The Role of Local Knowledge in planning and managing urban solid waste: the tale of two (2) West African Cities, Accra and Kumasi, Ghana

By

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Ongoing and potential developments with regards to solid waste management have raised concerns about well being in African cities. There is also growing concern among environmental managers, scientists, and the public that the pace and scale of human activities may lead to adverse environmental and health impacts. These concerns have been worsened by two factors: (1.) That all attempts so far made at dealing with the present situation of solid waste handling in African cities have either failed or only met with moderate success; and, (2.) There is significant economic, spiritual and cultural value placed on the city's development in Africa, therefore, a deterioration in its environment spells further difficulties for improving conditions of development. To date however, very little research has been conducted on the role local knowledge has to play in managing urban solid waste in the context of African cities. This study is a contribution on this topic, using case study cities of Accra and Kumasi in Ghana, West Africa where it was found that local knowledge plays a role not only in the day-to-day decision making of the actors involved, but also in the management of solid waste activities through, the employment of appropriate technology, the creation of awareness around local waste practices, education, adherence to norms and beliefs, and also in stopping littering and encouraging proper waste practices.

Key words: *Solid waste management, Local knowledge, Accra, Kumasi*

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In expressing my gratitude, I do wish to state that I am solely responsible for any errors or omissions that may be found in this thesis. Any such omissions are merely a reflection of my human limitations.

Benoit Klenam Demanya,

Waterloo, Ontario

Canada

December, 2006

DEDICATION

For my Mother Felicia Nadu Lawson,

A phenomenally phenomenal woman

Who has given me strength, fortitude, and love,

So that,

"…I shall be telling this with a sigh
somewhere ages and ages hence:
Two roads diverged in a wood, and I,
I took the one less traveled by,
And that has made all the difference".

-Robert Frost

"…Did you want to see me broken?
Bowed head and lowered eyes?
Shoulders falling down like teardrops.
Weakened by my soulful cries.
Just like moons and like suns,
With the certainty of tides,
Just like hopes springing high,
Still I'll rise".

-Maya Angelou

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CHAPTER 1

INTRODUCTION

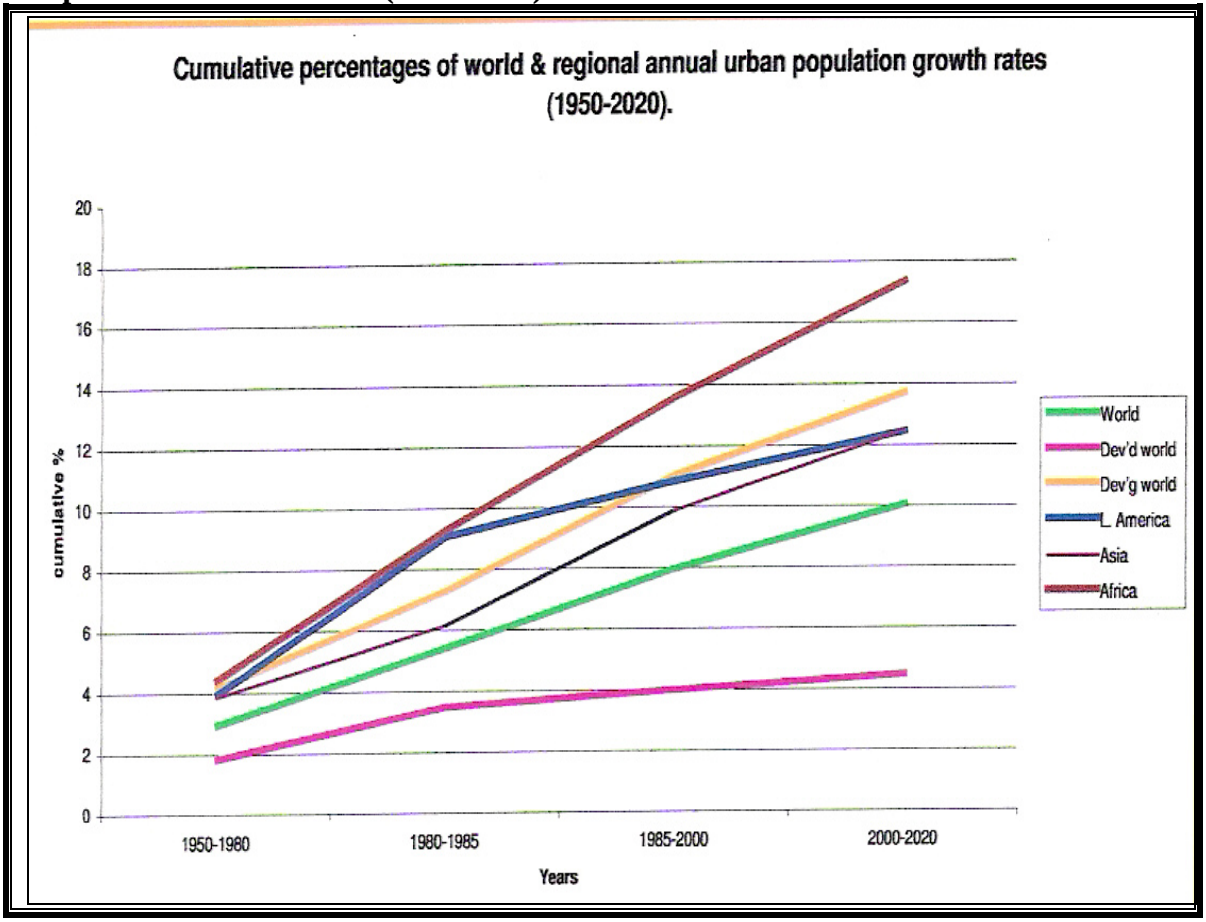
1.1 Background

The management of municipal solid waste worldwide is posing complicated challenges to city managers, due to pressures of urbanization, dwindling land space for disposal sites, and the desire to conserve resources. Both the Developed and Developing World have high rising levels of waste accumulation in urban centers, which poses enormous challenges for waste management in present times. Thus, waste handling has emerged as one of the greatest challenges facing human kind today in spite of numerous technological achievements made. Attempts to reduce waste accumulation in most countries in the world have relied mostly on landfill, which seems to be relatively less expensive than the other options of incineration and composting in disposing of greater proportions of waste produced. The philosophy of prevention and minimization, materials recovery, incineration, and landfill, has been adopted by most First world nations as the menu for developing their municipal solid waste management systems[1].

In the Developing countries, in particular African countries, increasing levels of urbanization (Figure 1-1) is creating growing concentrations of people, commerce and industry that generate ever-larger amounts of municipal solid waste (Fekade, 2000; Hardoy et al., 2001).

[1] The extent to which any one option is used within a given country or region varies depending on a large number of factors, including but not limited to topography, population density, transportation infrastructure, socioeconomics and environmental regulations. For instance where as in Canada and the United States, Landfill accounts for 83.9% and 62 % respectively of management methods employed for getting rid of the trash, in Denmark, Japan and Sweden, incineration of the waste is preferred and accounts for 58%; 74.3%; and 53% respectively (Sakai et. al.,1996). Generally, a solid waste management system consists of collection, transportation, and disposal

Figure 1-1: Cumulative Percentages of World and Regional Annual Urban Population Growth Rates (1950-2020)



Source: Adapted from Hardoy et al., (2001); UN Population Division (2002)

Urban population growth rates in sub-Saharan Africa range from four to seven percent per annum (Fekade, 2000; Hardoy et al., 2001).[2] This has resulted in a large (increasing) proportion of 'mega cities' emerging in Africa, many of which have populations that grew more than tenfold to over five million between 1950 and 1990, including Abidjan, Dar es Salaam, Harare, Khartoum, Lagos, Nairobi, Lusaka, and Maputo (Hardoy, et al.,

[2] There are now 43 cities with populations of more than one million people. The figure is expected to rise to 70 by the year 2015. The cumulative percentages of world and regional annual urban population growth rates shown in Figure1 above further illustrate the strong urbanization position for Africa in the world system. There are sub-regional and national variations in these urbanization trends. North African sub-region is most urbanized and has an average urban population of 54 percent. The other sub-regions are as follows: West Africa (40 percent), Southern Africa (39 percent), Central Africa (36 percent), Western Indian Ocean Islands (36 percent), and East Africa, the least, (23 percent).

2001). [3] This increase in population in itself would pose serious challenges for any formal management system. As a result, many African cities are now faced with serious environmental degradation and health risks caused by uncollected and poorly disposed off refuse in streets, open areas, and urban drainage systems that have become clogged by indiscriminately dumped refuse, and the pollution of water resources near uncontrolled dumping sites. According to Songsore et al., (1998) households have been estimated to account for about half of the solid waste generated by weight in developing world cities. This overwhelming rate of waste generation has resulted in open dumping as the most widely used means of disposal of solid waste in the developing world (Bartone et al., 1991; IETC, 2000). Cointreau (1982), and, Stren and White (1989), estimate that in the cities of developing countries some 30 to 50 percent of solid wastes often remain uncollected, to rot, wash away, burn out in the open, and be scavenged at dumps, where the wastes are piled up uncovered. These dumpsites have become refuges for disease spreading parasites. The use of incineration is limited in many African and Latin American cities due to the high cost of operation, high moisture content of the waste, and the high proportion of organic matter (IETC, 2000).

These ongoing and potential developments with regards to solid waste management have raised concerns in the urban environmental management literature (for e.g. Aina, 1997; Benneh et al., 1996; Cointreau, 1982; Diaw et al., 2002; Hardoy, Mitlin, and Satterthwaite, 2001; Hardoy and Satterthwaite, 1992; Musandu-Nyamayaro, 1991,

[3] An examination of the growth rates of individual African cities shows a rate of 33% for Swaziland, which in 1950 had an urban population of only 1%. This is expected to rise to 63% by 2025. Similarly, Mauritania's urban population may grow from 3% in 1950 to 70% in 2025 by which time, the population in most major cities will have quadrupled (Onibokun and Kumuyi, 1999: 2).

Obirih-Opareh, 2002; Onibokun, 1999; Porter et al., 1997; Rakodi, 1997; Songsore et al., 1993; 1998; Stren and White, 1989; Stren, White, and Whitney, 1992) about well being in African cities. There is also growing concern among environmental managers, scientists, and the public that the pace and scale of human activities may lead to adverse environmental and health impacts (Hardoy, Mitlin, and Satterwaith, 2001; Rakodi; 1997, Stren, and Kjellberg-Bell, 1994; Stren, and White 1989; Wekwete, 1994.). These concerns have been worsened by two factors:

1) That all attempts so far made at dealing with the present situation of solid waste handling in African cities have either failed or only met with moderate success; and,
2) That there is significant economic, spiritual and cultural value placed on the city's development in Africa by its people, therefore, a deterioration in its environment spells further difficulties for improving conditions of development.

1.2 The Central Research Theme/ Problematique

With African cities currently under going such significant change and experiencing rapid growth, an ongoing lack of finance, and a weak institutional structure are leaving the city vulnerable and in decline (Silitshena, 1996). Thus, as with other types of municipal services relatively little attention has been paid to the issues of solid waste management in African cities. Although all services (roads, water, sanitation) have been historically neglected, solid waste collection and disposal appears to be particularly problematic for African cities. Piles of rubbish in open spaces characterize many African cities, for example Accra (Demanya, 2001; Obirih-Opareh, 2002;); Kumasi (Post, 1999); Lagos, Ibadan (Onibokun, 1999), and Abidjan (Attahi, 1999).

Although there is no overall data on the level of waste collection services provided, it is clear that waste services in many African cities are ineffective. Most local governments, and urban agencies in Africa have time, and again identified solid waste as a major problem that has reached proportions requiring drastic measures (Srinivas, 2004). Extensive research has been conducted on solid waste management on the continent, and according to Benneh et al., (1996), Onibokun (1999), and Silitshena (1996) common features of solid waste management in African cities are, the lack of sufficient capacity to deal with the refuse that is generated, a lack of regular collection services, lack of proper equipment and maintenance for haulage, poor financial backing of waste management systems, and an absence of strong political will and leadership. Dar es Salaam, in Tanzania, for example, generates an estimated 2000 tonnes of refuse a day but the city's removal capacity is only 100 tonnes a day (Mosha, 1990). Thus, open dumping is the most common disposal arrangement because it is cheap (Kwawe, 1995). A nuance in all of these issues is the problem of a rigid colonial top down planning legacy.

However, it must be noted that various attempts have been employed at the international, national, local community, and even at the level of the individual to help solve these problems. The main approaches to dealing with municipal solid waste management problems in African cities have evolved within the context of current approaches to managing the urban environment in Africa. The situation in the African cities is being tackled by what has been called the "*Urban management approach"* (Aina, 1997:420). This is a professionalized approach to the management of these settlements. The

approach covers a whole series of issues, from infrastructure provision to housing, of which solid waste is just a component.

In spite of these initiatives, African cities continue to be unsuccessful in adequately dealing with the challenges they face. Thus, criticisms have been leveled at the urban management concept as a whole. The approach has been seen as being too state centered with regards to state-society relations, too narrow, formalized, and technocratic, relying mainly on a body of professionals and trained urban managers (Lee-Smith and Stren, 1991). Also, even though it sought to incorporate participatory methods, it is still too top-down and needs to respect and incorporate the wide range of non-formalized human practices, and coping actions and mechanisms extensively utilized by the varied sections, and communities of African cities in providing themselves with urban services (Aina, 1997:421).

Colby (1990), and Pery and Vanderklein (1996), state that in developing countries, resource and environmental management is done mostly by a top-down decision-making approach. And in the case of solid waste management in African cities, Diaw et al. (2002) have established the planning to be generally technical, top-down, and agency driven. A situation which has led Fekade (2000: 130), and Pierre (2000) to conclude that the existing approaches which all overlook local knowledge, are becoming part of the problem of poor planning and management of waste in African cities, rather than the solution. The term local knowledge refers to the knowledge of some region of people. It can be argued that indigenous knowledge is a subset of local knowledge, since the term

indigenous knowledge is defined as the local knowledge held by indigenous peoples or local knowledge unique to a given society (Warren et al., 1995).

Further, empirical evidence (e.g. Greyer, 1994; Meredith, 1997; and Mitchell, 1997; 2002; Norgaard, 1987) suggests a need for equity in considering local knowledge in environmental management in developing countries. Chambers (1980, 1992) and Agrawal (1995) note that many local or indigenous peoples have lived in harmony and stability with their environment for generations, and this knowledge should be incorporated in to the decision-making process. In this regard Hall (1997) emphasizes that methods of management should therefore be appropriate to the local people and their environment. Appiah-Opoku and Hyma (1999) also indicate that local practices and institutions provide a framework for successful resource and environmental management, and Mitchell (2002: 211-213) points out that local people have often developed understanding of the local surroundings through "their close ties to the environment and resources". However, it is important to be wary not to over romanticize it, as Arce and Long (1992: 211) amongst others, have characterized local knowledge as "fragmentary and provisional."

In spite of this characterization, it has become increasingly expected and recognized that local perceptions of, and perspectives on environmental management should play a key role in planning and decision-making (Appiah-Opoku and Hyma, 1999; Berkes and Folke, 1994; Brokesha et al. 1980; Gupta, 1992; McCall, 1996; Mitchell, 2002; Niamir, 1990; Quiroz 1996; Warren 1990). This has not always been fulfilled (Neis, 1992; Reed

1990), because the role that local knowledge, has to play in resource and environmental management is still yet to be succinctly resolved (Fenge and Rees 1987; Sillitoe 2000), although local knowledge is often viewed as pivotal in discussions of sustainable management and balanced development (Agrawal, 1995; Berkes and Henley, 1997; Brokensha et al., 1990; Gupta, 1992; Niamir, 1990; Warren 1990).

Also, Fardon (1995), Hobart (1993), and Sillitoe (2000) have criticized top down management approaches for over simplifying and generalizing the complex environmental management problems that emerge, instead of promoting an in-depth appreciation of the local people's ideas about the management of their environment as necessary for their development of interventions.

1.2.1 The Research Question and sub questions:

In order to contribute to the resolution of this problem, the principal research question for the study is:

What is the role of local knowledge in solid waste management in the African city? [4]

To address the above research question, three sub questions have been developed through a review of the literature:

a.) What is the relationship between local knowledge and solid waste management in the African city?

[4] The term local knowledge refers to the knowledge of some region of people. It can be argued that indigenous knowledge is a subset of local knowledge, since the term indigenous knowledge is defined as the local knowledge held by indigenous peoples or local knowledge unique to a given society (Warren et al. 1995

b.) How does local knowledge complement solid waste management approaches in use in African cities?

c.) What positive and negative implications do the relationship in (a) above, have for planning solid waste management at the institutional level in an African city?

1.3 Relevance and Purpose of Study

In examining these questions, the study employs a comparative analytical approach through the case studies of two West African cities Accra, and Kumasi in Ghana. A comparative perspective of the role of local knowledge in the provision of urban solid waste services is invaluable in terms of formulating realistic objectives in determining which policies and institutional structures are to be preferred and have the best outcomes. In addition, Rakodi (2001) notes that a comparative analysis serves a range of possible purposes, which include individualized comparisons, and construction and verification of generalizations. In the absence of such a comparative framework, Angel et al., (1993) posit that general policy recommendations may be inapplicable to certain cities, while city-specific policies remain highly idiosyncratic. The purpose of this study is to understand and catalogue the role that local knowledge plays or has to play in planning solid waste management for the African city using city-based data drawn from the African continent, to be precise, Ghana, West Africa. In particular, the paper seeks to provide answers to the set of questions posed in the preceding discussion.

In Ghana, most studies and policies concerning urban management (c.f.: Benneh et al., 1993; Konadu-Agyemang, 1999; MacGranahan et al., 2001; Songsore et al., 1998) have

been somewhat one-sided, siding with the views of only one of the actors involved rather than all major stakeholders. They have also fallen short by not indicating how recent policy reforms have affected the solid waste management landscape. Dawson (1995:10) argues that in order to understand why individuals and firms make particular choices and how they could be persuaded to act differently, we have to study them not in isolation but in conjunction. Such a study is necessary to indicate the critical role of local knowledge at various levels, and the institutional responses to the failures of the solid waste management system, as well as the inability of the private sector to fill the vacuum created by a receding public sector.

When waste is not collected and disposed off properly, unsanitary conditions are bound to develop, and these conditions are associated with the prevalence of parasites and diseases such as, malaria, cholera, diarrhea, tetanus, and intestinal worm infections (Stephens and Harpham, 1992). In Accra, and Kumasi in Ghana, solid waste collection and disposal is a pressing problem with solutions being increasingly demanded by the residents (Obirih-Opareh, 2002). The poor management of solid waste, has a major impact on the people's health and livelihood, and yet has not been given the attention it deserves as such the consequences have been disastrous. For instance, Songsore et al. (1998:1) reveal that in the Greater Accra Metropolitan Area, the ten most common problems reported at outpatient facilities clearly demonstrate the importance of environmental conditions. Of these, malaria is the most prominent, followed by upper respiratory tract infections, diarrhea, skin diseases, and intestinal worms. Thus, in Accra, Ghana, the major health problems are diseases attributed to poor environmental sanitation

(Ababio, 1992). Also, Amofah, Knott, and Amexo (2001) have noted that malaria is Ghana's major health problem, the country's number one source of death, currently killing 25 percent of children aged five and under, and accounting for over 40 percent of all outpatients in health centers in Accra and Kumasi. It is important to note here that not only does poor sanitation affect the health and socio-economic status of the people; it is also a disincentive to potential investors.

The significance of this study for theory and practice can be summarized as follows:

a.) In Accra and Kumasi, as in many African cities, studies on solid waste management from varying perspectives and different angles of all actors involved are still lacking, since studies have been undertaken mostly from a purely top-down perspective.

b.) The study tries to analyze the problem of solid waste management in the African city from the perspective of local knowledge, notably the combined impact of the relationship between local knowledge and solid waste management. In doing so, the study assesses the modes of solid waste management from a (holistic) local knowledge perspective rather than from the conventional perspective of service efficiency and effectiveness that is so prevalent and customary in the solid waste management literature.

The study hopes to contribute to the existing theories on planning, within the broader discourse on urban management, environment, public-private partnerships, and the practice of solid waste management planning. Hopefully, the recommendations in this thesis will contribute towards developing a more sustainable, effective, and contextually

appropriately suited, waste management policy in Accra and Kumasi, Ghana in particular and urban Africa in general.

