A Situational Analysis of Waste Management in Harare, Zimbabwe.

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Abstract: Waste Management has emerged as one of the greatest challenges facing Harare, the capital city of Zimbabwe. The volume of waste being generated continues to increase at a faster rate than the ability of the city authorities to improve on the financial and technical resources needed to parallel this growth. Although waste removal is one of the most pressing problems in Harare, it is not a new problem. It was established that the seeds of the apparent chaos in the governance of waste in Harare were laid during the colonial period. Despite many ordinances the colonialists put in place to strengthen urban administration, they regarded native suburbs as areas for a cheap and easily controlled labour force, and therefore, made no serious efforts to resolve the emerging problems, particularly those of waste management. The current authority is struggling to manage the waste under tight budgets; highly inadequate and malfunctioning equipment; inefficient collection practices with variable levels of service, poor and unhygienic operating practices; including no environmental control systems; open burning of garbage; indiscriminate illegal dumping and littering; and a public with seemingly little sensitivity to the garbage around them or any awareness of what represents responsible waste management. Harare's waste management system needs serious rehabilitation, first on an emergency basis, followed by development and implementation of long-term sustainable measures.

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1. Introduction

The transition to majority rule in Zimbabwe in 1980 saw the lifting of decades of racial restrictions to the "Right to the City". This was immediately followed by massive rural-urban migration as people pursued better livelihoods in terms of income opportunities and access to social services. As a result, the major cities attained population growth rates of over 5% per annum throughout the 1980s. Increasing rural poverty, drought (1981-1983, 1986, 1990-1994, 2001-2003), overcrowded communal farming areas and high youth unemployment continues to fuel a major exodus from country to city. This is more apparent in Harare, the capital city of Zimbabwe, which has experienced a phenomenal population increase from 310, 360 people in 1961; 658, 400 in 1982; 1, 896, 134 in 2002 (Central Statistics Office, 1982; 2002); to approximately 3 million as of 2010 (Brinkhoff, 2010). Combined with Harare's natural population increase, it is estimated that the capital of Zimbabwe has been experiencing a growth rate of some 6 to 8 per cent per annum since the year 2000. At the same time, the city of Harare, as an economic unit, continues to witness impoverishment. First, many migrants to the city operate in the informal sector. Despite their active contribution to the urban economy, they rarely pay taxes or fees in direct proportion to the services they use. Second, the Harare City Council (HCC) depends to a large extent on central government transfers which rarely increase in proportion to this demographic growth, thus contributing to declining municipal revenues and expenditures in per capita terms. This vicious circle continues to translate into a serious erosion of local government capacity in terms of planning, environmental management and the provision of basic services (Tibaijuka, 2005; Mclvor, 2001).

Besieged by a plethora of social and economic challenges, Harare's urban managers are generally seen as incapable of dealing with the problems of rapid urbanization. Waste management has probably emerged as one of the major challenges facing Harare, as a consequence of its effects on human health, sustainable development, and urban finance. According to Practical Action Southern Africa (2006), more than 2.5 million tonnes of household and industrial waste are produced per annum in urban areas across Zimbabwe. Urban waste collection was reported in 2006 to have dropped from at least 80% (in the mid-1990s) of total waste generated to as low as 30% in some large cities and small towns. Areas worst affected by erratic waste collection are low-income residential areas such as Mbare in Harare and informal settlements such as Jacha in Epworth, which receive no formal waste collection services at all. At least 70% of the collected waste is crudely tipped at open dumpsites, 90% of which do not meet basic environmental standards. The low waste collection levels and

rudimentary disposal methods employed are a cause for grave concern because they trigger widespread illegal open dumping. This has put the health of residents at great risk as the open waste dumps are prime breeding sites for houseflies, rats and mosquitoes and other vectors of communicable diseases such as fever, dysentery, diarrhoea, cholera and malaria. The illegal waste dumps are also a source of environmental problems such as odours and smoke emissions resulting from rampant waste burning causing acute respiratory infections. The leachate from the dumpsites pollute the underground water which has emerged as an alternative source given the current water shortages within the capital city, while loose papers and plastics are blown away by wind resulting in aesthetic intrusion of the surrounding environment.

It is against this background that this study aims to analyse the state of waste management in Harare. This will be achieved by first taking a historical perspective, looking at the perceived drivers, both local and international, which have influenced the current waste management situation. Subsequent sections identify the current waste collection practices, categorization and disposal methods. The report is based on a study of various documents related to the question of waste in the capital city and on discussions and interviews with the general public. Observations were also made throughout the city.

2. Study Area

Harare (before 1982 known as Salisbury) is the capital and largest city of Zimbabwe. It is an urban agglomeration with a population of approximately 3 million people (Brinkhoff, 2010). It is the product of a settler-colonial political economy. The colonial desire for a sanitary and pleasant environment for the white settlers and their need for a cheap and easily controlled labour force is visibly reflected in the features of Harare today. The city is composed of the Central Business District (CBD) laid out on a grid of street patterns; residential suburbs to the north, east and west; and industrial areas along the railway lines that acted as buffer zones between the former European (now most of the low density suburbs) and former African (now high density suburbs) residential areas. The most distant and most extensive suburb is Chitungwiza to the south, which is also a legacy of the settler ideology of separate development and control of the urban African population. New suburbs such as Budiriro, Westgate, etc. have developed since independence, and old suburbs have expanded, with some of the high-density areas developing backyard shacks to cater for the ever growing population. In and around Harare, there is significant urban agricultural activity, notably widespread use of flood-prone peri-urban sites (Epworth, Caledonia etc.) for maize and horticultural crops. Political issues place even greater pressure on land availability for subsistence farming. Harare also has an extensive industrial base including steel, chemicals, foundries and textiles.

3. Historical Perspective of Waste Management in Harare

Although waste removal is one of the most pressing problems in Harare, it is not a new problem. Within the literature it has been observed that the history of waste management in Harare is closely tied to that of its local government, which went through two evolutionary periods, colonial and post-independence.

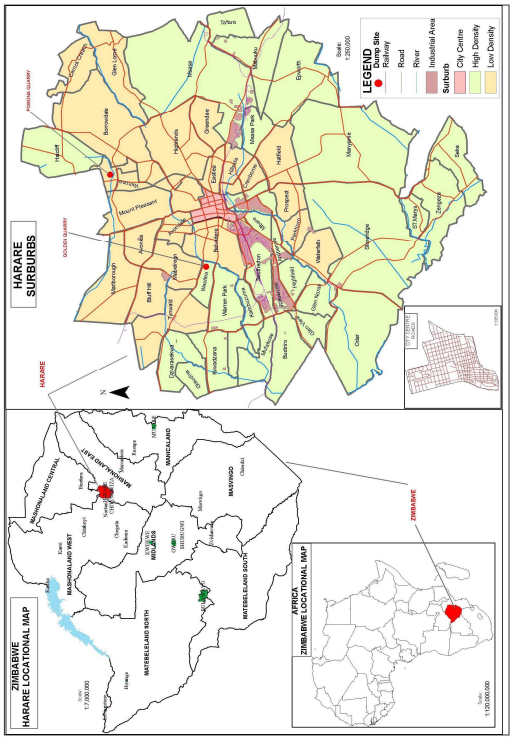

Figure 1: Location of Harare, Zimbabwe

3.1 The Colonial Period

The colonial desire for a sanitary and pleasant environment for the white settlers was enforced through segregation and ordinances. This was a time of racial segregation, with colonialists and natives confined to different quarters of the city. Areas inhabited by colonialists were well planned and characterized by basic sanitation facilities provided either free or at heavily subsidized rates. Coupled with a set of ordinances, the colonial government was able to efficiently manage waste within the capital city. According to Muza (2006b) and Magadzire and Maseva (2006), some of the ordinances include;

