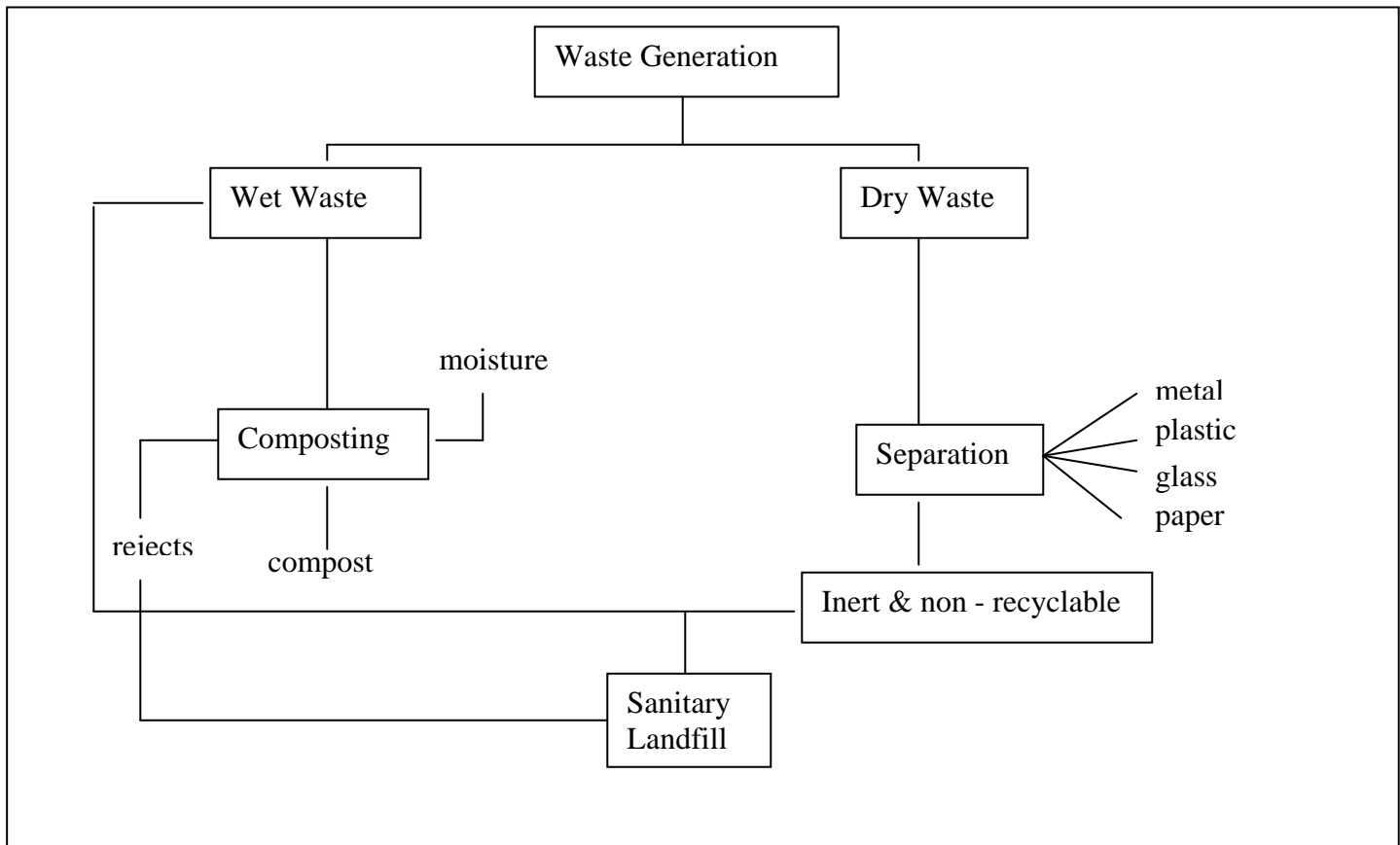
Careless disposal of the waste adds to management problems. Due to the inadequate collecting facilities, people have the habit of disposing of solid waste in public places, waterways and any other open space, which contributes to the spread of disease and public nuisance. Even at collecting points, people, especially children, throw waste outside the bin which not only makes the place untidy but adds to collection costs as labor must be hired to put the garbage in the bin. Due to the lack of adequate sanitary facilities, garbage heaps are often mixed with human excreta which only further aggravates the waste management problem.