1.4 Study Areas: The Accra Metropolitan Area (AMA) and Kumasi Metropolitan Area (KMA)

1.4.1 The Accra Metropolitan Area (AMA) an overview

1.4.1.1 Location and physical characteristics

Accra is the capital of Ghana, and the center of industrial and commercial activity of the country (Map 1-1). It is located on longitude 0 10'West and latitude 5 36'North on the seashores of the Gulf of Guinea. The climate is tropical, and is marked by alternating dry and wet seasons. The extremes of the dry season occur during November and March, whilst during the wet season the peaks of rainfall are in June and September. The annual rainfall is less than 1000mm, and humidity is about 80 percent during the wet season, dropping to 70 percent in the dry season (Henderson-Quartey, 2001:20), with monthly temperature ranges of 26 to 32 ^{o}C (Boateng, 1960:46). Topographically the land area covered by Accra lies between 5 to 20 meters above sea level with gentle slopes (Ministry of Local Government & Rural Development, 1995:2).

1.4.1.2 Cultural Background

The inhabitants of Accra are mainly of *Ga* origin (-the main indigenous people of Accra-) even though the city has become more heterogeneous in nature due to its assumption of a cosmopolitan character. The *Gas* are made up of several sub-ethnic groups and clans, which consist of a grouping of people occupying a particular (spatial) area or locality and includes all people who claim a common founding ancestor. A chief and a council of elders head each clan. The social organization is centered on the family, which is then

superimposed upon by the national political administrative set up (Azu, 1974; Robertson, 1984). Accra's spatial organization is characteristic of the settlement patterns of people of various ethnic groups. Thus, the *Ga* people are principally based in the localities of Osu, Ga-Mashie, La/Labadi, Nungua, and Teshie (Map 1-1), and the early settlers from the northern parts of the country are based predominantly in Nima, Maamobi, Sukura, Zongo Lane and several Zongos through out the city.[5] The suburban residential areas of Dansoman, Odorkor, Abeka, Achimota, and Madina are predominantly heterogeneous in their ethnicity (Map 1-1).

There are definite interactions that can be traced between the environment and *Ga* cultural development. These indicate an indigenous basis of *Ga* culture, customs, manners, and religion, though it might be appreciated that contributions to the culture complex from non-*Ga* origins cannot altogether be disregarded. There are many illustrations of these in *Ga* social and political organization (Azu, 1974; Kilson, 1976; Robertson, 1984). Firth (1964), also enumerates ways of interactions between human culture and the environment, which supports the basis of the above inference.

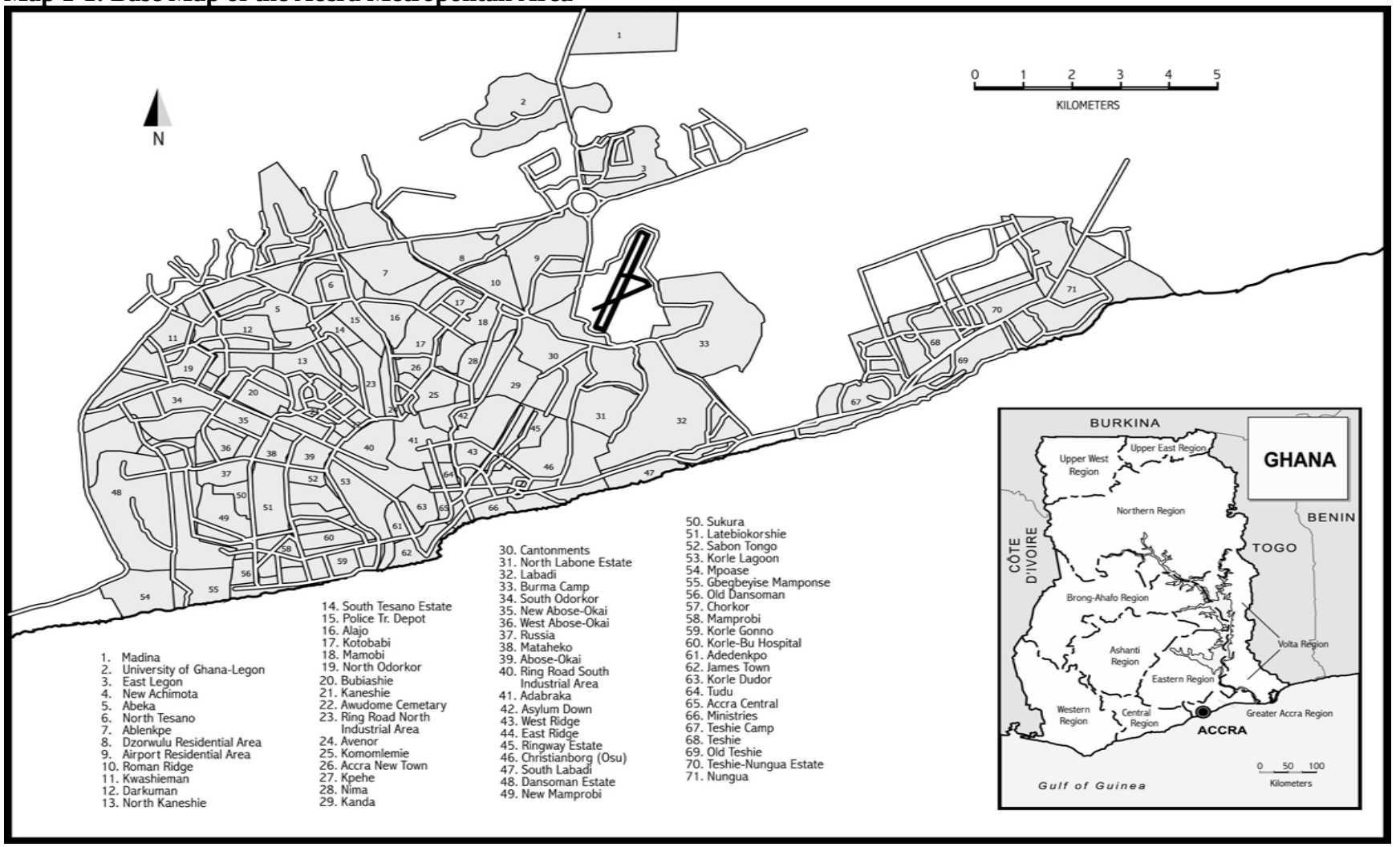
1.4.1.3 History of growth:

The *Ga* people of southeastern Ghana founded the city of Accra in the 16th century as a small coastal fishing village. On the arrival of the *Gas* to Accra from Niger River country in present day Nigeria, they integrated with other groups, such as the La, Kpeshie, and

[5] The Zongo is a term used to refer to an area that has poor access roads, water, drainage gutters, which was settled first by people from the northern part of Ghana. The term has assumed the descriptive qualities of other words such as '*slum*' '*ghetto*' or '*hood*'.

the Gua who were in coastal villages encompassing the areas of James Town, Ussher Town, Osu, La, Teshie, and Nungua (Map 1-1).

Map 1-1: Base Map of the Accra Metropolitan Area



Source: Field Survey (2004)

Accra became a preeminent center in the country due to two factors: 1.) In the 17th century it became the most important European trading center along the West African coast; and 2.) In 1877 after having established themselves as the sole colonial power in Ghana, the British decided to transfer the seat of colonial administration and government of the territory from Cape Coast to Accra. An event of seminal importance in the development of Accra (Dickson, 1969:259), as Accra grew rapidly with its population increasing from 16,000 in 1891 to around 136,000 in 1948 just before independence (Plan Consult, 1989: ii). Accra's population has since grown very fast over the years from 388,400 in 1960 at an annual growth rate of 4.4 percent to 642,700 in 1970,and then to 956,300 in 1984 at an annual growth rate of 3.3 percent (GSS, 1984). According to the Housing and Population census survey of 2000, Accra's present day population stands at 1.6 million (GSS, 2000), but there are estimates of a 'floating population' of between 500,000-800,000 daily visitors (MLGRD, 2000:15). With an area of 345 km^2 (0.12% of the national land area), the population density is estimated at 3,826 people per km^2 (Table 1-1).

Table 1-1: Population Density of Accra by locality

Class	Population Density (People/Km^2)	Locality
High	<50	North Legon, Abelenkpe, Cantonments, North Ridge, Airport Residential Area, Roman Ridge, McCarthy Hill
Medium	50-150	Dzorwulu, Dansoman, Laterbiokorshie, North Kaneshie, Ringway Osu, Christianborg, North Teshie
Low	150-350	South Odorkor, Darkuman, Bubuashie, Mataheko, Abossey Okai, Sukura, Old Dansoman, Chorkor, Mamprobi, Korle Gonno, Adabraka, Kotobabi, Maamobi, Kokomlemle, South Teshie, South Labadi, Nungua
Poor	>350	Sabon Zongo, James Town, Ussher Town, New Town, Nima, Mallam

Source: Ghana Statistical Service (2000); Taywood Environmental Consultancy (1998)

In line with the spatial differentiation in density (Table 1-1), development control has become a very serious problem that the planning and management system of the city faces (Aryeetey and Anipa, 1992). As such, Accra is sprawling along all its frontiers with little or no control resulting in an over-stretched city administration, inadequate physical, and social infrastructure, and is fragmented because of a planning system that is unable to sustain new developments (Larbi, 1996). The worst aspect of the growth of Accra has been the poor environmental and sanitation situation in drainage, solid waste collection and disposal, and the disposal of human excreta (Benneh et al., 1993).

1.4.1.4 The administrative structure

With an annual growth rate of 4.1 percent, which is more than the national average of 3.2 percent, the city of Accra is the fastest growing settlement in Ghana, and was declared the Accra Metropolitan Area in April, 1988 when it was acknowledged that the city had expanded rapidly to include the outlying towns to the north, eastern and western outskirts (Demanya, 2001: 30). Thus, it has become the largest urban agglomeration in Ghana, with the management of the city under the purview of the Accra Metropolitan Assembly (AMA), with the passing of the local government, Accra Metropolitan Assembly establishment Legislative Instrument (L.I) 1615. The Assembly's functions were fully outlined, and the spatial area of jurisdiction delineated.[6] These functions are classified in categories, the most relevant being, the provision of a sound sanitary and healthy environment, and the establishment, maintenance and carrying out of services for the removal and destruction of all refuse, filth, and carcasses of dead animals from any public and private place (L.I 1615 Schedule 2; 1995). L.I 1615 also established six sub-

[6] All 88 statutory functions are well stated in the first schedule of LI 1615, 1995

metropolitan areas: Ablekuma, Ashiedu Keteke, Osu Clottey, Kpeshie, Ayawaso, and Okaikoi as the lowest tier of local governance. This management structure comprises 16 decentralized departments responsible for operationalizing the Assembly's policies, of which the Waste Management Department (WMD) and the Environmental Health Department (EHD) are the two most relevant to the investigations of this study. While the Waste Management Department takes care of the bulk of the collection, transport and disposal of solid waste within the Accra metropolis, the Environmental Health Department deals with sanitizing public spaces, education in hygiene, and monitoring support (MLGRD, 1996). Politically, the Accra Metropolitan Assembly, a 103-member assembly, 68 of which are elected, and 35 including the Metropolitan Chief Executive (MCE) which are appointed by the national government defines the political structure (MLGRD, 2000:15).

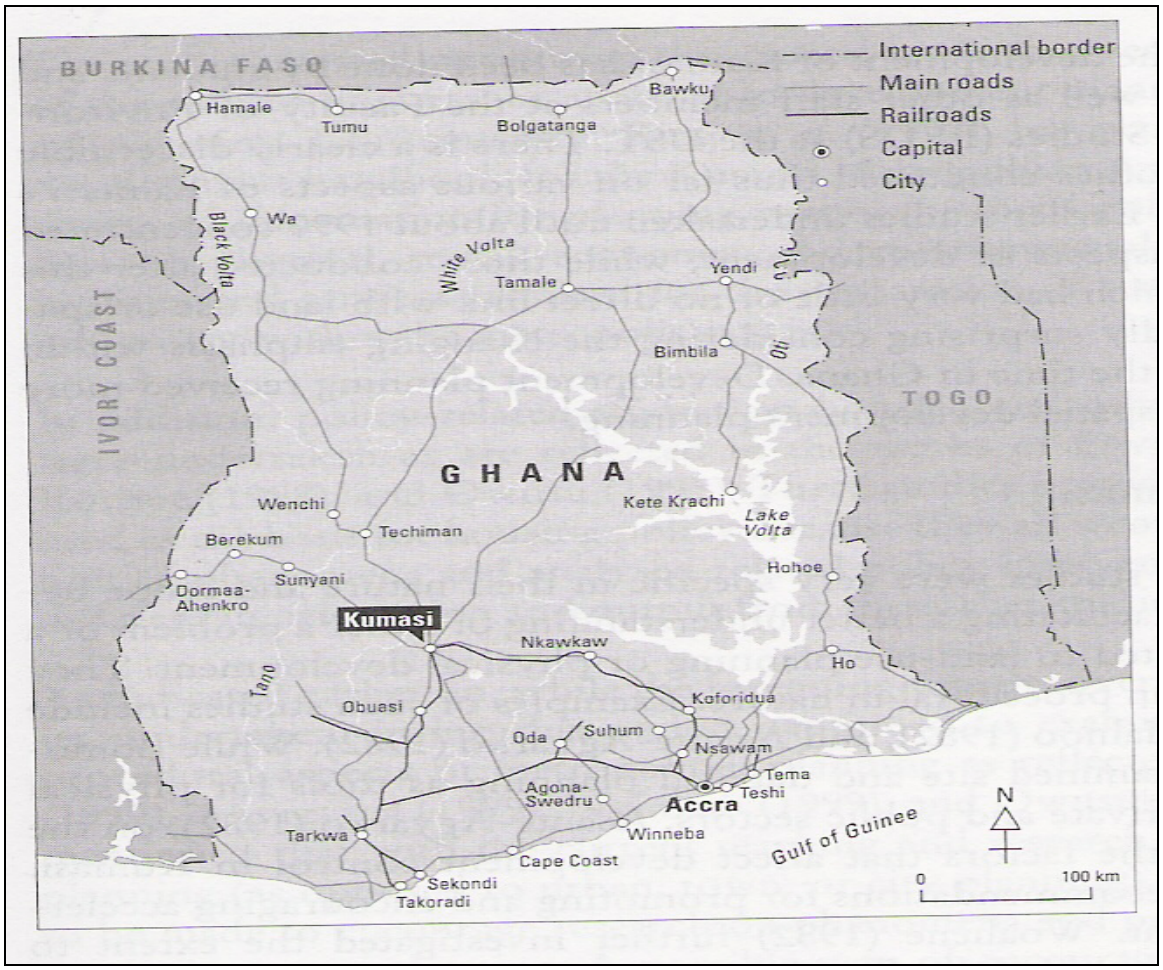
1.4.2 The Kumasi Metropolitan Area

1.4.2.1 Location and physical characteristics

The second case study site is Kumasi, which is the second largest city in Ghana, located in the rainforest zone with a population of 1.17 million inhabitants (G.S.S, 2000). Kumasi is located between latitude 6 30' and 7 00' north and longitude l 30' and 2 00' west in West Africa. It has a wet semi-equatorial climate with an annual rainfall of 1400mm with two distinct rainy seasons. The mean annual temperature is 25.7 ^{o}C with a humidity ranging from 53 to 93 % (percent). The location of the city in the center of the country (Map 1-2), at a crossroads between the different regions of Ghana and neighboring

countries, encourages its continuing role as a marketing center (Korboe and Tipple, 1995).

Map 1-2: Location of Kumasi in Ghana



Source: Adarkwa and Post (2001)

1.4.2.2 Cultural Background

The city of Kumasi was founded as the capital of the *Asante* Kingdom in the seventeenth century by Osei Tutu who was the '*Asantehene* ' i.e. king of the Asante state based on the advice of *Komfo Anokye* his senior fetish priest. History has it that the Asante Union ("*Asanteman*") consisting of settlements inhabited by the peoples of the *Asante*-Akan clan, was principally a defensive organization against its enemy states and led to the establishment of the ruler of Kumasi being enstooled as the ruler of "*Asanteman*" and

thus the Kingdom of *Asante* consequently establishing Kumasi as the capital of the *Asante* Kingdom.

1.4.2.3 History of growth

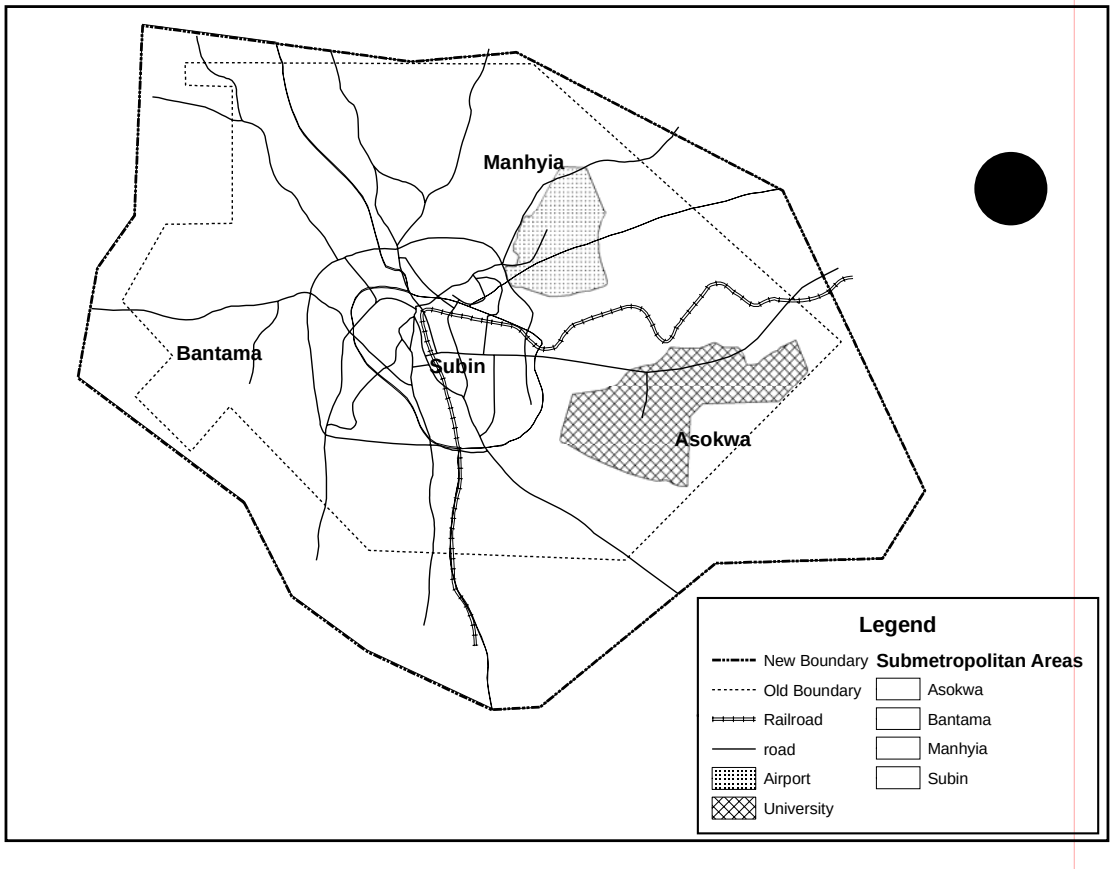
Kumasi like Accra has also grown very rapidly with its population growing from 218,175 in 1960 to 345,117 in 1970 at an annual growth rate of 4.6 %, and then to 590,000 by 1984 at a rate of 3.0 %, finally toping a million at 1,170,270 in the 2000 population and housing census (Boapeah, 1999; G.S.S, 2000; Tipple 1987: 4;). With Kumasi Metropolitan area now accommodating over one million people, i.e. over four times the population in 1960, and an annual growth rate of 3.2 % (Government of Ghana, 2000; Post, 1999), its growth rate has exceeded the local authority's capacity to provide adequate services and prevent environmental degradation. The present metropolitan area covers an area of approximately 150 km^2, with a radius averaging about seven kilometers. However, there is a significant amount of sprawl. Apart from the central business district (CBD) and the adjoining city area comprising approximately 30 sq. km. (bounded by the ring road) (Map 1-3), much of the rest of the metropolis is built to relatively low density, evidenced by undeveloped plots, uncompleted buildings, and market gardens (Korboe, 2001: 48).