- The *Public Health Act*, which was amended 14 times between 1924 and 1977. The Act laid the foundations for improved health management; this period also saw the introduction of sanitary inspectors, who went house to house to ensure that the houses and their surroundings were clean and, for recalcitrant residents, applied appropriate sanctions.
- By-laws on waste management, which date back to 1948 when they were adopted as the Salisbury Sanitary and Refuse Removal by-laws. They were amended 8 times between 1953 and 1978 before being repealed by the Salisbury (Waste Management) by-laws in 1979. A summary of the *Salisbury (Waste-Management) By-laws Statutory Instrument 477 of 1979* include the following main provisions; (i) No person was allowed to deposit or abandon any waste upon any vacant land, public place or premises other than a waste disposal site. Section 13 (1) restricted access to waste materials once they were deposited at a waste disposal site, (ii) Domestic waste was collected once a week, or at such more frequent interval as council determined from time to time, (iii) Only the council or its contractors had the responsibility for removing all domestic waste from premises, (iv) Council could ask that the owner or occupier of any premises to which no waste removal service was provided to remove all domestic waste and deposit it at a waste disposal site, and (v) Council supplied a "standard" waste receptacle to residents.
- The *Water Act* of 1976 (a revision of the Water Acts of 1927 and 1947) prohibited the discharge of any matter into any surface or groundwater either directly or indirectly so as to cause pollution of the water.

Despite these measures, the major shortcoming of the colonial era was that British colonial masters regarded African residential areas as sources for a cheap and easily controlled labour force, and therefore, colonialists made no serious efforts to provide adequate waste management services. Only a fraction of the waste generated daily in African residential areas was collected and safely disposed of by the colonial government. In addition, during the early years of colonial rule, a fraction of African households (Matapi flats and Mbare hostels), were connected to a sewer network or to a local septic tank. Consequently, most residents in African areas were forced to bury or burn their waste or dispose it haphazardly by roadsides, in open spaces, or in valleys and drains. These areas presented a challenge which should have been met. They now present almost insoluble problems of planning and sewage and lack any normal civilized amenities.

3.2 The Post-independence Period

Since the attainment of independence in Zimbabwe, waste management in Harare has been treated as a political football. Responsibility for waste management has changed hands from one department to another within the City of Harare. Unfortunately, each change further deteriorated the system, bringing it on the verge of collapse.

Before 1996, the Department of Works was responsible for waste management in the city. This responsibility was transferred to the City Health Department in and after 1996. It was during this period that the HCC contracted out 56% of refuse collection to some private companies with the City Health Department retaining responsibility for the remaining 44%. This unbundling of waste management was meant to cope with the ever increasing population of Harare, which by 1996, was estimated to be around 1.5 million. Research published in the State of the Environment Report between 1995 and 1996 showed that Harare was producing approximately 660 tonnes/day of solid waste, with the local authorities managing to collect 89% of it. Such high refuse collection rates were partly attributed to the fact that waste management and related programmes undertaken by local authorities throughout Zimbabwe were predominantly supported by external assistance mainly from Europe, United States of America and Australia. Technical, material and financial assistance was provided through such programmes as Urban I and II, the Local Government Capital Development Programme and Deregulation Programme and the Rural District Councils Capacity Building Programme.

However, the local government sector was seriously affected by withdrawal of donor support as from 1998 owing to political differences between the central government and donor countries. This period also coincided with Zimbabwe being disqualified from benefitting from loans made available through the International Monitoring Fund (IMF) and other international aid organizations mainly due to its inability to pay back the loans and partly because its economic and social policies were not in line with those of international lending institutions (International Labour Office (ILO), 2007). Consequently, the City of Harare lost its credit worthiness and even the local bank's refused to extend loans to the city's authorities. This series of events left the HCC having to rely on revenue generated from levying ratepayers to finance capital procurement, institutional development and meet overheads. The rates, taxes or fees paid by residents

in Harare were rarely in direct proportion to the services they used. As a result, the HCC was faced with a budget deficit. The provision of essential services such as refuse collection and disposal were undermined (Practical Action Southern Africa, 2006). The fleet of refuse trucks, which had been purchased and maintained through external aid, began to deteriorate. According to the United Nations Commission for Human Settlements (UNCHS) (2001b), in 1999, only seven of the 90 garbage trucks in the city of Harare, were operating, because there were insufficient funds for training of personnel and equipment maintenance.

By the year 2000, the economy of Zimbabwe began to shrink. According to the IMF and World Economic Outlook database, Zimbabwe's Gross Domestic Product (GDP) contracted by approximately 7.3 per cent (Makochekanwa and Kwaramba, 2009). This economic downturn impacted negatively on the performance of local authorities. Consequently, the HCC was only managing to collect and dispose 54 per cent of the 1400 tonnes/day of waste generated within the city due to shortages of fuel and the much needed foreign currency for the repair of an old fleet of vehicles and equipment. This was also evidenced by the fact that the City Health Department now had "on paper", 40 refuse collection trucks but only 8 to 14 of them were operational on a consistent basis. Litter in some suburbs went for even up to two months without being collected. The uncollected waste remained strewn on the ground, littered in open drains or in garbage dumps, often resulting in municipal sewer and storm water drains blockages. The government through the National Oil Company of Zimbabwe (NOCZIM) intervened by allocating 9,000 litters of diesel weekly to the HCC for refuse collection. This resulted in litter being collected after two to three weeks from some homesteads. However, this did not ease the city's litter crisis as residents from these areas continued to dump litter on undesignated open spaces as soon as their bins filled up. Also, according to Dr. Stanley Mungofa, HCC's Deputy Director of Health at that time, the 9,000 litters of diesel was supposed to be enough for the City Health Department and its private contractor's refuse collection vehicles. He however, suspected but could not prove that some of the private contactor's who were getting diesel at more than 11 times cheaper than the market rate to deliver waste collection services were using the fuel for other business (Koro, 2003).

Even the previously successful initiative of sub-contracting waste management to private companies began to suffer setbacks by the year 2000. To start off, the business became unprofitable due to the prevailing economic downturn. In addition, there was reported inefficiency and dishonesty on part of the contractors and, late payment of contractors by the local authorities. A March 2000 report in a private newspaper claimed that the City of Harare had cancelled a contract with a refuse collection company, Waste Management Services, citing fraudulent claims by the company. The contract, which had been in force since October 1997, was terminated on March 31 after months of haggling between the HCC and the company (The Independent, 2000). According to a government newspaper, the relationship between private companies and the HCC became irreparable in 2002 to the extent that the commissioners who were running the city at that time recommended that the majority of refuse collection contracts should not be renewed at expiry in August of that year (The Herald, 2002).

The other major features in the history of waste management in Harare during this period include the following:

Unbundling of Operations: The HCC adopted a strategic turnaround plan in 2004. According to Muza (2006a), the idea was to unbundle its operations into autonomous strategic business units to run council affairs. Although, the city passed a resolution to split its operations, it was not fully implemented because the then council objected and questioned some aspects of the turnaround strategy hence most of the plans were later shelved. Of interest to waste management is that this turnaround strategy resulted in the institutional responsibility for Harare's waste being moved from the City Health Department to the newly created Waste Management Department within the HCC. The Waste Management Department was an autonomous target driven business unit which was 100% owned by the City of Harare. It was designed to operate under Charter on behalf of the HCC in terms of the Urban Councils Act, Chapter 29:15.