Suggestions to try and alleviate the problems associated with solid waste management.

The door to door garbage collection service which existed in the 1970s can be re-introduced with modifications. Instead of the KCC providing the small bins for free, they can now be sold to the public and collection could be made compulsory, and a fee should be charged per month for garbage collection. The money can be collected through Local Councils (LCs). Alternatively, a garbage collection fee can be added to the electricity or water bill after the KCC has signed a mutual agreement with the two organizations for the purpose. Such practice is working in countries like Ghana where the municipal council is responsible for the sale of electricity and water. In Kenya, a garbage collection fee is added on the water bill (Nyakaana, 1995), but it means those without piped water do not pay the garbage fee. This built in weakness can be solved by forcing such people to pay through the LC system. Taxes should be imposed on industries that produce hazardous products (for example, alkaline, and Ni-Cd batteries, products containing cadmium or mercury and motor oils) which would be kept on a specific account and used exclusively for collection and treatment, or destruction. This action will provide an incentive for the general population to switch to less harmful products and it will influence industry to provide substitutes. Reducing the use of hazardous products will improve the quality of the city waste, allowing them to be more easily used as compost or as a soil conditioner and this will in turn contribute to a reduction in waste volume. Hospitals/clinics should pay full cost for the treatment and destruction of their infectious waste.

The door to door collection of garbage will assist in introducing an integrated method of garbage collection where it is sorted from source before disposal as indicated in the diagram below.

## Solid Waste Management in Urban Centers



Source: Adopted from Surpon Kootatep, (1995), Integrated solid waste disposal system: The solution of Chiang Mai Municipality. International Conference; Urban Habitat: The Environment of Tomorrow. Delft, 15-17 February.

With this method, separation of waste is done at the source by providing two collection systems: one for wet waste and one for dry waste. The dry waste bin is sent to the separation site from where the separated materials are sent to the manufacturer for recycling. The non-recycled materials will be deposited at the sanitary landfill site. The wet waste is dried and sorted into rejects and waste for making compost. This method of solid waste management helps by making better use of solid waste, keeping the environment healthy, and it creates employment for the waste pickers.

There is an urgent need to educate the masses about the need to dispose of solid waste and any other wastes carefully. This could be done through the LCs, NGOs, CBOs, schools and the mass media. Such programs should address the importance of effective (planned) solid waste disposal as a prerequisite to proper environmental management. Emphasis should be placed on the need to conserve the environment since it is a requirement for successful economic development. Competitions at school and at the LC levels on environmental conservation and how to keep it clean should be organized.

Collecting bins (small in size) should be provided at vantage points along the streets, parks and

open spaces so that careless littering can be reduced and eventually eliminated. Such bins should have inscriptions on them on the need to keep the city clean- Keep Kampala Clean (KCC). There should also be warnings against throwing garbage outside the bins and of the possibility of prosecution if found. These bins should be emptied regularly to avoid spillage. People will have to be educated on how to use them properly and on the importance of throwing every piece of solid waste, even chewing gum, into such collecting points.

Attempts should be made to privatize solid waste collection and disposal with the KCC providing and managing the landfill sites. This could be done in the same manner as the case for public toilets. Payment could be collected for every trip required, or tenders could be awarded for cleaning a specific area and the KCC through the Local Councils (LCs) would see to it that cleanliness is maintained as per agreement. The collection of garbage from the small bins suggested earlier should be the first thing to be privatized for experimental purposes.

In Kampala, just like other urban centers in Uganda, there is need for a better solid waste management. This needs to be done in order to strengthen the existing institutional arrangement by equipping it with modern collection and transportation facilities like compactor trucks, mechanical sweepers and containers. There is an urgent need to have a Department of Environment Protection within the KCC which would be charged with the duty of educating the masses on environmental conservation and upkeep. It would also see to it that environmental standards are maintained by all people, especially industrialists, estate developers and landfill sites. The department would also formulate environment plans and organize community NGO participation in the urban environment. It would also strengthen human resource development and its capacity for building solid waste management sites, pollution control facilities, and doing natural resource accounting, risk assessment and Environmental Impact Assessment (EIA) within the city.