1.4.2.4 Administrative structure

Administratively, Kumasi consists of a built up area, and over 55 small villages within its suburban districts. Though the *Asantehene* is still recognized as king of *Asanteman* at large, the existing Legislation Instrument (LI) 1614 places the responsibility for the formal administration of the affairs of the metropolis in the Kumasi Metropolitan

Assembly (KMA). The Kumasi Metropolitan Assembly has two main arms, responsible for its political and management functions. The political structures are defined by, an 86-person assembly; 60 of the assembly's members represent electoral constituencies, and the remaining 25 are appointees of the president including the Metropolitan Chief Executive. LI 1614 designates Kumasi into four sub-metropolitan areas: Asokwa, Bantama, Subin and Manhyia (Map 1-3).

Map 1-3: Base map of the Kumasi Metropolitan area



Unfortunately, the sub-metropolitan areas are so seriously under-funded that only one, Subin functions with any degree of effectiveness. Some of the others even struggle to pay the rent on their hired office premises (Korboe, 2001). Beneath the sub-metropolitan areas are 24 town district councils and several unit committees. As with the sub-

metropolitan areas, however, these fledgling institutions have yet to make an impact.

The dual political system is characterized by hidden tensions between the traditional (chieftain-based) and the modern systems of administration. The authority and influence of the office of *Asantehene* have seriously eroded during the reign of the last occupant Otumfuo Opoku Ware II who many perceived to be a relatively weak king by comparison with his predecessors. However, in short period since ascending the golden stool, the incumbent *Ashantehene,* Otumfuo OseiTutu II, has moved decisively and convincingly to re-establish the authority of the *Ashantehene's* office. The function of *Ashantehene* is felt most strongly in the area of land allocation, with the golden stool retaining allodial rights to the overwhelming majority of land in the metropolis. On balance, however, the modern political arrangement with its mayoral leadership has grown in importance at the expense of the traditional chieftain based system. Quite distinct from the political structure is a management structure comprising the 16 decentralized departments responsible for operationalizing Kumasi Metropolitan Assembly policy.

CHAPTER 2

RESEARCH DESIGN, CONDUCT, AND ANALYSIS

2.0 Introduction

The research method employed in this study in the investigation of the dynamics of local knowledge and solid waste management is the mixed methods approach (Tashakkori and Teddlie, 2003). Within social science at large, mixed methods research is considered a legitimate, stand-alone, research methodology (Creswell, 2002, and 2003; Green et al., 1989; Tashakkori and Teddlie, 1998, and 2003). It is defined as "the collection or analysis of both quantitative, and qualitative data in a single study in which the data are collected concurrently or sequentially, are given priority, and involve the integration of the data at one or more stages in the process of the research" (Creswell et al., 2003:212). The purpose for adopting this approach is because: (1) this study on solid waste management and local knowledge is complex, and so needed to be examined through various different perspectives; and (2) because of the ephemeral characteristic of the phenomenon being studied i.e. local knowledge. This form of research has been variously described in the literature as "multi method", "multi trait" (Campbell and Fiske, 1959), and "convergent validation"(Webb et al., 1966). According to Green et al., (1989), the mixed methods approach is used for initiation, development, expansion, complementarity, and triangulation. Of these, triangulation, which Martens (2003) and Punch (1998) suggest to be the better to be used to understand a research problem, identify variables and constructs that may be measured through the use of instruments, obtain statistical data and results from a sample of a population and identify individuals who may expand on the results through qualitative data and results, was apt for this

study's design, approach to data collection, and analysis of results. So results from precise instrument-based measurements can be augmented by contextual, field-based information (Green and Caracelli, 1997). Hence, the first step that was undertaken to attempt to resolve the proposed research question was to examine the literature (Booth, 2003: 76-86). A second involved reading the various documents that were collected in, and on Accra, and Kumasi, over the past several years with respect to solid waste management activities there.

Going forward, this study was based on participatory research tools, and interviews to generate the required qualitative and quantitative data. This was done because no sufficiently detailed data existed at the level of the households and private waste companies in both Accra and Kumasi. Specifically datasets on identified stakeholders' understanding of local knowledge's role and relationship to waste management in African cities in general, and Accra and Kumasi in particular is lacking. Consequently, the study is based mainly on primary data, which was collected through the administration of semi-structured questionnaires from samples of identified stakeholder groups in localities within Accra and Kumasi. The study was conducted in three phases: - the design, field survey and data collection, and analysis and collation phases.

2.1 Field Research methods and Structure of the Research Design phase:

Creswell et al., (2003) classify triangulation as a concurrent mixed methods research design. This study was designed using concurrent triangulation, and elements of concurrent nesting, and transformation (see: Hanson et al., 2005). With the concurrent

triangulation design, qualitative and quantitative data are collected and analyzed at the same time. Priority is equally given to both forms of data; data analysis is conducted separately, with data integration occurring later (Hanson et al., 2005: 229). With regards to the concurrent nested design, the elements of relevance used here were for less prioritized forms of data to be included to help answer a multiplicity of research questions as posed in Chapter 1 of this study. According to Hanson et al., (2005: 229), this design approach is useful for gaining a broader perspective on the issues of interest, and for studying different groups, or levels, within a single study.

Examining the role of local knowledge in solid waste management, for this study involved a number of steps. These included: deciding on a purpose of the study, and research questions, which in turn informed the type of data that was collected. A scan of the literature: Creswell, (1999), Green and Caracelli, (1997), Morgan (1998), and Tashakkori, and Teddlie, (1998) shows that this approach to designing research also involves identifying the data collection, analysis, and integration procedures, all of which were done in this case. This was useful for the purposes of this research, in particular for confirming, cross validating, and corroborating the study's findings (Lincoln and Guba, 1985; Waege, 1997,). The research involved data triangulation by using individual interviews, field observations, and focus group discussions with various identified stakeholder groups (chiefs, residents, government officials, and private waste companies), as well as the methodological triangulation of both qualitative and quantitative data (see: Beck, 2005; and Goodyear et al., 2005) on the topics of solid waste management, and local knowledge. Song (1989:115) has observed that "multiple

interviews help to reveal the complexities, contradictions, and tensions in people's accounts, and in their daily lives.

This study bears a post-positivist ontology (Perlesz, and Lindsay, 2003), in that social structures and practices within Accra and Kumasi are understood by the researcher to exist, and be represented by the research data. In so doing, recognizing that all researchers bring implicit theories, assumptions, and perceptions to their investigations, as such, I as the principal researcher at the initial stage, had to decide on how I was going to view the study from the perspective of a paradigm that does not necessarily involve a goal of advocacy based social change. In this regard, Seale (1999) suggests that post-positivism is a useful paradigm for those researchers who maintain an interest in some aspects of positivism such as quantification, yet wish to incorporate interpretivist concerns around subjectivity and meaning, and who are interested in the pragmatic combination of qualitative and quantitative methods.

According to Perlesz, and Lindsay (2003:29), "post-positivism and critical theory, are ontologically closer to positivism than the unambiguously relativist ontology of constructivism." Epistemologically, however, post-positivism, critical theory and constructivism assume that knowledge is value dependent, and to differing degrees is created in interaction between researcher and respondents. Although Guba and Lincoln's (1994) work implies a continuum, they also argue that the positivist and constructivist paradigms are essentially contradictory i.e. either reality exists or it does not, or knowledge is value-laden or objectively ascertained. They however allow a 'cross-over'

for post-positivism via its rejection of a totally relativist position, and through its adoption of increased sensitivity to subjectivity and meaning. Thus, this study's post-positivist position with respect to triangulation posits it well to be able to accommodate both positivist and constructivist elements, as according to Seale (1999:59), "within this paradigm, triangulation strategies both deepen understanding, and help in adjudicating the accuracy of interview accounts by increasing sensitivity to the variable relationship between an account, and the reality to which it refers". Hence, in taking this nuanced epistemological approach, I have been self-reflective at multiple levels when interpreting data methodologically, ontologically, and paradigmatically. This approach is consistent with Seale (1999:57) who recommends a greater theoretical and pragmatic flexibility stating, "an all-or-nothing commitment to a philosophical position is unwise for practicing social researchers".

Further, it is worth noting that fundamental differences exist between survey research among different ethnic groups in Africa, and that conducted in developed countries (Wanjiku, 1996). For instance, in the United States, or Canada, survey interviews can be done by telephone, or by emailing questionnaires to potential respondents. This is not the case in Africa where majority of the population either do not possess telephones in their homes, or the postal mailing systems are unreliable. Also high illiteracy rates characteristic with the population in Africa further make it difficult to conduct and obtain, effective results from mailed questionnaires. In this regard, Chambers (1983) outlines a number of constraints with the use of questionnaire surveys in third world cities.

Consequently, face-to-face interviewing, and the use of semi-structured interview guides were pursued for the purposes of this study as the best approach.

2.1.1 Surveying and Sampling:

The sampling and field survey for this study was conducted over a period of six months from June 2004 to October 2004 inclusive. The research employed detailed semi-structured interviews with senior officials from the Ministry of Local Government and Rural Development (MLGRD), the Environmental Protection Agency (EPA), Accra Metropolitan Assembly (AMA), Kumasi Metropolitan Assembly (KMA), the Waste Management Department (WMD) of the two assemblies, a sampling of residents, and community leaders, in Accra and Kumasi. These persons were chosen based on their experiences in the field of solid waste management, and their willingness to participate in the study. A summary of the demographic characteristics of interviewees is illustrated in Appendix I.

For community level knowledge mapping, focus group discussions were held sometimes in a semi directive observation format (e.g. Huntington, 1998), with the courts of traditional rulers or chiefs. Residential respondents were sampled through the random stratified sampling technique in both study sites, since there are two types of formal service delivery options (i.e. house-to-house collection, and Central Communal Container collection based on the income levels, and the accessibility of neighbourhoods within both cities). This was done to take into account the socio-economic characteristics of the residential areas. In Accra, as well as Kumasi, English was the principal language used

for interviews, and as appropriate, other vernacular languages and translations were done as and when the need arose.

Interviews were conducted in several localities throughout Accra and Kumasi, to account for the different income and density levels present throughout the cities, a characteristic which according to Fobil, (2002: 107), can alter results significantly. For a copy of the questionnaire used in the conduct of the interviews see Appendix A. Triangulation in data collection was achieved through conducting interviews with the four different actor or stakeholder groups with varying interests (see: Palys, 2003: 142). The set of questions used in the interviews were mostly open-ended questions. The open-ended questions were intended to invite general comments, and a sharing of knowledge and experiences (Palmer and Cochran, 1988: 73). Although their analysis proves slightly more difficult, open-ended questions were used to give insight on the thoughts of respondents.

Further, four research assistants were engaged for the interviewing process, two each in Accra and Kumasi. In Accra, the research assistants employed were undergraduate university students obtained through advertisements of the position in the Geography department at the University of Ghana, Legon. In Kumasi, the same process was followed to engage a couple of students from the social sciences faculty at the Kwame Nkrumah University of Science and Technology, in Kumasi. Both assistants were trained for two weeks on what the research objectives were, and the ethical interviewing protocol, and processes were clearly explained to them. Also, a consideration in their engagement was the fact that they lived in these cities for the greater part of their lifetime, and could

communicate fluently in at least two local languages in addition to the English language. In Accra, fluency in *Ga* was required in addition to english because the city is situated in a predominantly *Ga* traditional area, where as in Kumasi, *Asante Twi* was required for the same reason with respect to the city's cultural and locational roots in the heartland of the *Asante* Kingdom.

A representative number per location, from low, middle, and high-income areas were sampled for the questionnaire interviews, and the same number of households within each income level was administered with the interviews. For Accra, it was 30 households per income level culminating in a total of 90 residential interviews, and in Kumasi it was 20 households per income level; thus, 60 residential interviews in all. Also, 20 government officials, and 15 private waste companies were interviewed in Accra bringing the total of key informants to 125; while in Kumasi, 10 government officials and 5 private waste companies were interviewed as well, totaling 75 key participants.

2.1.2 Ethical considerations and ethics review

The cultural context and customs of the interviewees were respected, and government regulations were also adhered to during the conduct of the fieldwork in Accra and Kumasi. Research instruments were developed in consultation with the Ethics Review Committee of the University of Waterloo, Graduate Studies Office, and the interview questionnaires (Appendix A), and focus group discussion facilitation questions (Appendix B), were reviewed, and approved by the University of Waterloo, Social Research Ethics Review Board before being used in the field interviewing exercises. This

process was instrumental in acting as a screening devise of the questions that were posed to the research participants. Thus, the study succeeded to avoid seeking unwarranted information. The confidentiality of data was also maintained, by preserving the anonymity of the participants unless they otherwise offered their consent. Respondents' identities were protected, through a clause in the participant consent form. As seen in Appendix C, every participant filled out a consent form, and if the participant did not wish to answer any questions, nor give certain information such as name or place of employment they were not obliged to. On the consent form, the interviewee's also had several options, i.e., if they permitted the use of a tape recorder, or if the information that they were providing could be directly quoted, and if they were giving permission to have their name attached to the statement. Finally, by participating in the study the interviewees have the option of obtaining the results of the research upon completion.

2.2 Data Collection Phase: Field Observations and Interviews:

Direct observation of the solid waste handling practices in Accra and Kumasi was performed throughout the six months duration of field data gathering. The focus group discussion sessions proved to be very useful to further refine and contextualize the information gathered during different stages of the study. Hanson et al., (2005), and Green et al., (1989) for example identified a number of rationales for combining collection methods. Specifically relevant is the fact that quantitative and qualitative methods can be combined in collection so as to use results from one method to elaborate, develop, and inform the results from the other methods.

Focus group discussions were the main process in which socially recognized indigenous knowledge holders generated data based on a consensus of all the participants present in the session, rather than answering a stream of questions directed by the values and bias of the researcher, local people represent their ideas in a form they could discuss. During the sessions, participants from the chief's court tended to describe the waste practices behaviour in their particular culture and locality, based on the consensus generated through the discussion of their different experiences, and views. Differences in individual descriptions could be clarified because the different experiences were conceptualized. For example in Accra, sweeping of the neighbourhood or households' compound after dark was considered a prohibited norm in one court, where as in another it wasn't actually the act of sweeping after dark, but the throwing away of the refuse gathered from the sweeping that was. However, the rationale behind these practices are the same in both instances in that, when one sweeps or throws away the refuse gathered in the dark, they may be sweeping out or throwing out a valuable possession, that may have gotten mixed up with the refuse gathered.

2.3 Procedures for Local Knowledge Assessment*:*

Community perceptions and knowledge were assessed primarily through participatory appraisal based techniques, in this case, focus group discussions, which explored the conditions and trends in local knowledge perception within Accra and Kumasi. According to Grenier (1997), and Mitchell (1997), the use of focus group discussions is particularly useful for local knowledge studies like this one, since it is geared to facilitate and stimulate community awareness and capability regarding environmental management

issues, in this case, solid waste handling.

In Accra, focus group discussions were conducted with the courts of 10 paramount chiefs of the *Ga* traditional council, which covers the Accra Metropolitan Area. In Kumasi, the traditional structure as described in chapter 1 is such that only one focus group discussion session was necessary. This was held with the representative of the Asante King, *Asantehene*'s court, the *Bantamahene*, the chief of *Bantama* a sub metropolitan area of Kumasi. The focus group discussions yielded data about local life conditions, and revealed hitherto hidden complexities of local knowledge within the two cities. The discussion sessions resulted in the rich menu of qualitative data presented in chapters five through seven of this thesis, which represent the ideas of the ethos of the local culture with respect to the natural environment, land use, and solid waste handling practices; since the chiefs are considered as the holders of knowledge in trust for their respective communities (Arhin, 2001; Abayie Boaten, 1990).

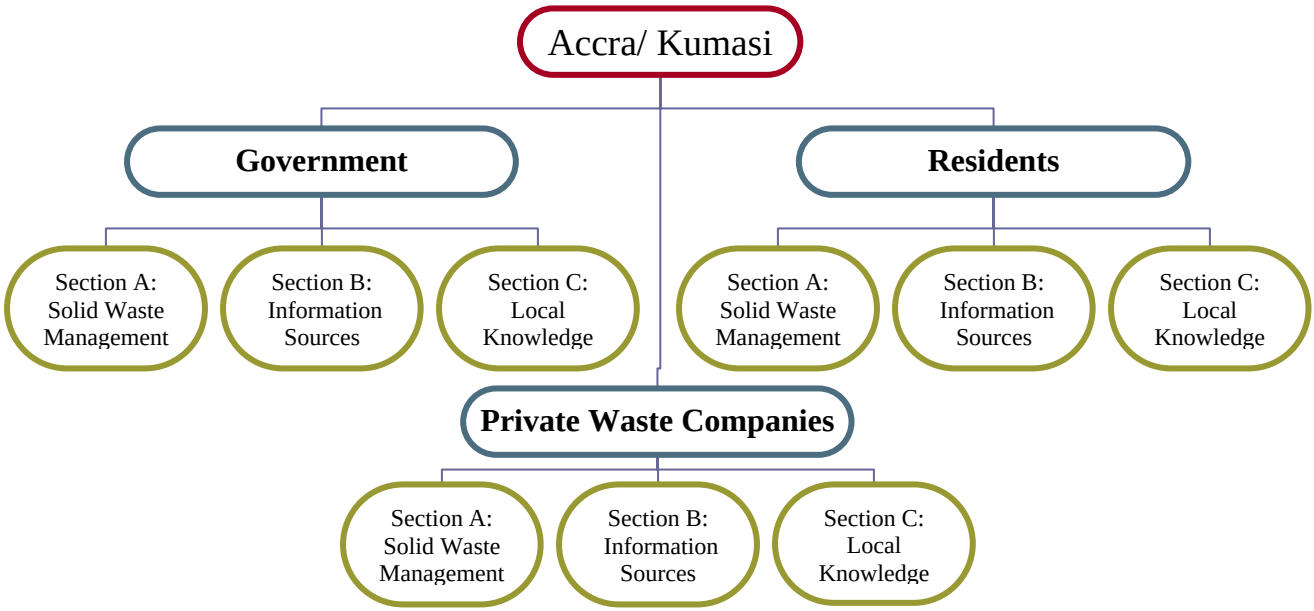
2.4 Analysis phase: Data Presentation and Crosschecking

As already discussed, data collection was implemented concurrently (quantitative, and qualitative at the same time), prioritized equally, and integrated after analyzing. In scanning the literature, Hill et al., (2000), Balmer (1994), Balmer, Seely, and Bachengana (1996), Good and Heppner (1995), Martin, Goodyear, and Newton (1987), and Meier (1999), are all examples of studies that used concurrent triangulation designs, as well as Gaston and Marmar (1989), Aspenson et al., (1993), and Guernina (1998) that used elements of concurrent nested designs. Specifically, qualitative data in the form of responses to open-ended questions from the interview questionnaires, and narratives from

focus group discussions, were collected to examine the issues of how respondents and participants use local knowledge in decision-making with respect to solid waste management activities.

In pursuing this, interviews from the field survey were reviewed to draw out themes from the questionnaire responses of participants. The analyses of responses were done through the aggregation of all the responses from the various stakeholder groups sampled (residents, private waste companies, and government officials), into respective files. For instance, all responses from residents were aggregated in one file, the residents' file for each case study site. The same was done for private waste companies, and government officials in both Accra and Kumasi. This approach to analyzing the data collected, facilitates a discussion of trends, relationships and themes based on a particular theme, at a particular study site. Thus, gauging the level of awareness around proper waste handling practices amongst the various stakeholder groups in both cities for example is straightforward. This allows for an relationship analysis of awareness levels within the various groups, and between the group (e.g. government officials versus residents). These relationships can be examined within Accra and Kumasi and between these two areas (Figure 2-1).

Figure 2-1: Conceptual representation of theme analysis from data



Thus, as mapped out in figure 2-1, the analysis afforded comparison of similar stakeholder groups from the two study cities Accra, and Kumasi, allowing for at least three different levels of explanation and understanding of the trends and relationships that manifest. After analyzing the data, the results were integrated and used to help answer the study's research questions. This is characteristic of mixed methods studies, as according to Creswell et al., (2003), in mixed methods studies, data analysis and integration may occur at any point in time. Onwuegbuzie and Teddlie (2003: 251) have also noted that, "the point at which the data analysis begins and ends depends on the type of data collected, which in turn depends on the sample size, which in turn depends, on the research design, which in turn depends on its purpose."

2.4.1 Interviews

For ethical reasons, to be able to manage each individual's response and their level of consent, the surveys and the consent forms were given a matching identifying number. A table was subsequently created that listed each participant and the level of anonymity that they requested as well as the location of the interview. After creating the participant reference table, data were aggregated according to the randomly assigned number. Further, the interviews were entered into the Nvivo 1.2 software program to perform a qualitative analysis. This software is designed to facilitate the management of large qualitative datasets. It has the ability to create attributes and to code the documents with identified themes. Responses from the interviews were coded, and all of the different codes were weighted equally, because even though the stratified random sampling procedure was employed in the conduct of the residential interviews, it was too costly and time consuming to cover all the localities within the cities of Accra and Kumasi. Such a scope of work is beyond the realms of this study. For this study, each interview was given an attribute in Nvivo, based on the location that the interview took place. By adding the location attribute, the software is able to search the results for each area, which facilitates a geospatial analysis process. The list of some of the coding used is available in Appendix E.