Central Government Intervention: In times of crisis the Government of Zimbabwe had to intervene directly by way of providing additional financial support to local authorities. In 2004, the Reserve Bank of Zimbabwe unveiled a $10 trillion (Zimbabwean Dollars) fund under the Parastatals and Local Authorities Re-orientation Programme (PLARP) in which the local authorities could access funds to improve their service delivery in areas such as waste management. Harare received 32.15% of this money. In 2005 and 2006, local authorities throughout the country were availed a total of Z$286 billion and Z$1,1 trillion, respectively for water and sewage projects under the auspices of the Public Sector Investment Programme (PSIP), the new

Infrastructure Development Bank (IDB) and the Zimbabwe Allied Banking Group (ZABG). Instead of local authorities using the majority of this capital for the intended purposes, a large proportion was spent on salaries. At that time, the Government had prescribed a ratio of between 28-32% of total recurrent expenditure for salaries, but the majority of councils went on to overshoot this threshold by a wide margin due to pressure exerted by employees on respective council budgets. This left very little capital to support the completion of most projects. As a result, an overhaul of Harare's sewerage system was abandoned, leaving the already overloaded obsolete reticulation infrastructure reeling under intense pressure from a population of approximately 2 million people.

Operation Murambatsvina: Just when residents of Harare thought the waste management situation could not get any worse, the Government of Zimbabwe embarked on an operation to "clean-up" its cities. It was known as "Operation Murambatsvina" or Operation Restore Order and began on 19 May 2005. It started in the Zimbabwe capital, Harare, and rapidly evolved into a nationwide demolition of illegal homes, business premises and vending sites. Operation Restore Order exacerbated existing waste disposal and management problems experienced in major towns across the country. Urban waste collection rates had dropped from at least 80% (mid 1990s) of the waste generated to as low as 30% in some large cities and small towns.

Although there is limited data on quantities of demolition waste generated by the operation, a general estimate ranges between 1.0 and 2.0 ton/m^2 of total ground level area. Waste from demolitions comprised 30-50% of national waste streams. The government did not even put in place demolition waste clearing and management strategies before or after implementation of Operation Restore Order in view of limited dumpsite life and transport capacities. Instead, responsibility of removing and transporting demolition waste to specific dumpsites was left with the owner. Penalties were even put in place for those who did not dispose their waste. Because the operation was undertaken without adequate warning and consultation, most households whose illegal structures were destroyed either did not have transport or felt aggrieved and ended up dumping the waste in unlicensed areas. Ubiquitous and highly visible demolition waste dumpsites in unlicensed areas in Harare and other urban environs were associated with the aftermath of Operation Restore Order (Madebwe and Madebwe, 2006; Tibaijuka, 2005).

ZINWA, Sewage Waste and Cholera Outbreak: As of 2007, institutional responsibility for Harare's sewerage system and wastewater treatment plants was removed from the HCC and taken over by the cash-strapped Zimbabwe National Water Authority (ZINWA). At the beginning of that year, Harare's biggest sewage plant, Firle, broke down. According to the state run The Herald (2007) newspaper, the Firle plant had become inoperable, with biological nutrient removal plants, primary settling tanks, biofilters and effluent pumps as well as clarifiers, digesters and boilers all down. Unable to raise money to repair the plant and overhaul Harare's sewerage system, an independent newspaper article claimed that ZINWA began to divert untreated human waste into Lake Chivero, the city's main source of water (Integrated Regional Information Networks (IRIN), 2007). By August 2007, this situation had finally caught up with the authorities, with an upsurge in cases of diarrhoea and dysentery in the city. According to a City Health Director, Harare's clinics were attending to more than 900 cases of diarrhoea every day, and ended up treating patients free of charge to try and halt the spread of infection. To make matters worse, ZINWA was unable to attend to burst sewer pipes due to a dire shortage of fuel. This resulted in effluent flowing into the streets of several Harare townships such as Mabvuku and Tafara. The government responded by making available $100 billion Zimbabwe dollars (about US$400,000 at the parallel market exchange rate) to the Ministry of Water Resources which oversaw ZINWA, for the refurbishment of water and sewage treatment plants. However, such efforts came too late for some people as the cholera outbreak spread to other parts of Zimbabwe and neighbouring countries such as Botswana, Mozambique, South Africa and Zambia. By the end of 2009, there had been 98,741 reported cases and 4,293 deaths, making it the deadliest African cholera outbreak in the last 15 years (BBC, 2009).

In July 2008, the first democratically-elected council in seven years was appointed to run the affairs of Harare. Its first task was to curb the cholera epidemic by making sure everyone had access to safe quality water. Consequently, in early 2009, the government devolved the management of water and sewerage from ZINWA to local councils. The newly-elected council continued to face new challenges at the beginning of its tenure. In early 2009, nearly, 7,000 HCC employees were failing to report for duty because of the exorbitant transport costs. The cash-strapped council was failing to provide alternative means of transporting its workers to their workstations because of the lack of finance and a depleted fleet. Departments severely affected included engineering services, waste management, housing and grass cutting, resulting in service

delivery in the capital city grinding to a halt. By the middle of January, council workers had downed tools citing the non-availability of protective clothing and competitive remuneration. They demanded their salaries to be paid in foreign currency as the value of the local currency was being adversely eroded by the monthly hyper-inflation rate of 79,600,000,000.00% (Hanke, 2010). Because the government had turned down proposals by the council to charge fees and rates in foreign currency, council could not afford to meet these demands as revenue continued to be collected in local currency. This marked another sign of the turbulent period that lied ahead between council and its employees. As a result, most high density areas in Harare remained plagued with pools of raw sewerage as council was failing to attend to burst sewer pipes. A snap survey by the CHRA in January 2009 revealed that burst sewer pipes in Kuwadzana 4 and Dzivarasekwa ward 40 had not been fixed since the beginning of 2008. Areas such as Highfield, Kuwadzana 2 and Glenview had experienced unabated sewer bursts for the past six months, and chances of the situation improving soon were slim as council employees were currently on strike (The Financial Gazzette, 2009; CHRA, 2009).

The return of corporate social responsibility: The year 2010 was marked by the return of private companies as players in waste management. Over the past decade, Zimbabwean companies were languishing in deep financial constraints emanating from the economic meltdown caused by hyper-inflation and economic sanctions imposed on the country by western donors. In the economic quagmire that ensued, profits of many corporates dwindled significantly or alternatively diminished such that many had to abandon their social responsibilities in engaging in community development projects that included refuse collection. Attention was thus focussed on keeping the companies afloat. However, the positive economic environment obtaining in the country by 2010 due to the introduction of multi-currency regime reset the tone for corporate social responsibility. In that light, Delta Beverages, a private company contracted Bitcon, another private company to collect refuse collection in some parts of Harare, namely Dzivarasekwa, Kambuzuma, Mbare, Mufakose and Warren Park. In addition, the company also extended a US$1 million waste management project to the City of Harare. Within this project, Delta Beverages erected can collection cages throughout the city. Ten centres were cans were crushed and recycled were fully operational by March 2010 with 25 others rolled out in the next three months. At these centres, research was also being undertaken to find the best way to dispose empty opaque beer containers. The can initiative was recognised as a noble programme par excellence, as research had revealed that cans were fast becoming an environmental hazard in Harare, because of their non-decomposing nature. Another player was BanABC, a local bank which loaned the HCC US$10 million to buy new trucks and equipment for refuse collection. Using this loan, council was able to commission 20 refuse compactors, 6 tipper trucks, 7 tractors, 2 front-end loaders, 3 skip trucks, 1 honey sucker (septic tank truck), 1 wheel loader, 1 landfill compactor, 1 bulldozer and 6 supervisory trucks among other equipment. Using this equipment, the HCC was able to reintroduce door-to-door refuse collection in some areas several years after abandoning the service. Non-Governmental Organization (NGOs) also began to resurface and offer their support. An example is Miracle Mission, an organization that worked closely with HCC and the Environmental Management Agency (EMA) in spearheading the "Anti-Illegal Dumping and Anti-Littering Campaign" to raise awareness among the local communities as far as waste management is concerned.

4. Analysis of the current situation

4.1 Categorization of Harare's Wastes

Most urban municipalities in Africa handle wastes from households, markets and institutions, streets and public open spaces, hazardous and non-hazardous waste from processing and industries. These are classed into three groups: municipal, industrial and hazardous, and are characterized by their sources, the types of waste produced, and the composition and generation rates. This holds true for Harare's waste, as well. According to the ILO (2007) there are six major classifications of waste generators in Harare as shown in Table 1.