The private sector and the waste pickers should be integrated into solid waste management just as in the local communities where neighborhood cleanliness competitions could be organized and institutionalized. Solid waste management plans should be developed to ensure that waste from various areas can be collected and transported to acceptable disposal sites or treatment plants. Transfer stations and collection organizations should be identified as a necessity for further treatment facilities. All of these require the KCC to increase the budget for solid waste management.

The city should introduce other methods of solid waste disposal. The following methods should be considered by the City: Incineration - this is the process of reducing combustible wastes to inert residue by burning at high temperatures of over 900°C. At such temperatures all combustible materials are consumed leaving a residue of ash and non-combustibles which occupy only 5-25% of the original volume. Though incineration greatly reduces the volume, the problem of disposal still remains, but a much smaller space is now required.

In Kampala the current method of burning is inadequate with limited impact as the temperatures are not very high and the waste is usually wet and unsorted. Many households in Kampala burn their household refuse due to lack of space to dispose of it since the KCC does not serve them. Even at collection bins in the city center, burning is a common practice since the collection for disposal is not regular.

On-site disposal: With the increasing rate of solid waste production in Kampala, there is a growing need to handle waste at the home, restaurant, and institution. This can be done by introducing waste disposal units (garbage grinders) in the kitchen and incinerators in institutions, high rise buildings and estates.

Animal feeding: Food wastes, banana peels, vegetable wastes and other related garbage are increasingly being collected by farmers to feed domestic animals (pigs and cattle). Due to the high competition for this source of feed, farmers usually contract specific sources to ensure regular supplies. Today some unemployed youths collect banana peels for sale to the farmers. However, there is still room for improve-

men! with the collection and handling methods so that it becomes a meaningful way of earning a living.

### Composting

This involves the decomposition of refuse through bacterial action, into a humus like material similar to peat moss in appearance and application. The end product is useful as a soil conditioner and fertilizer. Today composting for commercial purposes is limited to the developed countries due to the costs involved. However, if introduced it would help recycle nutrients from the city back to the supporting rural hinterland thus completing the nutrient cycle.

### Conclusion:

Solid waste in Kampala is made up of organic wastes (food and garden wastes) mainly associated with household and market waste; broken glasses, plastics, polyethylene, rubber, scrap metal, wood, paper and other inorganic wastes associated with the industrial and commercial sectors. The KCC which is charged with the responsibility of collecting all the garbage in the city has provided communal bins at specific points. These communal bins are supposed to be emptied twice week, but unfortunately this rarely happens so they end up overflowing, thus making the surroundings an eyesore. Business operators are fond of sweeping part of their solid waste onto the pavement in the evening in anticipation that the street cleaners will collect it in the morning. High density residential areas are not provided with garbage collection services. In these environments individuals dispose of their household refuse in shallow holes where available and burn it. Otherwise solid waste is thrown in any open space as the residents seem to employ the notion of "not in my back yard" (the area beyond the back yard in this case could even be less than five meters from the door step). Those with gardens throw it there, unsorted, and this is environmentally unfriendly especially with plastics and polyethylene papers which do not decompose, and they even inhibit water penetration into the soil. Even in the city center, medium and low density residential areas waste disposal and collection facilities are inadequate so that solid waste is put on the roadside, illegal dumps, rain water drains, alleys and back streets where it is expected to rot or be removed by KCC cleaners. Increasing population densities and overcrowded housing, coupled with poor layout plans make access into certain areas of the city less feasible, and this encourages solid waste accumulation rather than disposal. The failure by the KCC to collect all the solid waste has attracted a new wave of immigrants - the marabou storks, rats, flies and other rodents.

The general observation is that solid waste management is deteriorating on account of lack of equipment, under financing, inappropriate planning and coordination of the various cleaning activities. In order to solve these problems and improve on solid waste management activities not only in Kampala, but in all Uganda's urban centers, the local government should turn to strategies of incorporating private enterprises into the system, and drawing in local communities so as to make the whole system more effective.

Recycling industries, informal use and trade in waste for instance, the current use of waste paper (from printers) for making mattresses, pillows and chair cushions; scrap metal for domestic hollow ware and old tires for sandals should be encouraged. The activities of the informal sector in recycling solid waste have been given limited recognition by the local government and no policies have been put in place to strengthen such initiatives. The activities of the informal sector operators have often been considered undesirable by some residents, police, municipal authorities and local government in general. These activities by the "urban poor" need to be supported, and where possible taken into account when drawing up development plans so as to make solid waste management more effective.

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