After all of the coding had been applied to the entire dataset the different statistical tools available in the Nvivo software were utilized to count the frequency of each coding stripe created. A set of data based on the occurrence of each code was then generated. The coding was recorded based on whether a code was present or absent in a response. Once the results had been generated the themes and relationships were illustrated with charts

and diagrams, used in the following discussions from chapters five through eight in the thesis, allowing for explanations, and giving meaning to the analyses.

2.4.2 Geospatial Analysis:

The second step in the research analysis was to use the results generated through the Nvivo software analysis of the qualitative data and apply it to the explanation of the environmental health issues around waste management in Accra and Kumasi by using geospatial software to gain insight on any spatial correlations between the environment and health problems attributed to solid waste management by the research participants. For this, the aggregation of the data was done in two stages: - firstly, the results of all interviews of residents conducted in both Accra and Kumasi were compared with those of the government and private waste companies' responses. Secondly, the residential interviews were grouped by the localities of the respondents, where the interview took place. In Accra, the neighbourhoods of Abossey-Okai, Abeka, Abelenpke, Adabraka, Bubiashie, Dansoman, Darkuman, Dzorwulu, Kaneshie, Kwashiman, Mataheko, Accra New Town, North Kaneshie, Odorkor, Nungua, and Roman Ridge were noted; and in Kumasi, the following localities, within the corresponding sub metropolitan areas: - Anloga, Asawasi, and Ayiga (Asokwa sub metro); Ridge, Nyiaeso, Bantama, Kwadaso and Suntreso (Bantama sub metro); Asafo, Adum, and Amakom (Subin sub metro); and Dichemso, Manhyia, and Mossi Zongo (Manhyia sub metro) were noted. The occurrences for each of the identified environmental and health effects resulting from solid waste management activities were then compiled for these localities in both Accra and Kumasi. In using the interview data collected to map the environment and health

consequences, it is suggested that the problems identified are occurring or have occurred at some recent point in time in the locality where the interview was conducted. The different environment and health problems were then mapped based on the localities. Mapping this data was done for the following reasons: firstly, the creation of digital data from the interviews facilitates interpretation and analysis through being able to visualize the results. Also, by using the digital data it is possible to overlay several layers of different issue based thematic maps to identify areas of concern as well as possible contributing factors, trends and relationships. Lastly, the most important aspect of creating digital data is to begin to build a dataset for an area and country that lack such information and analysis. With a set of digital data, many planning, monitoring, and modeling applications would be facilitated (Esnard, 1997: 55). This is imperative in African cities in general, and Accra and Kumasi in particular because authorities are constantly struggling with issues of urban planning and design, revenue collection, and environmental health education amongst many other potential applications that can be easily dealt with through better decision support capabilities.

Several maps of Accra and Kumasi were acquired during the field survey from the Accra Metropolitan Assembly, Kumasi Metropolitan Assembly, and the Ministry of Local Government and Rural Development for use. The maps consisted of a political map of Accra and Kumasi, showing the various sub metropolitan areas, and road networks; and thematic maps of waste privatization areas, ease of revenue collection, and the types of service provision by area or locality. The political maps of the various districts and road networks in the city of Accra and Kumasi were already available as vector files.

Regarding the rest of the maps, the data was digitized through the table digitizing method, and all the thematic maps were scanned into digital data as raster files. All of the raster files were converted into vector files using Arc Map 9.0 software in order to create the necessary thematic map representations, and in order to work with the data, they were all brought into the same digital space through the georeferencing tool in Arc Map 9.0. The raster images were spatially referenced using pre-existing vector files of district parcels, of both Accra, and Kumasi, and because of the quality of the original maps, the RMS error values ranged from 0.4 as a low and just over 2 as a high (see appendix D for all RMS error reports)[7]. All of the raster images were based on the district parcels, and this layer was copied and used for each map. Copying the data layer ensured that the maps would be the same during analysis. All layers were contained in a geodatabase, which allowed several domains to be created in order to quickly classify each polygon. New fields were added to each layer and each polygon was classified to the corresponding value that it represented: -the type of solid waste service, who provided solid waste collection services, or the ability to collect revenue from that area as well as the locality name. In working with the spatial data, a database design was not created because the dataset appeared small enough not to need one. If a normalized database design had been constructed, the creation of the various maps would have been simplified as well as given more opportunity for more detailed analysis. This process however demands more time.

[7] RMS error values are used as a measure of the accuracy in registering a map comparing the known locations to the digitized locations. It is how close a point location is on one map to the other. The lower the value, the more accurate the digital map will be (ESRI, 2005).

This research uses descriptive data combined with qualitative assessments through the Nvivo 1.2 software package to analyze and present its data. The findings presented in chapters five through eight lend them selves to both descriptive experiences, and thematic comparisons. This is similar to the approach used in other works on analyzing plan implementation within the urban planning research literature (see: Johnston, Schwartz, and Klinker, 1978; Johnston, Schwartz, and Tracy, 1984, Dalton, 1989; Mellina and Zuell, 2000).

Consequently, the various methods used together in this study produced largely consistent and convergent results. For instance, the Metropolitan Assemblies' financial reports data, and interview data indicated a strong relationship between poor internal revenue generation, cost recovery, and poor financial viability of solid waste management services in Accra, and Kumasi. Not only were the within methods comparisons consistent, but there was also consistency in between-methods comparisons. In this case charting results of daily local knowledge use in decision-making were congruent with the understanding of the role of norms, beliefs, and practices in the lives of people, as well as the roles of local knowledge in solid waste management identified in survey interviews, focus group discussions and through personal observations. Asserting Jick's (1979:608), point that " while researchers can rely on certain scientific conventions for maximizing the credibility of their findings, the researcher using triangulation is likely to rely more on a 'feel' of the situation, an intuition and first hand knowledge drawn from the multiple vantage points centrally reflected in the interpretation process. Glasser and Strauss' (1965:8) observation about field researchers summarize this point of

how triangulated investigations crystallize in stating that: “the field researcher knows that he knows, not only because he’s been there in the field, but also because of his careful verifications of the findings, and because s/he feels the worth of the final analysis”.

2.5 Limitations

Generally, the triangulation approach is not without limitations. Firstly, replication is exceedingly difficult. According to Jick (1979), replicating a mixed methods research including the idiosyncratic techniques is a nearly impossible task, as qualitative methods are particularly problematic to replicate. Secondly, time, and costs constraints potentially limit its extensive, and in some cases effective use. In this regard, Phillips (1971:175) observed that “triangulation demands creativity from its user-ingenuity in collecting data, and insightful interpretation of the data thus, a researcher cannot simply afford to continue to engage in some sterile, unproductive, unimaginative, investigations.” Clearly triangulation cannot be an end in itself but rather it stimulates a better definition, focus, and analysis of problems in research for as Denzin (1978: 28) puts it, “no single method ever adequately solves the problem of rival causal factors, because each method reveals different aspects of empirical reality, and so multiple methods of observation must be employed.”

The challenges to the study design as applied to its geospatial analyses are that, by using the primary data that was acquired through fieldwork, which was not originally collected to conduct a geospatial analysis, the distribution of the number of interviews per the districts delineated on the maps is inconsistent. As such, the geospatial results may not be

completely representative of the entire population, however, they give an excellent snapshot indication of the distribution of the environment and health consequences as a result of solid waste management in the cities of Accra and Kumasi; and form a good basis for the production of a type of data, and analysis that has been non-existent in the literature on solid waste management in African cities in general, and Accra and Kumasi in particular. Consequently, these limitations are acknowledged and taken into account.

Even though, the dataset being utilized for this study has been collected accurately and systematically, there were assumptions made in conducting this study because for the most part, the literature that is available is outdated. Thus, a limitation to conducting this type of research on Africa, and one of the most important reasons for conducting the study is that there is not a lot of data. In fact for the most part, the data used in the study was gathered through primary means, and the timeframe available to complete the field survey for collecting the data was relatively short. The fieldwork had to be conducted within six months.

Furthermore, the paucity of spatial information for the digital mapping of the study areas is apparent with the dating of the maps used in this study. Most of the maps had a small enough scale to be useful, but were copies of hand drawn originals. The thematic maps were also created by hand through information gathered from various sources, by the Waste Management Department of the Accra Metropolitan Assembly, and Kumasi Metropolitan Assembly. Thus, the state of the maps that were created through the digitization of the data gathered through this research could not be extremely precise and

could not be scaled (See RMS errors in Appendix D). From the analysis and discussions to follow, it is suggested that, the higher the proportion of responses in relation to specific thematic issues, the more prevalent or evident the issue of note is with regards to the interviewed stakeholder's knowledge, and experience of solid waste handling practices within Accra, and Kumasi.

CHAPTER 3

REVIEW OF LITERATURE: SOLID WASTE MANAGEMENT, AND LOCAL KNOWLEDGE, CONCEPTUAL ISSUES

3.0 Introduction

Solid waste or refuse is generated through human activities (Cotton and Fraceys, 1991; Furedy, 2002, 1997). The management of this waste often seems impossible in most of the cities of the South (Gilbert *et al.,* 1996: 3). Throughout history, cities and towns have struggled with how to collect and dispose of the refuse generated by their populations (Doan, 1998). The increasing complexity and costs of waste management are making it difficult for local authorities in many developing countries, to handle the process efficiently and effectively. Often, solid waste receives scant attention at the municipal planning stage, yet may account for between 20 and 40 % of municipal revenues (Cointreau-Levine, 1994, 1982; Cotton and Franceys, 1991, UNCHS,1996; World Bank, 1993). Connected to this problem is the issue of inadequate funding and poor cost recovery for solid waste management. Virtually all urban, authorities in developing countries have failed to devise effective response, mechanisms; to mitigate the problem of low cost recovery. In addition, several factors negatively affect contributions to a proper delivery of the service such as the non enforcement of physical planning and planning regulations, erratic land use policies, administrative bureaucracy, corruption, attitudes of residents towards solid waste management, and ineffective supervision and monitoring measures by the local authority as well as residents (Batley, 1996; Baud, 2000; Baud *et a*l., 2000, Hasan, 1998; Obirih-Opareh and Post, 2001; Server, 1996; Wekwete, 1995).

Attention for such solid waste management problems has increased in the international circle, academic literature, and policy practice since the 1990s. Two main reasons account for this. The primary reason is the issue of public health. Improper waste collection can lead to filth, stench and the possible spread of diseases from vectors, perhaps even leading to epidemics. Also, rather than on curative methods, such as medication and building hospitals, polyclinics and clinics, preventive methods often cost less than curative measures. This shift in orientation has influenced the debate and thinking in international and national development circles, academic literature, and government policies. The second reason for increased attention for solid waste management stems from an environmental point of view: improper handling of solid waste could degrade the environment, create nuisance and make places unsafe for habitation.

Solid waste management continues to be a major challenge in urban areas throughout the world, particularly in the rapidly growing cities and towns of the developing world (Lee, 1997). In this chapter, I discuss solid waste management in a theoretical perspective. By first, elaborating on the concept and definitions of solid waste management and the various perspectives that have been used to study the problem of solid waste management in developing countries in general and African cities in particular. Next, the solid waste management system is outlined, clarifying how solid waste collection relates to overall solid waste management. The second part of the chapter focuses on local knowledge, by characterizing it, and outlining its limitations. Also, linkages in the literature between solid waste handling and local knowledge are touched upon.

3.1 Solid waste management in theoretical perspective

3.1.1 Concept and definitions

Furedy (1997) defines waste as residual materials that are considered to be of no use and must eventually be disposed off typically by dumping or incineration. In her deliberations, Furedy uses words like "would-be-waste" to conceptually qualify waste as a resource with economic value, *i.e.* to show its potential as a resource for reuse, recycling or composting. Otherwise, waste is something to be discarded or thrown away. According to Skinner (1995: 11), solid waste management in its broadest sense means integrated systems for waste generation, gathering, storage, collection, transportation, recycling, energy recovery, treatment and disposal. Solid waste management practices include all domestic refuse, commercial and institutional waste, street sweepings and construction debris (UNEP, 1994, 1992; Cointreau-Levine, 1994). Thus, Solid waste management is concerned with how actors get organized for the collection, transport and disposal, reuse, recycling, and composting of solid waste materials (Obirih-Opareh, 2002).

From all these definitions and characterizations of solid waste management in the literature, it is clear that, solid waste management includes the cleaning and sweeping of public areas and streets, as well as the primary and secondary collection, transfer and final disposal of solid waste. Primary collection is the collection of solid waste at the source (from households, businesses, institutions, etc.) or from street containers, and its transportation to points of transfer. Secondary collection is the collection of the waste from transfer points for transport to the final disposal site. A further distinction can be made between house-to-house collection, where materials are collected from the

doorsteps of homes, against central/ communal container collection, where citizens have to bring their waste materials to indicated points. Solid waste management also involves waste recovery (at the source, through final disposal), and public education to encourage the population to develop attitudes and practices, which are sensitive to waste issues such as source separation or waste minimization. Waste recovery represents the removal or rescue of waste for some type of reuse, recycling or composting (Mustapha, 1993). This often implies its separation, sorting and eventual processing for use.

Finally, recycling can be defined as a method to reprocess waste in order to recover an original raw material. And composting in simple terms, means turning organic waste into manure for agricultural purposes. These processes make a fairly important contribution to reducing the amount of waste finally disposed off by the municipality even though the exact quantity usually cannot be determined with any degree of accuracy in most developing countries (Baud, 2002; and 1993: 356).

3.1.2 Types of solid waste management studies

Research on urban solid waste management in developing countries in general, and in particular Africa, have been developed from two main concerns: from a public health perspective (normally referred to as public management approach), and from a contribution to sustainable development approach (including reuse, recycling and composting). Historically, the primary objective of solid waste management is that of public health. Solid waste accumulating in densely populated urban areas posed epidemiological health hazards, which local authorities sought to control by providing effective collection, transport and safe disposal services (Baud *et al.,* 2000: 2).

According to Obirih-Opareh (2002), in more recent times, efficient collection and disposal of municipal solid waste is recognized not just as critical for maintaining a healthy environment but also as an important indicator of the level of development of a nation. Accordingly, cities in the developed world have devised complex procedures for handling waste and have established a variety of institutional mechanisms to ensure that these procedures are adhered to. Doan (1997) also points out that in the United States of America for example, many cities have adopted stringent regulations to govern their waste management. These include the kinds of materials that can be thrown away by a household or business, the type of storage containers and the kind of equipment to use to pick up waste. It also indicates the exact procedure for disposing waste in a sanitary landfill, the specifications for liners, covers, and aeration procedures for those landfills, and the proportion of the cost of this service to be paid by the consumer. This is hardly the case in many developing countries. Whilst the rate of waste generation increases very rapidly, resources to manage it grow very slowly, at times negatively. Solid waste collection has always remained an area of concern for cities around the world because of the public health dangers of poor collection practices. Also, solid waste is mostly managed as a public service, which is often provided for through one of four main forms of service provision arrangements. This may include complete municipal involvement (public provision), a management contract, franchises and full private sector operations (Doan 1997; Roth, 1987; Savas, 1977).

Further, many solid waste management studies focus on public health challenges through

community participation (Van Naerssen, 2001). They acknowledge the close interrelationship between urban health and the urban environment. An example is the WHO "Healthy Cities Project" for the period 1995-1999, which aimed to improve the urban environment and health conditions by raising awareness and mobilizing community participation through partnerships with local (municipal) agencies and institutions, thereby helping them to deliver effective environmental and health services (Van Naerssen, 2001). Other studies focus on how public health can be improved or how to do more with the same amount of money (Potney, 1997; Lee, 1997). Most of the privatization approaches in solid waste collection in Africa for example, are based on this idea.

Another area is that of livelihood and poverty-based studies which seek to improve employment opportunities and reduce poverty for the people working with waste (see Baud, 2002). The focus on livelihood has not been based on public health and private management perspectives. It has been inspired more by alternative development views that started from people's own initiatives (bottom-up). These studies recognize the economic potentials of waste, while simultaneously streaming the positive impacts on the environment.

Clearly, solid waste management in developed and developing countries has undergone substantial changes over the last two decades as a result of increasing attention to solid waste management by donors and academics alike (Savage and Diaz 1995). In African cities especially, the problem has become more visible with the decline of services due to

the structural adjustment programmes (SAPs) that have been adopted for the restructuring of economies since the 1980's.

3.2 Managing municipal solid waste in Developing countries

In an overview of municipal solid waste in the developing world, it is worthwhile to note that the amount of solid waste generated in many cities in the developing world, has been increasing rapidly over the years, mainly as a result of increases in population, and urbanization amongst other factors. Rapid population growth in developing countries has direct implications for human living patterns, leading to a greater concentration of people mostly organized in the form of urban centers. In urban Asia alone, 760,000 tones of waste are produced daily (Hoornweg and Thomas, 1999). While in Latin America, 240,000 tonnes of waste are generated daily (Moreno et al., 1999).

In developing countries, the approach to managing waste has mainly focused on getting rid of the trash, with very little or no attention paid to waste minimization or recovery efforts (Poerbo, 1991; Cointreau, 1982). If a household can find a nearby site simply to dump the waste, it has solved its disposal problem, regardless of the cost this dumping may impose on others. Thus, low collection is a major problem in most developing countries in general, and throughout Africa in particular, contributing to ecological degradation, and health hazards. Even public sector organizations in charge of garbage disposal are inclined to ignore formal guidelines, since waste disposal is often among the worst hit by government financing problems due to the low status associated with waste collection activities by relevant authorities within the government hierarchy. Over the

past two decades, these problems have persisted and in some cases even worsened. Threats to both human and ecological health have also persisted due to technical, financial, legal, social, and institutional inadequacies that have emerged from the use of current solid waste management approaches. Several researches have ascertained this (See table 3-1 following).

Table 3-1: Problems of municipal solid waste management in developing countries.

ASPECT OF MANAGEMENT	PROBLEM/ CONSTRAINT	EXAMPLE BY RESEARCHER
Technical	• Lack of support in source separation • Inadequate landfill sites • Uncontrolled open dumping • Operational inefficiencies • Accumulation of uncollected waste • Environmental and public health risks from waste	UNHCS (1994); Lohani (1988); Bartone et al. (1991); Meyer and Schertenleib (1992); Johnson (1992) Haight and Rather (1995); Pfammatter and Schertenleib (1995); Forbes (1995); Medina (1993)
Social	• Culture • Lack of public awareness and insufficient public education • Limited community/public participation • Affordability of service	Sakurai (1990); Vogler (1984); UNCHS (1994); Ali and Saywell (1995); Ogawa (1989); Ouano (1991); Flintoff (1984); Arlosoroff and Bartone (1987)
Financial	• Lack of funds • Low cost recovery • Foreign currency exchange	Cointreau (1982; 1987); Sakurai (1990); Doberstein (1992); Ouano and Ogawa (1993); Arlosoroff (1991); Johnson (1992); Pfammatter and Schertenleib (1995)
Legal	• Lack of appropriate legislation and insufficient enforcement	Kirov (1982); Sumardjito and Sutisna (1993); Muttamara (1994)
Institutional	• Lack of planning • Narrow view of waste management • Lack of coordination among agencies and government bureaucracies • Lack of experts and trained personnel • Lack of interest of municipal authorities in recycling efforts	Karamoy and Dias (1986): Sicular (1992); van Buekering (1994); Meyer and Schertenleib (1992)
External	• Imposition of inappropriate foreign waste management technology and practice • Privatization of solid waste management services without appropriate management capabilities. • World Bank, IMF and European Union grants and loans conditioned, incompatible BOTs, incinerators, and landfills	Demanya (2001); Obirih-Opareh (2002); Post (1999); Onibokun (1999)

. Source: Adapted from Yudoko (2000: 19-21).

As shown in Table 3-1 above, culture has been discussed in the literature mostly as a constraint or hindrance to the management of waste in the developing world in general, and African cities in particular. This is especially evident in the literature on the technical issues of management. However, most of the community-based approaches have tried to incorporate some elements of local culture into the set ups of waste management approaches.

3.2.1 Overview of solid waste management in African cities

Most of the literature on solid waste issues in African cities focuses on collection options and equipment for collecting wastes, and cost recovery through private sector involvement, but the discussion, here is going to try to outline the waste management context as it relates to the growth of African cities.