Generally, the waste generated in Harare has high proportions of imported non-biodegradable waste such as glass, plastics, metals, paper, and cardboard. Studies by MLGRUD (1995), and Masocha (2004) have tried to estimate the mass, volume and composition of waste generated in Harare and some of its suburbs (Table 2).

Current total quantities of wastes generated from all sources and characteristics of Harare's waste streams are not officially known. What has been stated in Tables 1 and 2 is based on newspaper reports, past literature, field observations during the study and the work done in comparable economic, climate and population size cities.

However, studies carried out in some suburbs provide a better insight into the quantities and composition of household waste generated in Harare.

Table 1: The six major categories of solid wastes in Harare

Source	Typical waste generators	Types of solid wastes
Household or domestic	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, cans, yard waste, textiles, leather, wood, glass, and household hazardous wastes etc.
Commercial	Stores, markets, office buildings, restaurants, shops, bars	Packaging and container materials (cardboard and plastics), used office paper, wood shavings, food waste, hazardous waste, electronic-waste etc.
Industrial	Light and heavy manufacturing	Housekeeping wastes, packaging, food waste, demolition materials, slag, mineral tailings, electronic-waste, batteries, pesticides, coolants, lubricants etc.
Institutional	Police camps, barracks, schools, hospitals, prisons	Food wastes, used paper and plastics, used needles, syringes, and gloves, wood, steel, concrete wastes etc.
Street Sweepings/ Municipal services	High density neighbourhoods	Dust/sand, leaves, paper, human and animal excreta, sludge water, electronic-waste etc.
Construction debris	New and old building sites	Wood, brick-stones, concrete, glass and metals.

Table 2: General composition of urban waste collected by the Harare municipality between 1995 and 2004

Type of waste	% of total weight
Paper and cardboard	30
Glass and ceramics	10
Metals	10
Plastics	10
Leather and rubber	5
Textiles	5
Wood	5
Vegetables/putrescibles	5
Miscellaneous	20

Adapted from Sources: MLGRUD (1995), Masocha (2004)

Studies by Madimutsa (2000), Kativu (2001) and Gumbo (2005) established that by the year 2000, each resident in a high and low income residential area was discarding on average, approximately 0.481 kg and 0.301 kg per day respectively of solid waste of which 60–80 % was compostable or biodegradable waste (Table 3). These figures were comparable to generation rates in other Third World Cities. About 50% of this was food scrap with a moisture content of about 50-70%. The rest of the compostable material was made up of natural grass, tree leaves, weeds (yard waste) and crop residues. The later had become predominant as urban agriculture was and is now a growing activity in Harare, in response to the ever rising prices of food and holds great merit as a means of self-sufficiency and income generation. Furthermore, urban agriculture is now recognized as a critical livelihood strategy by Harare's urban poor – given its contributions towards nutritional health, income generation and ecosystem services.

A recent study by TARSC (2010) also estimated the composition and quantities of household waste in some of Harare's suburbs as shown in Table 4.

Whilst simple comparisons on the differences in the reported levels are difficult (due to variations in density, shapes of the waste and so on), households and local authorities report production of considerable amount of food, yard, plastic and paper waste. Food, paper and yard waste generally have higher volumes than other forms of waste, particularly from medium density housing. According to household reports, lower volumes are produced of glass bottles, ceramics and metal tins, with higher quantities reported in high than low density areas. The distribution of waste indicate some opportunities for waste recovery and recycling at household level, particularly with regards to yard and food waste composting and plastic and paper recycling.

4.2 Waste Collection Practices

Solid waste collection is a vital component of the waste management process. For health reasons, it is recommended that solid waste in tropical regions like Harare be collected daily. According to a 2010 survey carried out by TARSC, solid waste services in Harare were found to be extremely limited. The HCC suspended door–to–door refuse collection several years ago after the council fleet was grounded. It was reintroduced in 2010 in areas such as Mabvuku, Waterfalls, Glen Norah, Budiriro and Highfields. Ever since, the service has now spread to some low-density suburbs and market places across the city. Households in medium and low-density areas have to pay on average between US$12 and US$15 per month, whilst those in high-density areas pay between US$0.70 and US$10 per month for refuse collection. Although these costs may appear modest,

most households are unwilling and/or cannot afford to pay such amounts of money. In addition, households also have reservations about paying these amounts due to the poor quality of service they continue to receive from council for other services and also express concern as to whether the money being collected for the service is being used for the intended purpose (The Herald, 2010).

Households often use various receptacles to collect solid waste in their houses, most frequently metal/plastic bags, which they empty in an outside plastic bin. Residents do not generally get support from council for accessing bins and either have to buy these themselves or get them free from private companies such as NGOs. Plastic bins recommended by council cost between US$0.20 and US$1.00. They are mainly made from low density polyethylene and can be purchased from companies such as Farm and City Centre and MEGA PAK Zimbabwe, which deal in plastic goods.

The collection of waste from all residential areas should be done once a week, while in the CBD and other public places it should be done every day, according to the council's policy on the frequency of refuse collection (Table 5).

Table 3: Domestic solid waste characteristics for a typical high, medium and low density suburb in Harare.

Category	Sunningdale	Mabelreign	Borrowdale
Paper and Cardboard	11.7	13.5	23.1
Glass and ceramics	0.8	2.3	6.5
Metals	0.8	1.1	4.0
Plastics	6.8	8.0	11.7
Leather and rubber	0.3	0.0	0.4
Wood and bones	0.6	0.3	0.7
Organic compostable matter	75.9	73.6	47.7
Textiles	2.1	1.1	3.8
Miscellaneous	0.8	0.2	2.3

Source: Madimutsa (2000)

Table 4: Household reports on levels of solid waste generated per week

Suburb	Density of area	No of households interviewed	% of households reporting producing more than 5 plastic bags per week					
			Paper	Plastics	Glass/ Bottles/ Ceramics	Metal Tins	Food waste	Yard waste
Chitungwiza	Medium*	10	10.0	10.0	0.0	0.0	0.0	30.0
	High	80	1.2	1.2	0.0	0.0	14.9	31.2
Sub Total		**90**	**2.3**	**2.2**	**0.0**	**0.0**	**13.4**	**60.0**
Epworth	High	50	30.0	10.0	23.9	2.2	8.0	60.0
Sub Total		**50**	**30.0**	**10.0**	**23.9**	**2.2**	**8.0**	**60.0**

*small sample size in this category so percent findings need to be read with caution, e.g. on food waste
Source: TARSC, CFH (2010)

Table 5: Harare's solid waste collection frequency policy

Sector	Policy on frequency of refuse collection
Household	Once a week
Industrial sites	Once a week
CBD	Daily
Market place	Daily
Hotels	Daily
Hospitals	Once a week
Schools	Once a week
Colleges	Once a week

However, a study by TARSC (2010) (Table 6) showed that due to resource constraints, the collection of waste is erratic and inconsistent.

There are usually no public announcements from council to notify residents of their collection schedules. Residents have to rely on physical sightings of the refuse trucks for them to get their waste collected. In addition, some of the collections are done during the week when members of the households are not present hence council is not collecting much waste from residential areas. The low income, high density areas also reported less frequent waste collection services compared to the higher income low density areas, despite being in the same local authority. As a result, households have resorted to using private collectors (Table 6) or alternative methods, such as digging pits inside their yards, burning waste and illegal dumping on roadsides and open spaces. Even at a time it is evident refuse collection is non-existence in some suburbs, the city council has continued to bill residents, who continue to protest by withholding the payments and in the process affecting the city's cash flow.

Waste from the CBD, industrial sites, hospitals, educational institutions, market places and hotels is collected via use of skips (containers), each with an average size of $6m^3$. These are either strategically placed along various streets or located at the back of buildings and can be accessed through a service road. At these skips, wastes is deposited

either at the end of the day or very early in the morning. In addition, council also employs street sweepers to clean key residential and commercial streets. Manual sweeping using a broom and dustpan is the norm, and no mechanical street sweepers are used. Street sweepers pick up their own sweeping and place them in polyethylene plastic bags or wheelbarrows for transport to the nearest skip. Depending on the availability of fuel and manpower, skip trucks are used to lift one skip, using a chain and pulley system or hydraulic arm-lift, and taken to the nearest dumpsite. This is done very early in the morning since crowded market places, schools, hospitals, commercial and industrial sites with thousands of daytime shoppers, vendors, school children, patients, workers and others makes daytime collection very difficult. Given highly inadequate number of skips, waste is often deposited in small illegal dumps along Harare's city streets, market and business districts, and making collection inefficient and expensive. Poor maintenance, misuse such as setting garbage loaded skips on fire, natural wear and tear are key contributing factors to the deteriorated status. With an average working life of 3 years for a skip, poor replacement ratio has also contributed to this situation.

4.3 Disposal Sites

The main depositories of Harare's waste are located at Pomona and Golden Quarry dump sites. These official disposal sites are operated as open dumps instead of sanitary landfills. A default strategy for municipal solid waste management in African countries, open dumps involve indiscriminate disposal of waste, and limited measures to control operations, including those related to the environmental effects of landfills. These uncontrolled open dumps have no environmental safeguards, pose major public health threats, and affect the landscape of Harare.

Gumbo (2005) and Love *et al.* (2006) assert that the Golden Quarry landfill site is an abandoned gold mine, which started operating as a landfill in 1985 to reclaim the land by filling the shafts and pits. It lies between Bulawayo and Kirkman roads close to the National Sports stadium on the fringes of Warren Park North residential area, about 7 km west of the city centre. According to Madimutsa (2000) and Tevera (1991), Golden Quarry receives about 90% of the waste disposed of through landfill operations due its proximity to sources of waste such as the CBD, industrial areas and most of high density suburbs. On the other hand, the Pomona or Teviotdale landfill site is located 12 km to the north of the city centre in the headwaters of the Gwayi River, a tributary of the highly polluted upper Manyame River. The landfill has been operational since 1982. According to Zaranyika (1997), solid waste also used to be dumped close to the Mukuvisi River, immediately south of the main railway station.

At each of the landfills, the official waste disposal methods are sanitary landfilling (controlled tipping) for solids and open dumping for liquids. Heaps of solid waste is first spread into thin layers, then compacted using bulldozers and landfill compactors which work diagonal to slope and finally it is covered with at least 0.20 metres of soil. Depending on the availability of landfill equipment, levelling of waste occurs in a several-day rhythm. However, uncertain bulldozer availability often results in garbage piles of uncovered waste. As a result, waste is easily blown away by the wind, making it an eyesore as plastics litter the area around the dump sites. The HCC often resorts to burning the waste to curb the nuisance produced by flying litter. Scavengers (mostly women and children) and workers at the dump run the risk of contracting respiratory diseases as they inhale the smoke. In addition, burning decreases the volume of waste thereby creating space for incoming garbage.

The Pomona landfill receives much of the capital city's domestic and market refuse, mainly from public market areas such as Mbare Musika. Bulk of the refuse deposited is organic, biodegradable waste with lesser amounts of industrial and street refuse. On the other hand, the waste stream deposited at the Golden Quarry is mainly industrial and hazardous materials with lesser amounts of domestic refuse from nearby high density areas (Warren Park, Kuwadzana, Dzivarasekwa, Mufakose etc.). At both sites, dumping is not done by category of refuse. All refuse is mixed and piled at available or accessible areas at each dumpsite. Some commercial, private institutions and individuals, which pay little or no fee to the HCC, do their own dumping using their own refuse carts or vehicles. These dumpsites are not fenced off or guarded, allowing easy access to anyone at any time of the day. Mangizvo (2008) observed that this enabled the dumping of restricted materials such as hazardous and medical waste. With free access to the dumpsites, scavengers end up mixing up the waste as they continuously dig into it to salvage any valuable material. At the Pomona dump site, marabou white, black and wood stock birds lazily wade about while black crows clumsily hop around, exercising their scavenging skills. These birds have abandoned their migratory instincts to set up homes in the nearby trees. Instead of searching for frogs, insects, fish, earthworms, small birds and mammals in mangroves and vleis, they are now scavenging through the waste and helping themselves on rotting meat and maggots. The food is abundant but to find it is painstaking. They have to forage

through the mass mixture of plastics, papers, metals, bottles, wood, rubber, tyres, cans, wire, clothes, blankets and masses of rotting food although once in a while the landfill compactor makes the job easier (The Financial Gazzette, 2011).

According to Sood (2004), open dumps as well as controlled dumps have the potential to significantly pollute groundwater sources. The lack of soil cover enables liquid waste and rainwater to infiltrate refuse. As the water percolates through the waste in landfills, it absorbs chemicals and microorganisms present in the rotting materials. The uncontrolled discharge of liquid formed in solid waste dumps or landfills, known as leachate, contaminates ground and surface waters, and thus, pose environmental and public health risks to the local area. At both the Pomona and Golden Quarry landfills, there is no geological or engineering lining to prevent water resources pollution by leachate. A study carried out by Love *et al*. (2006) at Golden Quarry indicated that chemical levels of coliforms, cadmium, iron, lead and nitrate were well above water quality guidelines throughout the nearby Westlea area, making the groundwater generally unsafe for domestic use.

Table 6: Households reports on frequency of collection of solid waste by local authorities

Suburb	**Density of Area**	**Number of households interviewed**	**% of households reporting that solid waste was collected during a months period**				
			More than 8 times	**4-8 times**	**Less than 4 times**	**Never/we use private collectors**	**Don't know**
Chitungwiza	Medium	10	0.0	0.0	20.0	60.0	0.0
	High	80	0.0	0.0	1.3	68.8	30.0
Sub total		**90**	**0.0**	**0.0**	**3.3**	**67.8**	**26.7**
Epworth	High	50	0.0	0.0	2.1	44.7	53.2
Sub total		**50**	**0.0**	**0.0**	**2.1**	**44.7**	**53.2**

Adapted from TARSC, CFH (2010)

High levels of lead, cadmium and iron were attributed to the disposal of industrial waste at the landfill. Concentrations of these metals decreased westwards, following the groundwater flow direction. Coliform levels also decreased westwards with groundwater flow. Nitrate levels (attributed to the food and other residues in the landfill) were at their highest near the north side of nearby suburbs and decreased with the groundwater flow direction. The same study also found high levels of coliform bacteria and nitrates in the Gwayi River and its tributaries around the Pomona landfill as well as in boreholes in the surrounding areas. These were attributed to decomposing refuse at the landfill. However, levels of metals were much lower at Pomona than recorded at Golden Quarry. This was probably due to the substantially less disposal of industrial waste at Pomona than at Golden Quarry. It is reasonable to assume that the pollution of water bodies' around the dumpsites by leachate is much higher now, because more waste is being generated and dumped at these sites.

Furthermore, both the Pomona and Golden Quarry landfills have reached their designed capacities, a situation exacerbated by the lack of appropriate equipment, in particular to level the refuse, preventing "refuse hills." The two landfills have already failed, having been pushed beyond their engineered limits; and due to poor operational practices, each landfill has almost degraded into a potentially hazardous and toxic dump.