Even though Africa is the least urbanized continent, it is currently experiencing the fastest rate of urbanization (O'Connor 1983). There are several elements of this urbanization trend in Africa, the most pertinent being the inability of a city's budget to satisfy the various infrastructure and service provision needs that arise due to the fast growth. This has implications for urban planning: increasingly, policy makers and planners are having to plan not for circulating but for rapidly growing permanent and stable urban populations (Gugler, 1982; O'Connor, 1983; Van Western and Klute, 1986). As a result, homes suffer from the prevalence of pathogens because of the lack of basic infrastructure and services such as sewers, drains, or services to collect solid and liquid wastes and safely dispose of them (Habitat, 1989). El Sammani et al., (1989) and Osman (1990), have stated the impact of rural-urban migration as being so massive as to make it

impossible for African cities to cope with the demands of solid waste service delivery, a situation responsible for the terrible conditions found in some African cities with respect to solid waste. For instance, Nigerian cities are characterized by open drains, which are never cleaned and often clogged with all types of debris and garbage (Nwaka, 1990). Even where sewers are provided, they are often blocked, and overflow into the streets and attract harmful insects and bacteria (Mosha, 1990). The litter problem is compounded by the fact that the spectacular growth in African urbanization over the past two decades has brought about social and economic changes that have contributed to increases in waste generated per capita, and began to move most African cities into a "throwaway" stage of development, between the low GDP per capita paucity of trash generation and the high GDP per capita sophistication of trash treatment (Ouapa Tsheko, 1997: 90). For example, in Gaborone, Botswana, this change is mostly clearly seen in beverage containers and plastic shopping bags. The beverage containers are no longer glass, no longer deposits or of high reuse-value, but not yet high-value aluminum, not yet much recycled -and hence much littered (Ouapa Tsheko, 1997: 90).

Also, the high rate of urbanization in African countries implies a rapid accumulation of refuse. For example, the Nigerian Environmental Study/Action Team estimated that 20 kilograms of solid waste is generated per capita per annum in Nigeria (NEST 1991). This amounts to 2.2 million tones per year, given Nigeria's estimated population of more than 100 million. In individual cities in Nigeria, there are indications of rapid increases in the rate of waste generation. In Lagos, an estimated 625 000 tonnes of wastes was generated in 1982 (Onibokun and Kumuyi, 1999: 3). This, according to the Federal Ministry of Housing and Environment, was projected to rise to 998 000 tonnes by 2000. Likewise, an

estimated 258 000 tonnes of waste was generated in 1982 in Kaduna, and this was expected to increase to 431 000 tonnes by 2000. These are clear indications of the need for appropriate, and adequate management services, which are typically not found in African cities.

One part of the argument in the literature states that, the sheer volume of waste alone does not actually constitute the problem, it is the inability of governments and waste disposal firms to keep up with it. The situation in Nairobi aptly illustrates this. Although between 1977 and 1983 the population of this city was increasing at an estimated annual rate of at least 6%, the amount of refuse collected fell from 202 229 tonnes in 1977 to 159 974 tonnes in 1983, a decline of 21% over 6 years (Onibokun and Kumuyi, 1999: 3). However, one cannot lose sight of the fact that, with very small rates of waste minimization and an absence of formal large-scale attempts at reduction, recycling, and reuse in most African cities, no government or firm can feasibly keep up with collection. Thus, drops in collection rates are inevitable as evident over the late 1970s and early 1980s in Nairobi, where the municipal authority in charge of waste was collecting, on average, almost 10% less refuse per capita every year (Stren and White 1989).[8]

In Nigeria, Nwaka (1990) has estimated that only 30 percent of waste is satisfactorily disposed off; the rest is dumped by the roadside or into nearby rivers and streams. In

[8] A similar situation was observed in Malindi (a secondary town in Kenya), where increasing population is a major constraint. In 1991, in Malindi, an estimated 36 000 tonnes of solid waste was produced, but only 7 300 tonnes was transported to dumping sites by the municipal collection service (Onibokun and Kumuyi, 1999: 3).Also, refuse removal provided by the Dar es Salaam city council is plagued by the same difficulties (Stren and White 1989). In this city, only 24% of daily refuse is collected. Also, in Kinshasa, household waste is only collected in a few residential areas. In the rest of the city, household waste is put on the road, on illegal dumps, or in storm-water drains or is buried in open sites (Hardoy and Satterwaite 1992).

many African cities, refuse collection is restricted to high-income areas (Leduka, 1991; Mwafongo, 1991). Collections in other areas of the city are irregular, and the uncollected refuse soon attracts rodents, flies, and other vermin. Even in places where the refuse is collected, it is often dumped at the edge of the city (Silitshena, 1996). The waste is untreated and is often a mixture of both domestic and industrial waste (Segosebe and Van der Post, 1990). This causes pollution of the land and ground water, since most of these dumps are surrounded by built up areas of the city (White, 1989; Musandu-Nyamayaro, 1991). In Harare for instance, the municipal garbage dump is a mere five kilometers to the west of the central business district (CBD) (COH, 1994: 131). Also in Ibadan, Nigeria, the ring- road dumpsite is "encircled by residential areas and has degenerated in to several open piles breeding flies, and habouring rodents, leading to potential major health hazards" (Onibokun and Kumuyi, 1999: 71).

The situation with respect to waste disposal in African cities is very serious because it has a tremendous direct effect on the quality of the environment. Izeogu has observed in Nigeria that: "by 1983 the large volumes of solid waste generated in Port Harcourt had changed the aesthetics of the urban environment. Garbage completely blocked some streets in Diobu and various parts of the city were dirty, unhealthy and visually unpleasant" (Izeogu, 1989: 64). Also in cities like Harare in Zimbabwe that had been coping, "residents are now resorting to emptying uncontrolled refuse in open spaces" (Musandu-Nyamayaro, 1991: 8). This situation has led to the African urban environment's aesthetic and ecological deterioration. According to Silitshena, (1996), the main environmental problems are at the city-wide level, and are related to various aspects

of pollution. Effluents are discharged and dumped with ordinary domestic garbage into rivers, lakes or estuaries, some of which are sources of drinking water (Izeogu, 1989; Christiansson, 1993). For example, in Harare, Zimbabwe, all the solid waste collected, publicly and privately, goes directly to the dump sited at the southeast edge of the city, a location surprisingly close to the Notwane River; a placement justified on the grounds that most of the solid waste is inert matter and that the adjacent sewage ponds would pollute the underlying aquifer anyway, and that the aquifer is already of poor quality (Oupa Tsheko, 1997: 92). Demanya (2001), has also found that the use of an old abandoned quarry site in Accra, Ghana as a dumpsite has led to the pollution of the Densu river which is the primary source of water extraction for providing drinking water to the western part of the city. Also, in most of the African cities, there are no effective regulations regarding the handling and disposal of waste, and even where there are, they are hardly enforced (Habitat, 1989; Segosebe and Van der Post, 1990). Further, air pollution is becoming a serious problem in some big African urban centers because of the burning of garbage (Habitat, 1989; Izeogu, 1989; Mosha, 1990).

3.2.2 Waste Generation

According to commentary in the literature, the amount of solid waste generated in African cities has risen rapidly over the years mainly because of increases in population and urbanization amongst other factors. For instance, Izeogu (1989), and Onibokun and Kumuyi (1999) have found six factors that affect solid waste generation in African cities, including population growth, urbanization, social development, income class composition, and diffusion of technical competence. However, it is worthwhile to note

that a precise estimate of the actual amount of municipal solid waste produced in a given area is a tricky proposition. Calculating the total annual volume or weight of refuse generated anywhere in the world is difficult, simply because there is no way one can weigh or measure more than a fraction of what is actually discarded (Rathje, 1989). As a result, estimates of waste production vary substantially between studies, a weakness in the literature on waste production or generation. To deal with this problem, most studies relate waste generation rates to population rates. And in the case of African cities where data collection and availability is as challenging as its reliability, relating these two rates gives a more reliable set of figures. Compounding this situation is the issue of civil wars and political upheavals. These situations can cause abrupt stop in waste collection, reduce generation or completely stop removal. For example, in Mogadishu, Somalia huge heaps of garbage accumulated around the city for over ten years of civil strife and war (Barise 2001). Barise (2001) further explains that soldiers turned this problem into an opportunity to get money as they interrupted clean-up operations demanding payment for allowing refuse to be removed. These interruptions may also explain why some cities such as Kinshasa register zero collection of waste as seen in Table 3-2 below

Nevertheless generation rates for the continent's major cities are estimated to range from 0.3-1.4 kg per capita per day (See table 3-2). This gives an average of 0.78 compared to an average of 1.22 kg per capita for developed countries (Beukering *et al.* 1999:9). Extreme cases may exist in both situations.

Table 3-2: Per capita solid waste generation and households with garbage collection, selected African cities with their population estimates in millions

Country	City Name	*Per capita SW generation kg/day	+Households with garbage collection (%)	Population > 0.5 million
Benin	Porto Novo	0.5	25	0.6
Burkina Faso	Ouagadougou	0.7	40	1.6
Burundi	Bujumbura	1.4	41	-
Cameroon	Douala	0.7	60	1.1
	Yaounde	0.8	44	1.0
Congo. DR	Kinshasa	1.2	0	6.3
Congo Rep.	Brazzaville	0.6	72	0.9
Cote d'Ivoire	Abidjan	1.0	70	3.4
Egypt	Cairo	0.5	65	14.5
Gambia, The	Banjul	0.3	35	0.5
Ghana	Accra	0.4	60	1.7
Guinea	Conakry	0.7	50	1.3
Mauritania	Nouakchott	0.9	15	0.6
Morocco	Rabat	0.6	90	1.6
Namibia	Windhoek	0.7	93	-
Niger	Niamey	1.0	25	0.5
Nigeria	Ibadan	1.1	40	2.0
	Lagos	0.3	8	8.0
Senegal	Dakar	0.7	36	2.3
Tanzania	Dar es Salaam	1.0	25	2.3
Togo	Lome	1.9	27	0.8
Tunisia	Tunis	0.5	61	1.8
Uganda	Kampala	0.6	20	0.8
Zimbabwe	Harare	0.7	100	1.5

***Solid waste generated per person, in kilograms per day.*
+Percentage of households enjoying regular waste collection.
=Actually based on city levels of 1993 by UNCHS (Habitat, Nairobi 1997)
Sources: World Resources (1998-99:278)

3.2.3 The main approaches to solid waste management and service delivery in African cities

The three (3) main approaches to solid waste management and service delivery identified in the urban management literature by various researchers (see for example: Ali and Saywell, 1995; Arlosoroff, 1991; Armstrong, 1993; Cointreau, 1982; Sakurai, 1990; Syagga, 1992; UNCHS, 1994.) are:

1. The Conventional Approach with its collect –transport and dispose set up
2. The Non-conventional Approach, and

3. The Integrated Approach.

These approaches were developed in the developed countries of Europe and the United States and were then transferred to Africa and the developing world. In fact, these approaches are still very widely in use in the western world as much as they are in Africa; continuing in the heritage of the colonial ties to planning for urban waste management in African cities. The conventional approach which is the most widely practiced to date, has been the predominant approach to managing solid waste. It predates the intervention programs under the urban management approach.[9] However, the non-conventional and the integrated approach in particular have developed and come into prominence since the early 1980's as urban management has gained in popularity through the various programs sponsored by the international agencies throughout African cities. Even with these attempts, the conventional approach still remains the most widely practiced through out Africa.

3.2.3.1 The Conventional approach

The conventional approach, primarily focuses on the collection and disposal of waste, and ignores other aspects such as waste generation, and the alternative practices of recycling and reuse. Thus, the approach struggles to cope with the nature, quality, and complexity of waste produced, as in most developing countries, the essential components of this approach are storage, collection and disposal (Cointreau, 1982; Oluwande, 1984; UNCHS, 1988). Of these, the disposal practice carries the greatest threat to human health. The prevalent disposal type in African cities under this approach is the open pit dumping

[9] These are the Healthy cities Project by the World Health Organization (WHO), the Sustainable Cities Program by the United Nations Commission on Human Settlements (UNCHS-Habitat), and the Mega-cities project.

with no leachate control, no application of cover material to limit odor, exposure to particulate, flies and refuse being blown, and no control of methane emissions. Further, the option of incineration is unpopular with city managers because of the high organic content of the urban waste stream in African cities, which accounts for a high financial cost of incineration.

With their top-down approaches to planning, the conventional approach has been the most commonly employed in developing countries (Furedy, 1993). Even with its main objective being operational efficiency, Furedy (1984; 1994; 1995), has noted that the approach has been increasingly unable to cope with the complex problems of urban solid waste planning and management. The approach has been noted to be both expensive and unsustainable (Sicular, 1992). Many cities that adopt this approach spend between 30 to 50 percent of their operating budgets on managing their waste (Arlosoroff and Bartone, 1987). Also, the approach suffers from a lack of public participation (Soerjani, 1984; Sinha, 1993).

3.2.3.2 The Non-Conventional Approach

The non-conventional approach on the other hand regards waste as a resource (Furedy, 1992; 1994). It focuses on accommodating informal activities in waste recovery and recycling, promoting source separation, and developing community partnerships (Furedy, 1992). However, the adoption of this approach has been low in African countries due to the entrenchment of the conventional approach, a lack of expertise, research, financial resources and interest. This approach developed primarily in response to the overlooking of the widespread informal waste handling set ups that had proliferated throughout

African cities, in a bid to help alleviate some of the problems that the conventional approach could not deal with. Also, it is an approach that has been encouraged under the *enabling approach* to urban management with an aim to make the informal sector more productive and responsible for waste management in African cities[10].

3.2.3.3 The Integrated Approach

The integrated management approach is the only one of the three that comes closest to departing from the traditional environmental approach.[11] It is based on the premise that to solve the complex problems of managing solid waste in African countries, the formal and informal sectors of managing urban solid waste would have to operate in a complementary manner so as not to conflict with each other (Ali, Coad, and Cotton, 1996). Such a multi-sectoral approach is distinctive for its engagement of partnerships

[10] The main thrust of the enabling approach is that governments in the developing world should transform themselves from sole providers to facilitators of solutions; from providing agents for the few into enabling catalysts for all (UNHCS-Habitat 1990; 1993). It essentially regards reliance on the state as the main agent of municipal management in African cities as misplaced because state intervention in the process of municipal development in Africa has been marred by corruption, gross financial deficiency, and poor planning (Nwaka, 1996:128). As a remedy, the approach espouses the appropriate role of government as that of an enabler, and regulator, which should not aspire to do more than its limited resources and capacities permit. The merit of this approach is that with the enormous underutilized resources in the formal and informal private sectors of African cities, governments enabling support could be harnessed for the adequate provision of services such as water supply, sanitary services and waste disposal. The problem with this approach as several studies have shown, is that the current economic crisis has weakened the private sector in African cities, for whom increased responsibility could hardly have come at a worse time (Gilbert, 1992; Onimode, 1992). This is evidenced by the failure of several privatization attempts in the provision of services such as waste disposal in African cities. Very few private enterprises have invested in the services for which the urban poor are unable and sometimes unwilling to pay. Further, the African private sector has often performed equally poorly in the services they have tried to provide in the past, and when services (such as solid waste disposal) pertaining to health and the environment are left to private enterprise, the social costs are quite high (Demanya, 2001). As Stokke (1992) has rightly observed, market forces enthroned by Structural Adjustment Programmes are probably not suitable to be entrusted with ultimate responsibility for the environment. Thus to argue that because governments have not performed well in the past they should be stripped of their traditional responsibilities in favour of large and small scale private enterprises would be a negative and defeatist approach, and counterproductive.

[11] Basic services and functions of cities such as land, housing, and waste disposal amongst others have been considered by most urbanists, and researchers simply as municipal services, and have only recently become core environmental planning issues in cities (McCarney, 1994: 232).

(Fernandez, 1993; Furedy, 1993; 1994a; 1994b; Ouono and Ogawa, 1993; Ali, Coad, and Cotton, 1996). Thus, cooperation amongst stakeholders and the spirit of shared responsibility are considered critical in this approach. Even with its partnership focus, attempts at implementing this approach has been bogged down by problems of mistrust between policy-makers, governing officials and residents, expense, time, and difficulty of sustaining commitment (Sicular, 1992; ESCAP, 1993; UNCHS, 1994; UNCRD, 1994; Furedy, 1995).

The conventional, non-conventional and integrated solid waste management approaches as shown in the preceding discussion, have not only been unsuccessful in dealing with the solid waste issues of cities in Africa, but also lack an explicit consideration for environmental monitoring within their framework. The urban management approach's international initiatives, such as the Healthy Cities Programme, the Sustainable Cities Programme, and the Mega-cities project, under which these waste management approaches have gained prominence, all seek to generate fresh ideas and innovative methods to enable African cities improve on their environmental situation. However, these approaches have failed to comprehensively deal with the challenges that managing urban solid waste in African cities present, fundamentally because they approach the issue from synoptic planning and environmental analysis perspective. A relevant approach to dealing with the problem will be one that incorporates aspects of ecological monitoring, resource recovery and use, local knowledge and appropriate technology, and

seek to be less technocratic, managerialist and rather garner more, local involvement and 'participation' of the African city dweller[12].

3.3 Definition and Characteristics of Local Knowledge

The term local knowledge can be defined as a body of knowledge acquired by local people through the accumulation of experiences and intimate understanding of local environment and resource systems in a given culture, which is a dynamic knowledge system changing through local mechanisms of creativity and innovativeness as well as through contact with other local and international knowledge systems (Warren 1987, 1990; Haverkort 1993; Rajasekaran, 1993). The literature on local knowledge is extensive (e.g. Posey 1985, 1991; Richards, 1986; Niamir, 1990; Gadgil et al., 1993; Berkes, 1999; Agrawal, 1995; Mailhot, 1993; Stevenson 1996; Usher, 2000, Huntington, 1998, 2000; Wilken, 1987; Ghodes 1988, Mathia-Mundy and McCorkle 1989), and uses various terms interchangeably with local knowledge, such as *"indigenous knowledge", "traditional knowledge", "traditional ecological knowledge", "traditional ecological knowledge and management systems", "community knowledge", "rural people's knowledge"* and "*farmers knowledge*" (e.g. Howes and Chambers, 1979; Reijntjes et al., 1992; Warren, 1992; Mathias, 1994; Roach 1994; Agrawal, 1995; Lawas and Luning 1997).

Local knowledge has several characteristics (Table 3-3), and according to Howes (1980), it is the concrete expression of a worldview that emphasizes the unity, and symbiosis of

[12] The use of the word participation here is to suggest the notion of openness to an involvement of local knowledge in not only the decision-making aspects, but the entire day-to-day running process of the solid waste management system.

man and nature, which is validated, and revised daily and seasonally through cycles of activities, and differs from western science in a number of ways, as western science has adopted a set of assumptions on which knowledge generation is based, and by which it is tested for validity (Wolfe et al., 1992)[13].

Table 3-3: Characteristics of Local knowledge

CHARACTERISTICS	LOCAL KNOWLEDGE	WESTERN SCIENCE
Intellectual hegemony	Subordinate	Dominant
Mode of data creation	Holistic Subjective Experiential Oral tradition (Academic)	Reductionism Objectivism Positivism Academic
Explanation	Spiritualism Beliefs and values Seeming inexplicable Isolated instances of experiments	Scientific inquiry Natural laws Hypothesis Laboratory experiments
Ecological classifications	Specific geographical and culture context	Transcend local, regional, and national boundaries Aims at universality
Recognition of source of new knowledge	Communal ownership vested in chiefs, ancestors, and gods and godesses	Copyrights Patent rights Authorship

Source: Field Study Observations (2004), and Wolfe et al., (1991)

Even though local knowledge is seen to exist in a local context, anchored to a particular setting and at a particular time, natural scientists have begun to recognize the knowledge systems of local resource dependent communities, whereas anthropologists have commented on the rationality and validity of such knowledge systems for decades (Agrawal, 1995; Rappaport, 1968). For instance, studies conducted in Sudan suggest that by relying on local informants and drawing on their experiential knowledge, it was possible to undertake an excellent soil survey and mapping in just a few days whereas formal scientific approaches took several months (Brokensha et al., 1980). Similarly, Richards (1985) working in West Africa concluded that experiential knowledge of local

[13] These assumptions are categorized by Rahman (2001) as *a.)Reductionism*: where the understanding of a whole and complex phenomenon can be achieved in terms of more elemental events*; b.) Objectivism*: the observer must deliberately separate her/himself from that which is being observed and learn about it through replicable probes; and, *c.) Positivism*: what is measurable is scientifically real, and what is real is measurable

people about the grasshopper (*Melanoplus differentialis*) equaled that of western trained ecologists in sophistication and detail. Also, Walker (1985) observes that for centuries before the advent of western science and civilization on the African continent, the Masai and other herdsmen knew when rain would fall based on the behaviour of the Safari ant (*Dorylus zimmermanni*) which moves to the wing stage of its reproductive cycle three weeks prior to rainfall.