4.4 Special Types of Waste and Disposal Techniques

4.4.1 Sludge/Sewage Waste

A very high proportion of inhabitants of formally recognized residential districts in Harare are connected to the sewer network via flush toilets. This includes as many as 1.8 million in low-income districts. The sewage goes to two large activated sludge plants, Crowborough and Firle, which according to Nhapi (2009) are overloaded. The total design capacity of these plants is 208,000 m^3/d compared to total current inflows of about 300,000 m^3/d, resulting in 44% overloading. This is having serious implications for downstream water quality. Large volumes of inadequately treated wastewater are being discharged to the rivers, Marimba and Mukuvisi, which drain to Lakes Chivero and Manyame, the city's major sources of water. 50% of the pollution load discharged into Lake Chivero is attributed to urban wastewater. The city also has two waste stabilisation ponds and an aeration pond; significant quantities of wastewater and sludge are applied to pasture. Nhapi *et al.* (2006) provide very detailed information on wastewater treatment and wastewater impacts on water resources in Harare; they note that a major problem is very high water use (leading to very high wastewater volumes) in relatively wealthy parts of the city.

However, Harare's sewerage system is currently highly dysfunctional. A number of high density areas (Kuwadzana, Highfield, Dzivarasekwa,

Glenview etc) have been experiencing unabated sewer bursts for years and remain plagued with pools of raw sewage as council is currently failing to attend to burst sewer pipes citing financial constraints (UNEP/IETC 2002). Furthermore, Harare's sewerage system does not serve its extensive informal (non-recognized) settlements. According to studies carried out by Makoni *et al.* (2004) in three neighbourhoods of the partially informal settlement of Epworth found pit latrines to be the most common solution. Specifically, between 1 and 33% of households had pour-flush toilets (presumably discharging to sewers, septic tanks or open drains); between 23 and 37% of households had Blair latrines (i.e. ventilated improved pit latrines); between 24 and 48% of households had insanitary pit latrines; between 2 and 13% of households had no toilet facilities. Practical Action (2010) also reports that open defecation is widespread in these informal settlements, which was one of the major causes of the cholera outbreak in 2007.

4.4.2 Health Care/ Medical Wastes (HCW)

HCW is generated mainly by Harare's public and private health care facilities. It is a category of waste that requires special care in handling and disposal, mainly because it is potentially hazardous, infectious, and toxic. According to Taru and Kuvarega (2005), medical waste is broadly classified into two; communal and special wastes. Communal waste usually has the characteristics of regular municipal waste, such as food, flowers, packaging materials, plastic, cardboards, and office supplies. It can be safely disposed of with regular municipal waste. The remaining HCWs, called special waste, such as syringes, needles, dirty gloves, and expired drugs, require special attention.

Medical waste generated within health care facilities is put into small bins at the bedside of each patient for temporary storage. At times, the bins are filled to capacity, and the waste is strewn over the bedsides. The small bins are emptied into large plastic refuse sacks, which are placed in the corridors for collection by a small vehicle, also known as a tag, which takes the sacks to a temporary storage site. A larger vehicle is then used to ferry the waste to the nearest incinerator on a daily basis, although the waste can go for days without being collected mainly due to fuel shortages, which are crippling service delivery at most medical centres in Harare. Usually the incinerators are overloaded with waste from unauthorised external parties. Rats and flies are a nuisance since, due to its delayed incineration, some waste decomposes. Residue from the incinerators is off-loaded and put into skip containers, which are ferried to the nearest dumpsites. The residue is not complete ash, as it contains glass bottles and organic material. At some health care facilities, medical waste is also finding its way into large plastic bins outside the hospitals, which are meant for domestic waste. In fact, medical waste including syringes, needles, and dirty gloves, is often seen in domestic bins located at the entrance of the accidents and emergencies sections. The domestic bins (often containing solid medical waste) are taken to either the Pomona or Golden Quarry municipal dumpsites for disposal. This means that solid medical waste is disposed together with the rest of the waste stream. The findings of a research conducted by Taru and Kuvarega (2005) at Parirenyatwa Hospital showed that only two percent of the staff interviewed separated medical waste from other refuse due to their experience of the dangers of sharp objects. This means that the majority of HCW is not sorted before disposal.

As in many other developing nations, Zimbabwe has no regulations or systems specifically designed to manage potentially hazardous medical waste. As a result, Harare's HCW is collected along with the rest of the waste stream and dumped on land sites with few safeguards to protect the environment and those who come in contact with it. It is unfortunate that, the overall health care delivery has significantly deteriorated in terms of quality and patient care, coupled with an inefficient waste handling and disposal system in the city's limited number of hospitals; hence, no current estimates of total quantity of medical wastes generated in Harare are available.

4.4.3 Industrial and Hazardous Wastes

Harare has a substantial and diverse industrial base. Key industries range from the formal large-scale manufacturing sector, the informal and unregistered cottage-industries, usually located in residential backyards to the small-scale industries. The majority of these industries engage in food and beverages, minerals processing, chemical and petroleum products, textile and clothing, paper and printing and transport and garaging among many others. With little or no efficient monitoring, these industries are spatially located anywhere and in most cases operate without a license. Consequently, most of them have no effluent controls. Waste lubricating oil, motor and gearbox oils, and some cutting oil; small amounts of organic solvents; flesh and hide cuttings contaminated with sulfide and chromium salts; waste batteries; and textile dyeing wastes which contain toxic metals like cyanide, are the main hazardous and toxic wastes arising from these industrial sites (Mubvami 1991; Benavides 1992). Hazardous wastes contain highly persistent inorganic or organic chemicals and compounds with acute and

chronic impacts on human health and on the environment that can cause immediate, short-term, public health problems as well as long-term human health and environmental problems. Direct contact such as during handling of waste is the most common exposure route. Within the textile, clothing, and leather group, the latter is considered as the one producing most of the hazardous waste, which are released, apparently untreated, to streams (Sood, 2004). The chemical industry is also identified as a large producer of hazardous wastes, which are generally generated mostly by spillages and out-of-date chemicals, which the HCC disposes by burying underground. In general, the HCC estimates that the small-scale industry is generating 8% of the hazardous waste in Harare, while the medium-scale and the large-scale industries produce 20% and 72% respectively. Additionally, there is non-hazardous waste from production processes, including, floor sweepings, rags, discarded cardboard and wooden packaging materials, broken glass, metal offcuts, and swarf, whilst the office waste is mainly paper and cardboard.

As for dealing with industrial waste, the Waste Management Department of the HCC has protocols for proper disposal of hazardous waste. Currently, companies are supposed to pay a certain amount to the HCC to dispose of hazardous waste in proper landfills. However, only a few do as the HCC does not have the resources to continually monitor effluent disposal from industrial sites. Companies have therefore resorted to dumping hazardous waste in either of the two landfills in Harare or burying the waste, depending on which method is the cheapest. The situation has been exacerbated by the inadequate enforcement rather than absence or ineffectiveness of national legislation governing hazardous waste management (ILO, 2007; Magadzire and Maseva, 2006). According to a UNEP report, since the Rio Earth Summit in 1992, Zimbabwe has carried out activities aimed at strengthening existing legislation. Through Section 72 of the Environmental Management Act, Zimbabwe has established a radiation protection services department, set up a Hazardous Substances Control Advisory Board, whose purpose is to issue guidelines on the making of regulations for the control of imports/exports, distribution, storage, transportation and handling of each category of toxic and hazardous chemicals and waste. There is also other existing legislation, which only deal tangentially with hazardous waste management, such as the Water Act, which sets the wastewater standards and the Public Health Act. In addition, by-laws have been enacted where industrial wastes are to be disposed under permit in municipal-approved dumps. However these by-laws do not differentiate hazardous from non-hazardous industrial wastes. At the international level, Zimbabwe is still falling short of the expected standards as far as handling hazardous waste is concerned. According to a report published by the UNEP Regional Office for Africa, Zimbabwe signed the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal on 22 March 1989, but has not yet ratified it. The Basel Action Network's International Toxics Progress Report Card also confirms that Zimbabwe has not ratified the Basel Convention. This is making it difficult for the international community to work with Zimbabwe on controlling the illegal movement of hazardous material into and out of the country (Finlay, 2005; Maseva, 2005).