As in many parts of the developing world, the search for a complementary knowledge based local, and scientific knowledge for improving natural resource management is gradually gaining importance in Africa. Reij *et al.* (1996) have documented more than 25 cases to illustrate how local (-they refer it as indigenous-) knowledge and practices are incorporated into soil and water conservation in Africa. In a recent work from Nigeria, Braimah (2002) discussed the role of local knowledge in agricultural development and shows that local knowledge of soil can be integrated with modern soil science to develop a soil classification system for Nigeria. These are not isolated cases. In fact, there are numerous experiences from other parts of Africa, which when studied could strengthen local resource management planning. A good example of this is seen from Zambia where, Sikana and Mwambazi (1996) described the *Dambo* utilization noting that as part of the local soil and water conservation strategy, farmers do adapt cropping arrangements according to seasonal fluctuation and flooding regimes – for example, cropping of the *Dambos* with rice during the wet years, with shifts towards crops such as maize and groundnut during the drier years. Similar adaptation strategies have been observed in the Lower Volta Basin of Ghana by Koku (2002) in some vegetable farming communities of the Tongu south district. These experiential knowledge systems are not simply the result

of accumulated passive observations. They include many years of analytical and experimental approaches to learning (Chimbas 1989: 91).

According to Kroma (1995), formal education in developing countries is contributing to the demise of local knowledge by both commission and omission. Formal education tends to promote western science and values at the expense of local knowledge and values, and fails to put forward local knowledge as a worthwhile subject matter for the learning process, and thereby creates attitudes in children that militate against the acquisition of local knowledge. Notwithstanding this limitation, Matowanyika (1991) states that several local systems of knowledge have tenaciously survived within groups in Africa, especially in the face of the vagaries of colonialism. The local knowledge systems survive in many subtle forms while adopting several external ideas, changing and evolving norms, and practices, and should thus not be judged for its worth according to a static image.

3.4 Contemporary perspectives on local knowledge

A survey of the literature on local knowledge shows that there is a significant amount of it on an extensive amount of different fields (c.f.: Basso 1972; Ceci 1978; Clement, 1995; Freeman 1984; Mabry 1996; Mathis-Mundy and McCorkle 1995 Nelson 1969; Pawluk et al. 1992; Pruitt 1984; Reij et al., 1996; Reiwe 1991; Schultes and Reis 1995). However, the main thrust of research on local knowledge has so far been on the explicit and measurable aspects of the local people's experimental and technical knowledge systems. These debates about whether and how to use local knowledge has had several foci:

1. One centers on the theoretical aspects of how local knowledge and scientific knowledge are constructed, and thus how they converge or diverge in various settings (c.f.: Agrawal 1995, Stevenson 1996).
2. Another theoretical focus has been on the scientific merits and environmental management applications of local knowledge, and whether in fact it offers more to scientific knowledge than additional pieces of data (c.f.: Berkes et al., 2000; Fernandez-Gimenez, 2000; Freeman and Carbyn, 1988; Gadgil et al., 2000; Kawagley, 1995).
3. A third complementary focal area has been the practical aspect of utilizing local knowledge and combining it with scientific knowledge, particularly in the context of environmental management (e.g., Berkes 1998, 1999; Ferguson and Messier 1997; Fernandez-Gimenez 2000, Gadgil et al. 2000; Huntington 1998, 2000; Nabhan 2000; Usher 2000).

For the most part however, research on the utilization of local knowledge has concentrated on documenting it and analyzing the results in comparison with scientific knowledge. Several projects have conducted interviews or otherwise gathered information from knowledgeable persons, compiled the results, and published summaries of local knowledge, often accompanied by a discussion of the lessons learned and the additions made to collective understanding (Huntington et al., 1999; Johnson 1992; Kalxdorff 1997; Kilabuck 1998; McDonald et al., 1997; Mymrin et al., 1999; Nakashima and Murray 1988; Thomsen 1993; Turner et al., 2000).

Most studies of local knowledge (see Berkes etal., 2003; Berkkes and Folke, 1998; Huntington, 2000; and Olsson and Folke, 2001) focus on rural communities. However,

very few studies (see Colding et al., 2003; and Barthel, 2005) have addressed the potential existence and use of such knowledge among urban communities. Also, the use of local knowledge in the urban land use planning process has gained acceptance within the literature (see Kansanen, 2004; Niemela, 1999; and Sukopp et al., 1995).

Very little research has however been conducted on the role local knowledge has to play in managing urban solid waste (an environmental stressor) in the context of African countries. This study is a contribution on this discourse, using case study cities of Accra and Kumasi in Ghana, West Africa.

3.5 Challenges and limitations of local knowledge

In pursuing this study, it must be noted that various investigators (Leach and Mearns, 1988; Reijntjes et al. 1992; Bebbington, 1993; Howard and Widdowson, 1996), have warned that local knowledge has its limitations and is not in it self capable of addressing all the issues related to better management of the environment. Thus this research took into consideration the importance of being wary so as not to over romanticize it. Also, Lawas and Luning (1997) note in this regard that the collection of local knowledge from diverse local sources often poses a laborious, time consuming and costly challenge. In spite of these limitations, various kinds of local knowledge have come to be accepted and used by scientific experts in a number of areas. For example, there has been growing recognition of the capabilities of traditional agriculturalists, pharmacologists, water engineers, and architects (Warren et al., 1995; Schultes, 1989; Groenfelt, 1991; and Fathy, 1986). This has come about as a result of the increased appreciation of local knowledge in contemporary times, paving the way for the acceptability of the validity of

such local knowledge in a variety of fields. The feasibility of applying such knowledge to contemporary management problems in various parts of the world from the Arctic to the Amazon and Tropics has become recognized in the international arena. This is reflected in the report of the World Commission on the Environment and Development (WCED), titled "*our common future"* (see: WCED, 1987: 12; WCED, 1987: 114-115) as well as the works of Anon (1999:1); GNWT (1993:11); Griffiths et al. (1999: 203), and Maclachlan et al. (1996: 74). Thus, it is not only important for more research such as this one, to be done to further build upon local knowledge use in environmental management, but also in planning the delivery of services that affect the quality of life and well being of cities (i.e. places where we live).

CHAPTER 4

PLANNING THE AFRICAN CITY: THEORIES, PRACTICE, AND CONCEPTUALIZATIONS

4.0 Introduction

Lots of urban areas have evolved as a result of different individual decisions, which led to the change of use of existing sites and structures, rather than as a result of an overall plan. However, planning, both in the form of designing new settlements and as the regulation of piecemeal urban development is an activity which is as old as civilization (McConnell, 1981: 1). Traditional planning theories underlying the planning of settlements have been concerned with prescribing for the functions and the form of urban areas, whilst other theories have been concerned with explaining and predicting some of their physical, environmental, economic, and social characteristics. Since the mid 1960's, nearly all the assumptions underlying planning theory in general, and planning in developing countries in particular have been questioned, including the desirability of growth, and the need for planning itself.

Although recent literature and policies reflect some agreement that the pace, direction, and benefits of growth in developing countries must be drastically altered, little consensus has emerged on what to do about planning. Thus, despite the continuing debate over the proper role of planning as a necessary and desirable instrument for affecting orderly change in a variety of social and economic environments in Africa, the proponents of planning argue that it can contribute to more rational decision making, an

accelerated pace of development and basic service delivery, and more equitable distribution in the benefits of development.

In this chapter, the discussion takes a critical look at decision-making in urban planning, and the national development planning process in order to demonstrate how it shapes both the physical and institutional landscape in African cities in general, and Accra and Kumasi in particular[14]. As well as to shed better understanding on how solid waste management is planned in African cities, so as to sketch out succinctly how it relates to local knowledge with respect to influencing decision-making around urban waste management in Africa. In this regard, this chapter presents discussions on approaches to planning theories and practice; and planning in the African context.

4.1 Approaches to Planning Theories and Practice

Planning through out Africa has been almost entirely based on western planning practice as such in order to understand the role that local knowledge can play in dealing with waste planning in African cities it is essential to review both the theoretical underpinnings of practice, and the process of and approaches to, decision-making in practice.

[14] The concept of national development is largely defined as an economic process of growth. Hirschman, (1958); Rostow (1960), and Potter et al., (2004) all state that development can be attained gradually by following the model of economic growth experienced by Western Europe and North America, i.e. an urban-industrialization defined in terms of economic efficiency in the mechanisms for growth such as the GDP and per capita income. The United Nations (U.N.) declared the period 1960-70 a development decade, and according to Aryeetey (1992:2), for many African countries and their leaders this implied naturally the adoption of foreign technologies, practices, and conceptions of the 'good life' i.e. the acceptance of foreign ways of living and producing which led to the adoption of economic growth oriented strategies and approaches of development.

Since the 1960s, a distinction has been made between planning theories. Three (3) main categories have been proposed in the literature: first the *substantive* theories used *in* planning, which are derived from many disciplines; second, the *procedural* theories *of* planning in which the processes and operations of planning are analyzed and explained, and which prescriptively offer theories for the improvement of these processes and operations (Hightower, 1969; Faludi, 1976; and Healy, 1974). Third, the *social* theories *for* planning, which explain why society and planning is as it is, and how it could be in the future. This is related to political and moral theory.[15] However, some scholars group the *social* as part of the *procedural.* Faludi (1973) defines the procedural category by contrasting it with the substantive as:- theories that are concerned with the planning process and organizational forms of planning (Alexander, 1986); but, in current planning theory discourse, the *social* theories have become a more prominent category with respect to the postmodern views in the literature (c.f.; Beauregard, 2000; Sandercock and Forsyth, 2000; Fainstein, 2000; Healy, 1992 Harvey, 1985; Milroy, 1992; Friedmann, 1992; 1987). It must be noted that the three (3) kinds of planning theory outlined above are interconnected, as such it is artificial to try to define rigid semantic boundaries around categories of planning theory. For this reason, the planning theory discourse is replete with commentary on the variations in explanation as to its nature or simply, the lack of agreement. Consequently, two (2) dominant decision-making groups in planning urban development and the environment are identified as: (1) the *synoptic/ rational*

[15] Political theory is a systematic thinking about the purposes of government and power relationships (Plamenatz, 1967: 19). Politics is about power, and urban planning is one way that power is used, thus planning is political (Blowers, 1980). The processes and the products of urban planning are influenced by the preferences of those in power. As such the means and ends of the planning process vary depending on the ideologies of the party in power. And so to understand which groups in a society gain most from planning it is important to know the dominant ideologies of those with political power even though such ideological motivations may be tempered by the need to have regard to other powerful groups in society, like unions and financial institutions (McConnell, 1981:109).

comprehensive approach, which is rooted in a positivist tradition, and also noted as the *explanatory* approach that explains the economic, geographical and social phenomena with which planners deal. It is the basis for predictive techniques and methods of analysis and modeling; and (2) *The normative or prescriptive approach*, which focuses on the process of making plans, proposals, or strategies.

The roots of these planning theory approaches lie in modernism, the "cultural precipitation of their socio-historical period" (Schulte-Sasse, 1987:6). Potter, (1990), and Hassa and Zetter (2002) define modernization as the hierarchical diffusion of innovation and change, which would lead to technical efficiency and economic growth. This is so because planning engaged the city of industrial capitalism and became institutionalized as a form of state intervention (Beauregard, 2000).

In line with this modernist character, planning as a practice assumes that reality can be controlled and perfected. The world is seen as malleable because its internal logic can be uncovered and subsequently manipulated. Thus, planning adopts a viewpoint that helps it overcome alienation through a belief in the efficacy of human action and the importance of commitment (Schulte-Sasse, 1987; Kraushaar, 1988; Orwell, 1953). Modernist planning believes in a future in which social and environmental problems are tamed and humanity is liberated from the constraints of scarcity (Hutcheon 1987; Jencks 1985); and control is wielded in order to drive society forward along a path of progress (Berman 1988: 6).

These are also the beliefs that are underlying development strategies in Africa, that, “the conscious application of professional expertise, instrumental rationality, and scientific methods could effectively promote economic growth and stability” (Klosterman, 2003:1993). This modernization-based approach to development supposedly heralded new promise for countries in Africa. The result however is that the development gap between the continent and the industrialized world is now wider than ever before, and a lot of criticism in the literature (c.f.: Lipton, 1988; Drakasis-Smith, 2000; Castells, 1989) has been directed at the large measure of attention paid to this process and methodology of institutionalized planning (Aryeetey, 1992: 5). According to Beauregard (2000 218), the “planners’ involvement in the modernist struggle to change the world was not as people of action. Their contribution was utilitarian understanding.” In essence planning would liberate through enlightenment (Albertsen 1988; Friedmann, 1987). Thus, modernist planning and development in Africa theoretically situated itself clearly within both a European rationalism and an American pragmatism and positioned the planner to act as experts who could utilize their laws of development to provide societal guidance.

Underlying this concrete manifestation are procedural assumptions and substantive commitments: - in practice the synthesis of the developmental processes and the built environment into a coherent urban form that fulfills functional necessities i.e. the Master plan examples of which abound in the literature on post independence 1960s and 70s African development planning. For theory, it involves the formulation of a dominant paradigm-*comprehensive rationalism* (Beauregard, 1984). This approach rooted in modernism has been described by Beauregard (2000:218) as the “*modernist planning*

project". Synoptic or rational comprehensive planning is a top-down approach to decision-making, policy formulation, planning, and public administration, in which there are four main elements: goal identification, analysis, implementation, and evaluation (Lindblom 2003:197-199).

4.1.1 Synoptic/ Rational Comprehensive Approach

This approach is the more dominant of the two decision-making approaches in planning practice, and the point of departure for the narrative planning approaches (Hudson, 1979). In spite of several criticisms over the years, the rational comprehensive approach continues to be unyieldingly present in the practice of urban planning (Lawrence, 1992). For instance decisions regarding where to locate waste disposal facilities, as well as the enforcement of acts and laws have depended on the rational comprehensive approach (Renn et al., 1995, Cooper, 1999). Rational comprehensive or modernist planning relies heavily on quantitative techniques such as cost-benefit analysis, pre-project experiments, statistical analysis and trend extrapolations, for arriving at decisions and considering alternatives (Field and McGregor, 1987). In so doing, the approach encourages planners and administrators to search for quantitative solutions to problems and to rely on technical standards. As such maintaining an aura of rationality, efficiency and science (Goodman, 1972). This rational efficiency is defined through the interaction of competing interests within an economic marketplace, and even though the approach is generally characterized as a neutral and value free process, Baum (1996) notes that the desire to be objective in decision-making and the heavy reliance on the free market make it difficult even for the well-intended planning practitioner to apply fair forms of practice.

The rational comprehensive approach ignores an important element about planning, that it is a political process and therefore, by its very nature, value laden (Dalton, 1986; Friedman, 1987; Renn et al., 1995; Campbell and Fainstein, 1996; Baum, 1996).

Such modernist approach to planning began to come apart in the 1970s and 1980s (Dear, 1986), as novel political forms, economic relations and restructuring posed new challenges for the premises that underlay practice. In turn the theoretical quest for a dominant paradigm has been challenged by an eclecticism and reluctance to embrace social theory, changes which according to Dear (1988) and Soja (1989) reflect the realities of a post-Fordist political economy and postmodern cultural sensibilities. This postmodern critique of modernist planning is a complex one that includes a turn to historical allusion and spatial understandings, the embracing of multiple discourses and the rejection of totalizing ones, a skepticism towards master or dominant paradigms, the rejection of notions of progress and enlightenment, and a tendency toward political acquiescence, each of which continue to challenge the modernist planning approach (Bernstein 1987; Cooke, 1988; Dear, 1986; Gregory, 1987; Jameson, 1984a; Jencks, 1985; Lyotard, 1984; Relph 1987; Soja 1989).

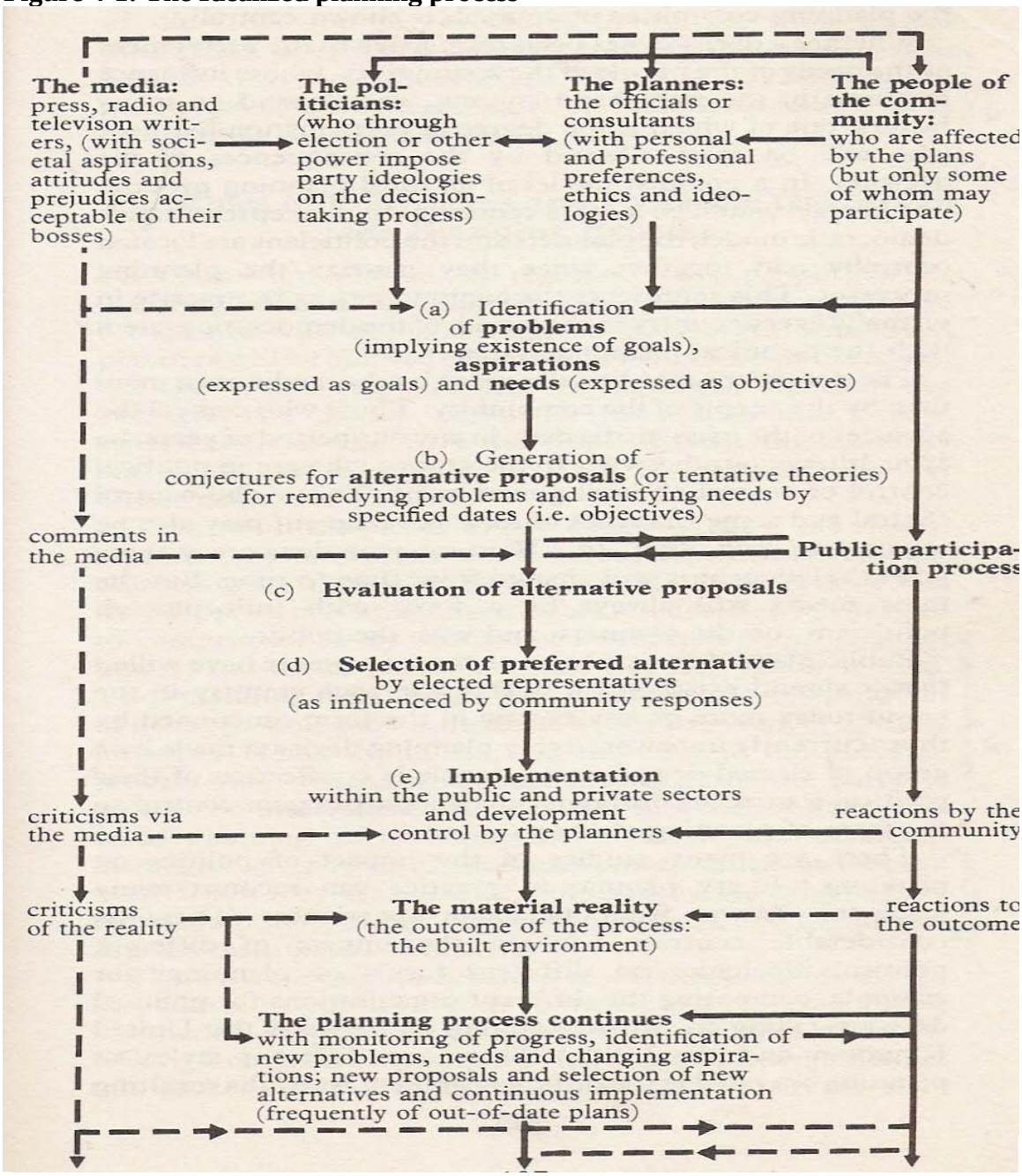
In the light of these new perspectives and critiques of the rational comprehensive (modernist planning) approach, alternative approaches have developed to the acquisition of both theoretical and applied knowledge to making choices (Harvey, 1989; Forester, 1989; Chekoway; 1994; Innes, 1996). These approaches collectively referred to as normative planning approaches generally take a more self-critical perspective in line with

their postmodern character (Harper and Stein, 1992; 1994; Friedmann, 1995). These new approaches include: Advocacy planning; Transactive planning (also modified as communicative planning, and social learning), and equity planning, which Hudson (1979) and Friedmann (1987) identify to provide the basis for decision-making.

4.1.2. Normative Approach

Friedmann (1995) refers to normative planning as an approach that tells about good planning practice and what planners might need to do to achieve this. Rawls (1972:396) suggests that "good planning should allow a focus on the evaluation of values such as justice, fairness or what is ethically and morally right or wrong. Thus Rawls argues that goodness, fairness and justice are rational behaviour especially if they influence intended objectives, such as land use decisions concerning the citing of hazardous waste facilities. Hence the normative approaches can be seen to be concerned with increasing pluralism and democracy in the planning process (Qadeer, 1997; Friedmann, 1995). In effect, planning activities are seen to occur within the social, economic and legal context of the place and people being planned for. Indeed Hagan (1992) highlights this fact that a people's experience and worldview are important for plan formulation. Thus to plan successfully, it is important to include several different levels of decision-making, where different attitudes and influences may be operative in strategic issues relating to the development of parts of an urban area. Figure 4-1 below illustrates such an idealized planning process.

Figure 4-1: The Idealized planning process



Source: Adapted from McConnell, 1981: 107

Whether a decision made in the idealized planning process shown in the chart above is responsive to the preferences and needs of the people of a community still depends on many factors, a main one being the degree of participation by those who are most affected by the consequences of the decision. In this regard Sandercock (1995) and

Leavitt (1994) have pointed out that the advocacy approach in such decision-making has come to be perceived as a process of experts (the planners) playing the role of representing the status quo. Causing the process to meet with resistance and suspicion. Lang (1990), Baum (1996) and Renn et al., (1995) have also attributed continued biases in the decision-making process with respect to a transactive approach even when it involves professional planners with good intentions to several factors. Prominent amongst them being that there is still considerable resistance within government and amongst decision-makers, whose fundamental concern is the legitimacy of the system. Thus, power relations remain an important influence in the normative planning process since the postmodern debate is not simply an issue of theoretical possibilities and cultural practices, but also a political agenda, that has implications for planning theory and decision-making processes (Smith, 1987). There are many studies that comment on the impact of politics on planning, and every planner in practice can recount many instances drawn from personal experiences.

Postmodern (normative) planning looks at space and time differently from modernist planning. The postmodern challenge conceives of space and time, socially, historically and dialectically (Beauregard, 2000: 225). Consequently, an attack on the modernist belief of the malleability of space; its generic paradigmatic western rational comprehensive approaches meant to be applicable regardless of context; and the imposition of these approaches through modernization based development planning programs and several centuries of colonization on the African continent. According to Aryeetey (1992: 10) this is reflected in the dimensions of problem analysis and solutions

that have been firmly rooted on the understanding that "*Africanisation*" or "*indigenization*" of decision-making processes would go a long way to improve the socio-economic status of the African. As a result, practitioners and theorists must open planning to a variety of constituencies in a multiplicity of communities and cultures giving more attention to broader explanations and local knowledge bases for thinking about practicing planning. Such an approach must address directly the conflicts within society and its social and cultural heterogeneity. Even though the modernist project of planning has disintegrated and become seemingly less viable as a response to contemporary social and environmental conditions in African cities, and practice has lost its "*neutral*" (supposedly value free) meditative position, practitioners still cling to a modernist sensibility and search for ways to impose expertise on, and to integrate their many specialties around a grand vision such as the master plan (Aryeetey, 1992).

4.2 Planning in the African context

Most planning in sub-Saharan Africa is carried out as a techno-bureaucratic exercise without adequate involvement of stakeholders, thus denying the public adequate opportunity to articulate their interests and values in the planning process, while planners block themselves off from the opportunity to be informed by the dynamics of the context within which the plans would be realized. The poor state of the urban environment in African cities reflects both the ineffectiveness of past approaches to urban planning and management, and the enormous scale of urban problems in relation to the declining resources available to deal with them. With several competing demands on the dwindling resources, African politicians and urban planners give low priority to urban environmental issues and even less to waste management (Nwaka, 1996). Consequently,

it is now widely recognized in the literature that the centralized approach to planning and development adopted by most African governments at independence has achieved disappointing results. Many African cities still bear a heavy imprint of their colonial past, with many of the features of colonial planning and the supporting legal framework, still largely unchanged (Nwaka, 1996*)*. Also, the narrow master planning approach has had limited impact on the ground, partly because of the limitation of resources, but mainly because the cities, originally designed for much smaller populations in the colonial period are now having to cope with the massive influx of migrants since independence. As Wekwete (1992) has observed in respect of southern Africa, "the urban poor are now predominant and in most cases are transforming the city to meet their needs, often in conflict with official laws and plans". The central dilemma in African urban policy and planning is how best to cope with the reality of poor quality in the provision of urban services in African cities, and how to arrest the deterioration in the environment and public health, how to raise money to support urban services particularly waste disposal, and how to set appropriate and attainable standards to ensure that the growth of urban services keeps pace with the inevitable growth in urban populations in Africa.

Furthermore, most African cities and towns have been subject, over long periods, to formal urban planning exercises. In the colonial and post-colonial periods these nearly always took the form of blueprint master plans, which assumed the ability of the municipal authority to regulate land use in accordance with the plan. Such plans (usually drawn up by expatriate consultants) were generally highly impositionary, reflecting attempts to 'modernize' African cities in the Western image, and frequently resulted in the large-scale removal of informal settlements and small traders. The growing inability

to implement such plans, together with more recent World Bank advice to replace spatial plans with 'urban management' approaches, means that most urban areas have expanded without formal state planning (Burgess *et al*., 1997; Wekwete, 1997).

4.3 Conclusion

Finally, it is noticed that, planning style does not come out of the blue, neither is it primarily the result of one planner's arbitrary or idiosyncratic improvisation. Style is linked -probably in some loose way- to the institutional environment via the characteristics of the planning agency and so to date, planning practice in Africa has focused on three areas: physical (spatial), macro-economic and social planning. This approach has been technical, top-down and, most importantly, agency driven (Diaw et al., 2002). In many parts of sub-Saharan Africa, planning practice has changed little since colonial times[16]. It is frequently top-down and aimed primarily at plan production, often with little connection to the real issues and problems facing communities.

Recent research on planning practice in Africa has shown that plans resulting from this method of planning have been actively detrimental (Diaw et al. 2002). For instance, with such provisions, the layouts of solid waste disposal sites are never accompanied by plans and strategies with a provision for monitoring and evaluation in support of decision-making to alleviate the environmental stresses that result from open dumping practices.

[16] It is important to note that the colonial powers were not homogeneous. There were the French, Portuguese and British who all had varying political administration tactics, and planning approaches that they left behind when they left. Of these various types the most widely practiced and enduring after independence has been the British style, which survived postcolonial rejection better than the others. Thus, the urban planning system and its legislative framework in the Anglophone African countries, remains a reflection of the 1947 British planning legislation. Planning conceptualization and practice still follows the 1940s' and 1950s' British approach of planning in most of the countries as design and land-use arrangement are based on projections of population and land.

As a consequence, while the demand for urban development planning and management increases with urbanization, an underpinning problem seems to be the still inherent notion in planning practice in African cities that planning is exclusively about plan production. This is greatly enhanced by what the planning system demands from the planners, and the way planning is carried out as a techno-bureaucratic exercise, which excludes a consideration of how plans affect peoples' lives. To compound all these is the fact that, planners working in African cities are frequently faced with problems for which there are little useful precedents in other parts of the world. At the same time, their tasks are complicated by the constraints of working within formal planning systems still strongly influenced by their colonial heritage, and with planning skills, which do not articulate well with these contextual realities of Africa.

CHAPTER 5

RESEARCH FINDINGS: CONFRONTING THE REALITIES OF SOLID WASTE PLANNING AND MANAGEMENT IN TWO (2) WEST AFRICAN CITIES: ACCRA AND KUMASI, GHANA

5.0 Introduction

This chapter discusses the research findings on the solid waste management set up in Ghana in general, and Accra and Kumasi in particular. First, an understanding of solid waste management within the urban governance structure is outlined, and then the dimensions of waste collection and generation, waste planning processes and disposal arrangements are then discussed. Observations on legislative control, regulations, and the monitoring of waste activities are noted. The financial viability of the system, and the main problems with the current waste service arrangements noted by interview respondents are also reported, after which findings on the environment and health consequences of the solid waste management activities in both Accra and Kumasi are presented. Finally, residents, government officials and private waste companies who provide collection and disposal services' perceptions on the effectiveness of the solid waste services provided in Accra and Kumasi are presented.

The findings presented here were collated from field survey conducted in Accra and Kumasi, Ghana. These involve the result of focus group discussions conducted with the courts of ten (10) paramount chiefs of the *Ga* traditional council in Accra, and one (1) with the court of the *Bantamahene*, the *Asantahene*'s acting representative as chief of Kumasi; the questions used to prompt these sessions can be seen in Appendix B. As well as semi-structured questionnaire interviews conducted with a total of 125 key informants in Accra: representing the following: residents (90), government officials (20), and private waste companies (15); and 75 total key informants in Kumasi representing:

residents (60), government officials (10), and private waste companies (5). Regarding the residential respondents, a representative number from low, middle, and high-income areas of Accra and Kumasi were sampled wherein the same number of households within each income level was administered the interviews. In Accra, this was 30 households, and in Kumasi 20 households per income level. The intention was to capture all the dimensions of the waste management issues since, the service type provided, as well as the fees collected for such services within the various localities of both cities is dependent on the socio-economic attribute i.e. income level assigned to the locality by the metropolitan Assembly.

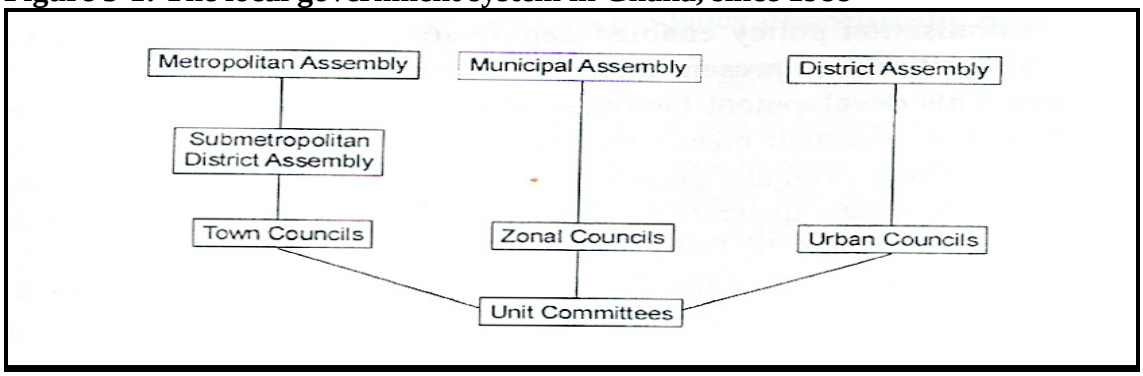
5.1. The urban governance structure and solid waste management in Ghana

The structure of Ghana's local government system has, like other human organizations, undergone dynamic changes since its inception as part of the national development framework. Jackson (1967) pointed out that as new needs, methods, and ideas emerge, and develop the system inevitably adjusts to meet the changing conditions. Thus, five main forms of local government administration in Ghana can be identified since the pre-colonial and post-colonial era in an attempt to explain the urban governance institutions in place in Accra and Kumasi. These are: the traditional system of governance, the colonial system, the dual hierarchy model (the two-tier system), the single hierarchy model (the single tier system) and the decentralization reform of 1988 (i.e. the district assembly concept). Of these, the district assemblies concept is the most pertinent to the discussion of waste management and planning in Accra and Kumasi, today, since it is the system that has been in practice for the past two decades in both cities, and has retained legal backing as the defining urban governance structure in the metropolitan areas and

districts of the country since the coming into force of the 1992 Constitution of the Republic of Ghana.

The fulcra of the local government system are the District and Metropolitan Assemblies, described in the 1992 constitution as the "*highest political authority in the district*". The constitution makes comprehensive provisions for local government decentralization, and confirms the local government system established in 1988, thus strengthening the role of district assemblies in the governance of their districts. Since the implementation of the district assembly concept in 1988, Ghana's system of public administration has been basically a five-tier one (but six-tier in the case of metropolitan assemblies like the Accra Metropolitan Assembly and Kumasi Metropolitan Assembly), with the central government at the apex. The 1988 reform mainly involves the creation (from 65 district councils) of 110 district assemblies, including three metropolitan assemblies:-the Accra, Kumasi, and Tema Metropolitan Assemblies. The new structure (see Figure 5-1 following) caters for the cross-sectoral coordination of policies and plans at district level through the Town, Zonal and Urban Councils, Unit Committees, and the Sub Metropolitan District Assemblies.

Figure 5-1: The local government system in Ghana, since 1988



Source: MLGRD (1994; 1996)

As depicted above, under the new local government system, the metropolitan assemblies have an additional structure just below the assembly i.e. the sub-metropolitan district assemblies. Thus there is now a four-tier metropolitan system along side the three-tier municipal, and district assemblies, i.e., Metropolitan assemblies have four levels, whilst municipal and district assemblies have three. This restructuring is in part to deal with the rapid urbanization of the country's major cities.

This has led to the election of members for the District and Metropolitan Assemblies. These processes are intended to enhance grassroots participatory democracy further, or to bring the system of government to the "doorsteps" of the people. This has also led to the creation of ceded revenue, and the District Assemblies Common Fund (DACF) in order to strengthen the financial base of the District and Metropolitan Assemblies.

The decentralization reform did not only entail a transfer of political administration and decentralized public services delivery from the center to the district assemblies, but also within the district assemblies to the lower levels and structures of authority. In both the Accra, and Kumasi Metropolitan Assemblies, for instance, this involves the transfer of responsibilities for the provision of some public services from the Accra Metropolitan Assembly and Kumasi Metropolitan Assembly head office (i.e. the center) to the thirteen sub-metropolitan assemblies (Ablekuma North and South, Ashiedu-Keteke; Ayawaso East, Central, and West, Kpeshie, La, Teshie, Nungua, Okaikoi North and South, and Osu-Clottey) for Accra, and the four (Asokwa, Bantama, Manhyia, and Subin) in Kumasi. Each of these sub-metropolitan assemblies handles, or has supervisory role for, specific public services within their area of jurisdiction. These include revenue collection

such as, market toll, land poll and property rates, maintenance of roads, solid and liquid waste management; and the maintenance of public toilets. In general, the sub-metropolitan in Accra and Kumasi have proved incapable of discharging their duties in some decentralized public services. One of such failures is in solid waste collection. Despite the logistics given to the sub-metropolitan, they are unable to cope with the escalating volume of solid waste being generated in the cities. Other services in Accra and Kumasi, with regards to which the sub-metropolitan have failed woefully, include sanitation, the sanctioning of offenders, the enforcement of byelaws, and contract agreements. The Local Government Act of 1993, Act 462 designates the district assemblies as the political, administrative, planning, development, budgeting and rating authorities in their respective geographical areas of jurisdiction. The sub-district structures comprise a series of urban, zonal, town and area councils and a countrywide network of unit committees.

According to the Ministry of Local Government and Rural Development, under this local government structure, individuals and communities are responsible for indoor sanitation, and proper storage of waste on or around their compounds (GOG, 2002). District and Metropolitan assemblies bear primary and ultimate responsibility for waste management, and this includes funding and implementation of plans. The assembly's responsibilities are outlined as follows:

1. Enhancing the awareness of citizens and business enterprises as to the nature of their waste handling responsibilities;
2. Facilitating and enabling the participation of the private sector, and communities in waste management activities;

3. Promoting minimization, though re-use and recycling of waste;
4. Setting standards, and issuing regulations and bye-laws;
5. Enforcing environmental regulations and bye-laws;
6. Preparing plans, and guidelines on the organization of waste management activities; and,
7. Coordinating sanitation programs (GOG, 2002: 17).

In this regard, the Waste Management Department (WMD) of the Assembly is directly responsible for the hardware aspects of waste management which include: -the collection and transportation of wastes; -intermediate storage and treatment of wastes; - final disposal and care of disposal sites; -public cleansing; (which includes the sweeping of streets)- zoning districts for service delivery and packaging of contracts; - maintenance of waste management equipment, and the management of environmental sanitation contracts. An organogram of the Waste Management Department's organizational structure is illustrated in Appendix F.

Also, the Environmental Health and Management Department (EHMD) of the district assembly is responsible for promoting better environmental practices, and protecting the health of the public against injurious environmental nuisances and hazards. Within the metropolitan assembly, their work complements the Waste Management Department's through the implementation of: -environment and health promotion; public education; enforcement of environment and health standards in the metropolis, and monitoring of the environment and environmental sanitation services. At the central government level, the Ministry of Local Government and Rural Development is responsible for: -

introducing legislation that will help enforce environmental health and sanitation laws; - the formulation and reviewing of policies on environmental health and sanitation; - supporting District and Metropolitan Assemblies to set up efficient waste management systems; and removing obstacles and barriers to the employment of efficient waste management systems.

5.2 Dimensions of solid waste generation in Accra and Kumasi

Solid waste generation, as one would expect, varies between countries, cities, and parts of cities thus, reliable data is hard to come by. In Accra and Kumasi, waste is generated from several sources- domestic, commercial, and industrial, and the rates have been increasing steadily over the years. This is likely to continue in the future in view of the rapid growth that these cities are experiencing. The estimation of daily waste generation rates in Accra and Kumasi pose a dilemma for planning because of the inconsistent character of the statistical data that has emerged mainly from government sources over the years. This is a major problem for city authorities in their planning and decision-making around waste management activities, and for researchers too. According to Obirih-Opareh (2001), the clearest indication yet of the quantity of solid waste generated per day in Accra given from three sources, - the Ministry of Local Government and Rural Development, the Accra Metropolitan Assembly, and the Waste Management Department as at July 1999 was 1,200 tonnes per day. Also, Archer et al., (1997:7) estimated the waste generation rate for Kumasi to be between 0.5 – 0.7 kg per capita per day with variations due to the weather seasons, and the social class. Further, Obirih-Opareh (2002:198) based on an estimated population of 18 million and an average daily

waste generation per capita of 0.45 kg, calculated Ghana's annual waste generated to be 3.0 million tonnes of solid waste. Accra, the capital, and Kumasi, the second city with a combined population of about 4 million were estimated at over 3,000 tons of solid waste daily. Through out the field survey, the Assemblies were not able to produce any figures for the volume of waste that was being generated within the cities of Accra and Kumasi. However, there were figures given for the volume of collection in Accra in 2000. Also, since January 2004, there have been weigh-bridges installed at the Oblogo dumpsite in Accra, and the landfill site in Kumasi, thus figures were made available through monthly dumpsite and landfill operational reports on amounts of waste dumped at the dumpsites for the period spanning January to August 2004. Results from analysis made on these monthly dumping reports gathered during the field survey, suggest that the combined average of the amount of solid waste dumped at the landfill site in Kumasi was 570 tonnes per day. Over the eight months period, the Dompoase landfill site in Kumasi took in 113,659 tonnes of solid waste, varying from a low of 12,846 in February to a peak of 18,124 in April. In Accra, the weight is measured in cubic meters rather than tonnes and so presents problems for comparison. The data states a total solid waste collection figure of 628,000m^3, ranging from a high of 67,000m^3 in August to a low of about 42,952m^3 in May.