Furthermore, there is also little or no consciousness on the part of small-scale or cottage entrepreneurs regarding the potential hazards involved in dumping wastes. When the HCC requires small-scale industries to set up pollution control devices or purchase a permit for dumping wastes, these are much too expensive and wastes end up illegally dumped in water courses or on the land.

4.4.4 Electronic Waste (E-waste)

Another source of hazardous wastes in Harare are electronic goods. The numbers of imported TV sets, mobile phones, computers, refrigerators, microwaves, etc., from developed countries such as China and Japan, are increasing as the cost of purchasing is getting lower and lower. Because most of these electronic goods have a short life span, more are being imported to such an extent that electronic waste (commonly known as e-waste) is fast becoming a menace in Harare, and Zimbabwe in general. At an individual level, e-waste is not considered a big issue at the moment. One school of thought is the fact that Harare has a more advanced repair and servicing industry compared to most African cities. The repair industry is very effective and most electronic equipment is either efficiently repaired or the parts are always reused in one way or another. This is attributed to the depressed economic growth in the country, which translates into fewer imports, forcing second-hand recycling companies to boom. However, the situation is different at the institutional level. Zimbabwe imports thousands of refurbished computers to equip its many schools through international bodies like Computer Aid International. The life span of these refurbished computers is no more than three years. Through the years, schools, ministries and companies have stockpiled out-dated computers that have long outlived their productive lives. Most of these institutions cannot dispose of the non-functional computer inventory due to limitations of writing off

the goods from asset registers. World Links Zimbabwe, an organisation whose focus is to facilitate the use of computers in pedagogy, encourages schools to bring obsolete computers to their workshop in Harare. World Links has a salvaging programme at its warehouse where computers are broken down to their basic parts; reusable parts are put back to use and the waste is sent to City Council municipal dumps and landfills. However, the cost of transporting these computers from remote locations to Harare is very high and there is no incentive to encourage schools to respond positively to the call. So these computers remain in cupboards gathering dust and taking up valuable space. This is an untenable situation, and at the end, e-waste is simply dumped in waste disposal sites. These sites are usually frequented by the urban poor and unemployed scavenging for reusable plastics or metals for resale. According to the World Computer Exchange, e-waste on average may contain up to 1,000 toxins including lead, mercury, cadmium and other heavy metals that are known to cause damage to the nervous system, the brain, the kidneys, and can cause birth defects and cancer (Zunguza, 2010).

Disappointingly, research done in Zimbabwe, found a very low level of e-waste awareness and readiness. There is no legislation on e-waste. With the removal of import duty, it only takes some scrupulous businessperson to import e-waste and dump it in Zimbabwe under the guise of bringing much-needed technology into the country. For the safe disposal of e‑waste, toxic materials must first be removed. However, Zimbabwe does not have a facility that focuses on removing toxic materials from electrical goods. Both the Environmental Management Agency (EMA) and the Waste Management Department of the Municipality of Harare, institutions with the responsibility of waste management, agree on the need and urgency to draft procedures and processes necessary for the safe disposal of e-waste.

5. Discussions

The governance of waste management in Harare is closely associated with the evolution of its local-government systems, and each phase has had its own influence on waste management systems. The seeds of the apparent chaos in the governance of waste in Harare were laid during the colonial period. This was a time of segregation, with waste management, just like other aspects of life, conceived on the basis of racial bias. Urban infrastructure and services were concentrated in areas designated for non-African races, whereas the native suburbs were left more or less on their own. But more importantly, despite many ordinances the colonialists put in place to strengthen urban administration, they regarded native suburbs as areas for a cheap and easily controlled labour force, and therefore, made no serious efforts to resolve the emerging problems, particularly those of waste management.

The uneven distribution of resources for refuse collection and disposal services still persist, despite political changes in the country which saw Zimbabwe gaining independence from colonialists in 1980. Despite the redefinition of roles of the different tiers of government and the fact that areas formerly inhabited by colonialists (low density areas) were taken over by natives, discrimination between segments of the city in terms of service delivery has been observed since 1980. Former African (now high density suburbs) residential areas such as Mabvuku, Tafara, Chitungwiza, Highfield, Kuwadzana, Mbare and Mufakose have over the years gone for up to 6 months without refuse collection. According to frequent surveys carried out by the CHRA, most households in these areas rate poorly the reliability of the HCC collection services and continue to express reservation about the payments they are making given this poor quality of services. Over the past 30 years, the HCC delivered door-to-door refuse collection services to most of the former European (now most of the low density suburbs) residential areas, whereas only sections of high density areas witnessed refuse collection. High density areas were also the most affected areas during the cholera outbreak in 2007. In addition, they play host to the two landfill sites, Pomona and Golden Quarry, which receive much of Harare's refuse. Such discrimination is also a feature of most cities and towns in Zimbabwe.

In addition, the current authority is struggling to offer waste collection services on a consistent basis. Although waste collection services were re-introduced in 2010, their frequency is generally low, with high density areas reporting less frequent refuse collection services compared to the higher income low density areas, despite being in the same local authority. Council is no longer supplying residents with the most basic receptacles. As a result, households have resorted to using private collectors or alternative methods, such as digging pits inside their yards, burning waste and illegal dumping on roadsides and open spaces. To compound the situation, medical, industrial, sewage and electronic waste, which requires special care and handling is not being discharged properly. As in many other less developed countries, Zimbabwe lacks systems specifically designed to manage this type of wastes, which is currently being collected along with the rest of the waste stream and dumped on land sites with few safeguards to protect the environment and those who come in contact with it.

Despite the many challenges surrounding waste management in Harare, there are encouraging signs of a positive turnaround of the situation. The positive economic environment obtaining in the country since 2010 due to the introduction of a multi-currency regime has seen the return of private companies as players in waste management. At the same time, the HCC has realised that it is impossible for them to fulfil their mandate to provide refuse collection and disposal services alone. They need to work in new ways with private companies who can provide them with the financial backing required for efficient service provision. Already, some of the private companies and banks have made loans available to the HCC as well as embarking on their own waste management initiatives. In addition, some of the NGOs, which had earlier left the country citing economic downturn and political instability, are beginning to return though in small numbers. Some of them have already joined the fight against waste by organizing clean-up campaigns in Harare and other parts of the country.

6. Conclusion

The preceding sections have demonstrated beyond reasonable doubt that the waste problem in the City of Harare has become a cross cutting issue that has no immediate solution. It is also now clear that the management of waste is an expensive operation and is becoming increasingly costly as a consequence of rapid population growth in the city. Although undealt with waste is a visible testament to failure in local governance, this is not a unique problem. Problems are experienced in other areas of urban governance, including the provision, management, and maintenance of infrastructure and other public services. These problems are rooted in the whole management arena of Harare. Overlapping institutional arrangements, poor local revenue collection, poor relationships among councillors, citizens, the private sector, NGOs, and lack of accountability and transparency have all contributed to poor urban governance that has manifested itself in poor waste management.

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References

1. BBC, 2009. *Zimbabwe cholera 'to top 100,000'* [online]. Available from: http://news.bbc.co.uk/1/hi/world/africa/8068232.stm [Accessed 29 June 2011].
2. Benavides, L., 1992. *Hazardous waste management for small-scale and cottage industries: Overview*. USA: United Nations Environmental Program (UNEP).
3. Brinkhoff, T., 2010. *City Population* [online]. Available from: http://www.citypopulation.de. [Accessed 13 June 2011].
4. Central Statistics Office, 1982. *1982 Census Report*. Harare: Government of Zimbabwe.
5. Central Statistics Office, 2002. *2002 Census Report*. Harare: Government of Zimbabwe.
6. CHRA, 2009. *Harare last week, 19-24 January 2009* [online]. Available from: http://www.chra.co.zw/index.php?option=com_content&task=view&id=114&Itemid=37 [Accessed 11 June 2011].
7. Finlay, A., 2005. E-waste Challenges in Developing Countries: South Africa Case Study, APC, Johannesburg [online]. Available from: www.apc.org/en/pubs/issue/e-wastechallenges-developing-countries-south-africa [Accessed 19 August 2011].
8. Gumbo, B., 2005. *Short-cutting the phosphorus cycle in urban ecosystems*. London: A.A. Balkem Publishers.
9. Hanke, S. H., 2010. *R. I. P. Zimbabwe Dollar* [online]. Available from: http://www.cato.org/zimbabwe [Accessed 3 July 2011].
10. International Labour Office, 2007. *Start Your Waste Recycling Business Technical Handouts. A Technical Stet-by-Step Guide of How to Start a Community-Based Waste Recycling Business*. Harare: International Labour Office.
11. IRIN, 2007. *Zimbabwe: Untreated sewage makes its way into drinking water* [online]. Available from: http://www.mopanetree.com/health-nutrition/477-zimbabwe-untreated-sewage-makes-its-way-into-drinking-water.html [Accessed 20 June 2011].
12. Kativu, D., 2001. *Economic Aspects of Solid Waste Management in Harare*. Unpublished Thesis (MSc). Department of Geography and Environmental Science, University of Zimbabwe, Harare.
13. Koro, E., 2003. *Voices from the Field: Harare Loses Status of Cleanest City in Africa*. Washington: World Bank.
14. Love, D., Zingoni, E., Ravengai, S., Owen, R., Moyce, W., Mangeya, P., Meck, M., Musiwa, K., Amos, A., Hoko, Z., Hranova, R., Gandidzanwa, P., Magadzire, F., Magadza, C., Tekere, M., Nyama, Z., Wuta, M. and Love, I., 2006. Characterization of diffuse pollution of shallow groundwater in the Harare urban area, Zimbabwe. *In*: Y. Xu and B.H. Usher, eds. *Groundwater pollution in Africa*. Gt. Britain: Taylor & Francis/Balkema, 65-76.
15. Madebwe, V., and Madebwe, C., 2006. Demolition Waste Management in the Aftermath of Zimbabwe's Operation Restore Order (Murambatsvina): The Case of Gweru, Zimbabwe. *Journal of Applied Sciences Research*, 2 (4), 217-221.
16. Madimutsa, B., 2000. *Cadmium flows through Golden Quarry sanitary landfill*. Unpublished Thesis (MSc), Department of Civil Engineering, University of Zimbabwe, Harare.
17. Magadzire, F.R. and Maseva, C., 2006. Policy and Legislative Environment Governing Waste Management in Zimbabwe. *Proceedings of the Emerging Issues in Urban Waste Management Workshop, 10 February 2006 Harare*. Harare: Practical Action Southern Africa, 13-19.

18. Makochekanwa, A., and Kwaramba, M., 2009. Stage Fragility: Zimbabwe's horrific journey in the new millennium. European Report on Development, 21-23 May 2009 Accra, Ghana.
19. Makoni, F. S., Ndamba, J., Mbati, P. A., and Manase, G., 2004. Impact of Waste Disposal on Health of a Poor Urban Community in Zimbabwe. *East African Medical Journal*, 81 (8), 422-426.
20. Mangizvo, R. V., 2008. Management practices at the Mucheke municipal solid waste disposal site in Masvingo City, in Zimbabwe. *Journal of Sustainable Development in Africa*, 10 (2), 147-164.
21. Maseva, C., 2005. *A Review of the Legislative and Policy Framework for Waste Management in Zimbabwe with Special Reference to Harare, Chitungwiza Municipality and Epworth Local Board*. Harare: Practical Action Southern Africa.
22. Masocha, M., 2004. *Solid Waste Disposal in Victoria Falls, Zimbabwe: An analysis of spatial, environmental and socio-economic impacts*. Unpublished Thesis (MPhil). Department of Geography and Environmental Science, University of Zimbabwe, Harare.
23. Mclvor, C., 2001. "Do not look down on us": child researchers investigate informal settlements in Zimbabwe. *PLA Notes*, Issue 42, 34-38. London: IIED.
24. Ministry of Local Government Rural and Urban Development (MLGRUD), 1995. *Zimbabwe Urban Solid Waste Management Study*. Harare: The Government of Zimbabwe.
25. Mubvami, T., 1991. Hazardous Waste Management for Small-Scale Manufacturing and Cottage Industries in Urban Areas in Zimbabwe.
26. Muza, E., 2006a. Current Challenges in Waste Management in Harare. *Proceedings of the Emerging Issues in Urban Waste Management, 10 February 2006 Harare*. Harare: Practical Action Southern Africa, 10-12.
27. Muza, E., 2006b. The city and urban waste management regulations. *The Regulatory Framework in Waste Management, 3 March 2006 Harare*. Harare: Practical Action Southern Africa, 13-14.
28. Nhapi, I., Siebel, M. A. and Gijzen, H. J., 2006. A proposal for managing wastewater in Harare, Zimbabwe. *Water and Environment Journal*, 20 (2), 101–108.
29. Nhapi, I., 2009. The water situation in Harare, Zimbabwe: a policy and management problem. *Water Policy*, 11 (2), 221-235.
30. Practical Action, 2010. Low-cost sanitation technology – Zimbabwe [online]. Available from: http://practicalaction.org/practicalanswers/product_info.php?products_id=408&attrib=2 [Accessed 12 July 2011].
31. Practical Action Southern Africa, 2006. Proceedings of the Emerging Issues in Urban Waste Management Workshop. *10 February 2006 Harare*. Harare: Practical Action Southern Africa.
32. Sood, D., 2004. Solid Waste Management Study for Freetown, Sierra Leone. (Component Design for the World Bank, Draft Report Project No. P078389). Great Falls, Virginia 22066, USA.
33. Taru, P., and Kuvarega, A.T., 2005. Solid medical waste management. The case of Parirenyatwa Hospital, Zimbabwe. *Revista Biomedica*, 16 (3), 153-158.
34. Tibaijuka, A. K., 2005. *Report of the Fact-Finding Mission to Zimbabwe to assess the Scope and Impact of Operation Murambatsvina by the UN Special Envoy on Human Settlements Issues in Zimbabwe*. New York: UN.
35. Tevera, D. S., 1991. Solid Waste Disposal in Harare and its Effects on the Environment: Some Preliminary Observations. *Zimbabwe Science News*, 25, 9-13.
36. The Herald, 2007. Untreated sewage polluting Harare water supply. *The Herald*, 15 January.
37. The Herald, 2010. Council gets Government nod on refuse trucks. *The Herald*, 11 March.
38. The Financial Gazzette, 2009. Council business grinds to a halt. *The Financial Gazzette*, 23 January.
39. The Financial Gazzette, 2011. A tale of poor waste management. *The Financial Gazzette*, 14 January.
40. The Zimbabwe Independent, 2000. Harare Cancels Waste Management's Contract. *The Zimbabwe Independent*, 7 April.
41. Training and Research Support Centre (TARSC), Civic Forum on Housing (CFH), 2010. Assessment of solid waste management in three local authority areas in Zimbabwe, Report of a Community Based Assessment: Discussion paper. Harare: TARSC.
42. UNCHS, 2001b. *The State of the Worlds Cities 2001*. Nairobi: United Nations Centre for Human Settlements.
43. UNEP/IETC, 2002. International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management [online]. Available from: http://www.unep.or.jp/Ietc/Publications/TechPublications/TechPub-15/main_index.asp [Accessed 9 June 2011].
44. Zaranyika, M., 1997. Sources and levels of pollution along Mukuvisi River: a review. *In*: Moyo, ed. *Lake Chivero: A Polluted Lake*. Harare: University of Zimbabwe Publications.
45. Zunguza, M, 2010. Zimbabwe: ICTs and Environmental Sustainability. *Global Information Society Watch*, 242-244.

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