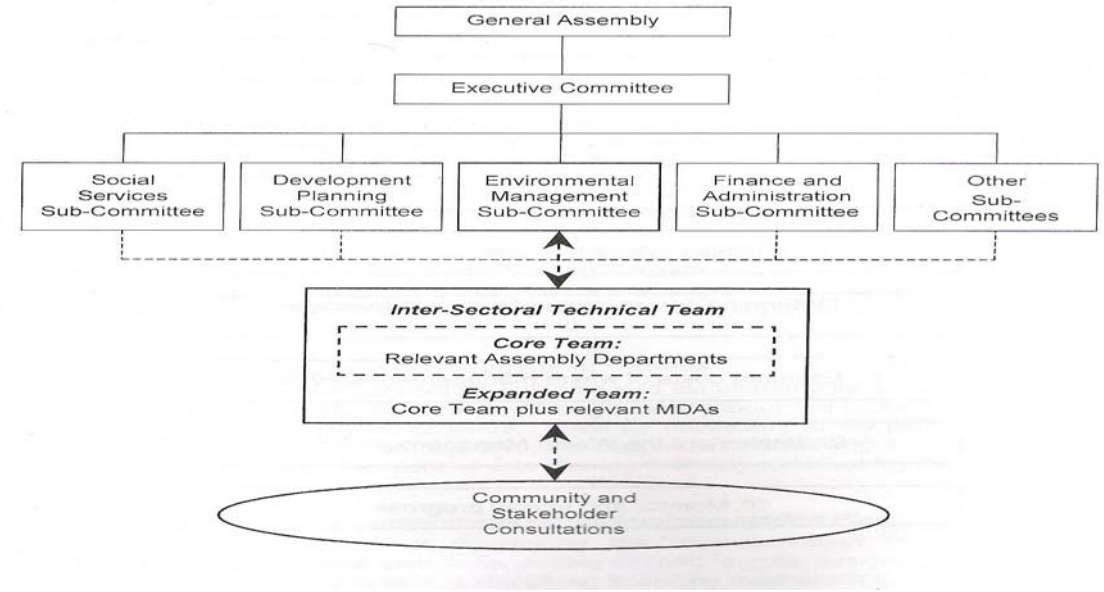
Inconsistencies in data gathering, by way of gaps in the available data, differing metric units of measurement in various cities, pose a big challenge for drawing out a complete picture of solid waste generation in the cities. It was noted in interviews with Waste Management Department officials in both Accra and Kumasi that, getting the exact figures are made even more difficult by the fact that the amounts of waste that are not

dumped in the collection containers or collected by private waste companies, and end up in drains and streams, buried, burnt or even thrown out at illegal dump heaps go unaccounted for.

5.3 The current solid waste planning process and management arrangements in Ghana

Solid waste collection in Accra and Kumasi is organized through various institutional arrangements. An institutional arrangement is defined for the purposes of this study as an enduring and potential pattern(s) or relationship(s) between two or more actors based on a written or verbal agreement and having a concrete, physical manifestation (Obirih-Opareh, 2001: 172). This relationship is expressed in things such as, garbage bins and collection containers, transfer stations, disposal sites, and collection vehicles. There are three main stakeholder categories in solid waste collection in Accra and Kumasi: the private service providers (private waste companies), the served public (residents) and local authorities (government officials). The last group comprises politicians (District Assembly members), administrators, and environmental protection officials who prepare, enforce, and implement policies on waste handling. These groups of stakeholders participate in the planning and management process variously. The waste planning process is depicted in figure 5-2 below as sourced from the *Best practices environmental guideline series No3*.

Figure 5-2: Structure of the waste planning process in Ghana



Source:GOG (2002)

As depicted in the illustrated diagram, the institutional waste management planning structure in Ghana facilitates waste planning through inter sectoral technical teams that work directly through the environmental management sub committee of the Metropolitan Assemblies. In so doing, technical input is provided into the work of the sub committees of the Assembly. The Metropolitan waste management plan is then adopted by the General Assembly, where it gets its approval. According to the Ministry of Local Government and Rural Development (2002), the plan is passed to the Executive Committee for consideration, and then to the General Assembly for final adoption into a working document. The problem with the structure however, is that the waste-planning situation on the ground manifests differently as the survey of institutional arrangements conducted in this study suggests. Various officials interviewed noted that this structure does not account for a clear inclusion of the private waste companies who are responsible

for some 80 percent of the collection of waste in both Accra and Kumasi, and so have become an integral part of the waste management set up. Also noted was the fact that the community and stakeholder consultations set up in the structure, is not pursued in the planning process as it is perceived to delay the process by being time consuming, as such the institutional structure fails to facilitate an effective planning process within which current planning data for waste that encompasses the perspectives of all stakeholders, is included in identifying, and evaluating appropriate management options that can be implemented, monitored, and reviewed effectively.

5.3.1 Collection Arrangements

In Accra and Kumasi, it was observed clear that only two independent variables really matter: - the mode of solid waste collection, and the type of service provider, as there is a correlation between the type of collection arrangement and the socio economic status of an area. This is so because in both cities, there are only two types of service provision: House to House Collection (H/H) and the Central/ Communal Container Collection (C/C).

With the House-to-house collection, solid waste is collected from the various homes, using a skip truck (see Plate 5-1 below). Some 15 franchised private contractors in Accra, and 5 in Kumasi provide the house-to-house service. The companies also have the mandate to collect revenue from these households for the service, based on charges set by the Metropolitan Assemblies.

Plate 5-1: A Skip truck making a house-to-house waste collection run in an Accra Neighbourhood

Source: Field Survey, (2004)

The Central/Communal Container collection service is rendered in areas that either have poor road networks, or are difficult to access for door-to-door service, or are predominantly poor neighbourhoods. For these localities in both cities, the Metropolitan Assemblies either task the Waste Management Department with the responsibility of collection for which residents do not pay, or the Assemblies pay a franchised private waste company to lift the containers. For the C/C collection service, containers are placed at designated sites for residents within an area to take their refuse to, and dump it in it (Plate 5-2).

Plate 5-2: A Central/Communal Container site for residents in Teshie, Accra

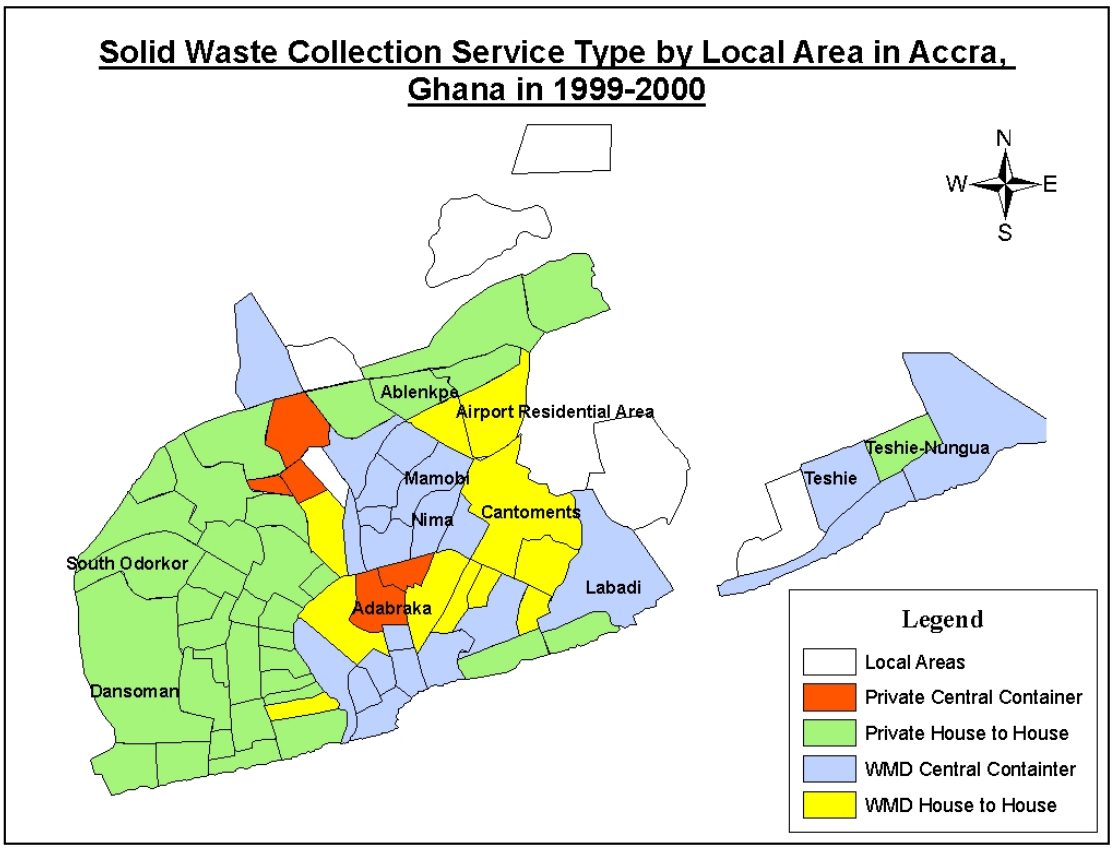
Source: Field Survey, (2004)

These two collection methods are the officially recognized, or formal set ups, because the collection service is run either by the Waste Management Department, of the Metropolitan Assemblies, and, or accredited Private Contractors on a franchise. For the Central/ Communal container service, the contractor provides the containers at the metropolitan assembly's designated sanitary points, which are lifted with multi-lift trucks to the landfill for disposal. The private companies are also tasked with making sure that these sites are clean after lifting. Both services are supervised by the Metropolitan Assemblies in Accra and Kumasi. In the House-to-house system, individual households secure standard size bins that are required, from the private companies who then pick them up at designated times, and carry the refuse to the landfill disposal sites.

In Accra, collection is mostly handled, through the franchise of the 15 Private Contractors all of whom are involved in both House-to-house and Central /Communal container collection. As depicted in Map 5-1 below, domestic refuse is collected in the high income low density populated areas such as Airport residential, and Cantoments by

the House-to-house system, and in heavy populated low income areas such as Mamobi, Nima, Teshie, Adabraka, and Labadi, the Central /Communal collection system is used. In Map 5-1 the service provider by service type is also indicated by colour for e.g. Waste Management Department (WMD) House-to-house-yellow, and Private (companies) House-to-house-green, and so on.

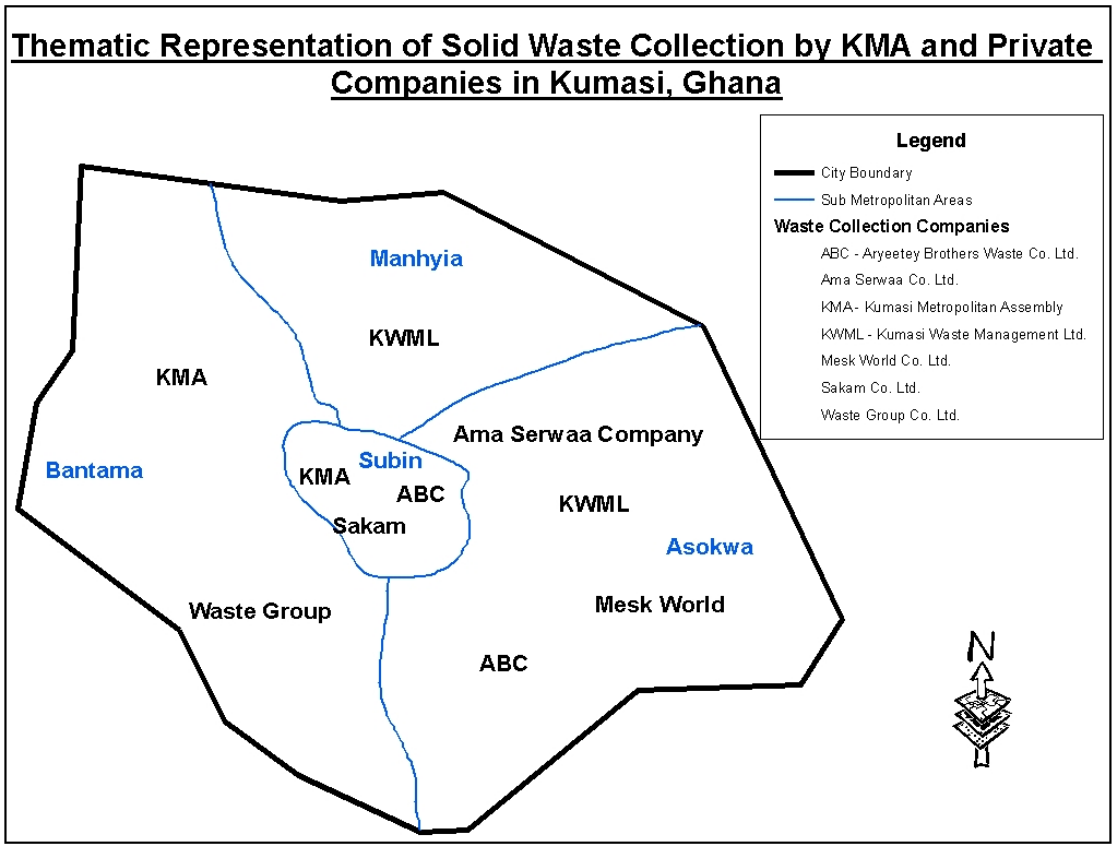
Map 5-1: Solid waste collection services in Accra



Source: WMD/AMA (2001).

In the case of Kumasi, franchised private contractors who have been assigned specific areas, and locality of operation within the city, predominantly do the collection as illustrated in map 5-2:

Map 5-2: Solid Waste collection service in Kumasi



Source: KMA/WMD (2003).

Unlike in the case of Accra where the map clearly shows the service type by service provider, the Kumasi map does not. Instead, it shows which service provider- private waste company or the Kumasi Metropolitan Assembly (KMA) Waste Management Department, operates within each sub-metropolitan area, with Kumasi Waste Management Limited (KWML) in Manhyia, Waste Group Limited, and the Kumasi Metropolitan Assembly (KMA) in Bantama, the KMA, Sakam Company Limited, and Aryeetey Brothers Company Limited (ABC) in Subin, with ABC, Mesk World Limited, Kumasi Waste Management Limited (KWML), and Ama Serwaa Company Limited in the Asokwa sub metropolitan Area. District cleansing officers interviewed in all 4 sub

metropolitan areas stated that all the companies in Kumasi delivered both the House-to-house, and Central/Communal container service.

It must be noted that there is a conflict in policy with respect to the franchising arrangements being used in both Accra and Kumasi in that, in some localities where H/H is assigned there are mixes of C/C so the high income area residents who have been designated to pay for their service, go on to dump for free by either carrying their waste several distances to the C/C site, or they have informal individual waste collectors known as "*Kaayaboola*" (see Plate 5-3 following) who come to their homes to collect the waste in wheel barrows for a nominal fee of between 1000 to 2000 cedis (equivalent to 0.14 to 0.28 cents Canadian), and take them to dump at the C/C sites located in adjoining neighbourhoods for free.

Plate 5-3 A *Kaayaboola* doing his house-to-house runs

Source: Field Survey (2004)

This situation does not make the franchising arrangement with the private waste companies very workable, especially in the middle income localities of the cities, where a mix of service types are provided, because of the inter mix of dense unplanned residential

areas within well planned and accessible areas. Obirih-Opareh also noted this situation in Accra, stating the distinction between formal or officially recognized service arrangements which are either run by the Waste Management Department of the Assembly or its accredited private waste company franchisees, on the one hand, and "the informal individual arrangements that exist for instance in parts of Adabraka where 90% of the inhabitants pay *kaayaboola* to carry garbage to the container sites, and also in Achimota, and Kaneshie where residents pay a small fee of 100 cedis to a *kaayaboola* to keep the site clean" (Obirih-Opareh, 2002:174).

5.3.2 Frequency of Collection:

Ghanaians detest keeping waste in homes and send the garbage out of their homes for dumping. According to a private waste company interview respondent (PWC2):

> At the homes, most people indicate that they are willing for daily collection or twice a week service. This is because of a myth concerning keeping garbage in homes that when one keeps his or her garbage for a long period of time, they invite ill luck and curses into the home, which can cause them and the family to be either very sick or not prosperous. So obviously if people don't want to keep the waste at home, this affects the frequency of collection (Field Interview, 2004).

In both Accra and Kumasi, according to the Waste Management Department solid waste Contractors' Performance Report (2004), the frequency of collection for the Central /Communal container collection is between 1-2 times daily, and for the House-to-house it is 2 times weekly. However, the common theme that emerged with respect to collection frequency from the responses of the Private Waste Companies in both cities is that collection frequency in the operational situation is not always done as required under the

performance stipulation of the report. This is exemplified by the statement here by a private waste company respondent (PWC5) that:

> Even though they are supposed to abide by the stated frequency in the performance report, collection frequency has tended to be fairly ambiguous, as collection has come to be done as often as the private companies can. As such, when the central containers are full, they pick it up mostly once daily except in the highly populated areas, twice because of distance and traffic on the way to the final disposal site (Field Survey 2004).

5.3.3 Technology:

A very important aspect of solid waste management is how waste is transported from various spots to its final disposal site. Various means of transport from wheelbarrows, and pushcarts drawn by donkeys, bullocks, and horses to multi-lift and compactor truck vehicles with complex hydraulic systems are used in both Accra and Kumasi (see: Appendix G), and each has its limitations as well as advantages.[17] According to Obirih-Opareh (2002: 82), "waste management involves the transfer of waste from one location to another, thus careful consideration must be given to what type of transportation option is employed." This is important to note since in both Accra and Kumasi, the mode of waste collection determines the technology used. For instance, in the house-to-house system, the multi-lift trucks, three wheeled tractors, power tillers, and wheelbarrows are used. The private waste companies, and the Waste Management Departments in both cities employ three wheeled tractors, power tillers, and multi-lift trucks, which lift and empty the waste containers mechanically, whiles informal individual waste collectors

[17] See Appendix G for illustrative representations of these various modes for collecting and transporting waste

(*Kaayaboola*) use wheelbarrows to deliver the house-to-house service. With regards to the Central/ Communal container system of collection, the private waste companies, and the waste management departments in both cities provide locally made $3m^3$ sized metal containers at various skip stations (see Appendix H) in markets, and around the city for households in various neighbourhoods for residents to bring their waste to for pick up. Cotton and Franceys (1991) observation that it is important to ensure that the design of communal containers and transfer stations enables the local authority to adopt the most efficient solution, seems to have been applied here by the service providers.

Another important observation, regarding the technology used at landfill sites in Accra and Kumasi, on which there is very little in the literature, is the use of compactor trucks and bulldozer trucks at dumpsites and landfills. In both Accra and Kumasi, in Ghana, these trucks often breakdown and go without repair for months at a time due to a lack of spare parts and or funds. Leading to dumping without compaction, and therefore a shortened life span for the Oblogo dumpsite, and Dompoase landfills.

5.3.4 Disposal Arrangements in Accra:

As in most cases in Africa, land filling in Accra is not done, to the proper scientific and environmentally sound specifications. Presently, an abandoned quarry mine is being used for the disposal of all of the waste generated in Accra. Even though the site has no perimeter banding, according to the dumpsite manager, Mr. Tetteh, a semi permeable clay lining was installed in consultation with the Ghana Water and Sewerage Corporation (GWSC) and the Environmental Protection Agency (EPA) before the dumping commenced. The dumpsite, situated in the community of Oblogo, on the western peri-urban fringe of the city is considered to be an exercise in land reclamation using organic

materials, by the Waste Management Department. The quarry site (Plate 5-4) is about 12 meters in depth from the valley floor in which it is located to surface ground, and is expected to be closed down leaving two meters covered with laterite soil.

Plate 5-4 The Oblogo waste disposal site in Accra

Source: Field Survey (2004)

According to the site manager, the Oblogo disposal site serves as the reception point for solid waste in the whole of the Accra metropolitan area. When the trucks transporting the waste arrive, they are weighed at the entry point before going onto the dumpsite, and also on the way out empty (Plate 5-5).

Plate 5-5: A truck full of solid waste on the weigh bridge at the Oblogo disposal site

Source: Field Survey (2004)

The information on the weight of the solid waste carried is entered into a computer, equipped with information management capabilities for tabulating and collating the amount of waste that gets dumped at the site (Plate 5-6).

Plate 5-6: The weighbridge office at the Oblogo disposal site

Source: Field Survey (2004)

The data gathered from the weighbridge is used for three main purposes: to determine how much waste is dumped at the site by each company so as to facilitate the proper charging of tipping fees, and secondly to confirm the amount of waste dumped by the franchised companies for picking up central communal containers for which the Metropolitan Assembly pays them on a tonnage basis, and also to have a record of the volume of waste coming into the dump with respect to its capacity to hold it. All the billing activities in regards to this take place at the main offices of the Waste Management Department in Accra.

The site is manned by 25 staff members of the Waste Management Department operating 24 hours a day for all 7 days of the week. This consists of signal men on the dump for directing, and on the weighbridge for truck invitation; machine operators for the compactor, dozer and excavator, and an auxiliary section in charge of making access roads on the dumps, as well as water tank truck drivers for checking dust within the area,

and gravelling access roads to the site. As well there is a spraying team that is scheduled to spray the dump, and the surrounding community areas three times a week against mosquitoes, flies, and vermin infestation. There is also security deployed at posts. According to the site manager, Mr. Tetteh:

> Hospital, industrial and institutional wastes are handled differently from solid waste at the dumpsite. In regards to the industrial waste officers are sent to weigh and destroy them for a fee. Hospital waste is buried at a depth of 4 meters at a particular section of the dumpsite, which is excavated for this purpose (Field Survey, 2004).

Peculiar to the disposal arrangements at the disposal site in Accra, is the extensive recycling activity that takes place on the dump. This ranges from as informal an arrangement as a one man scavenger collecting and sorting through the dump for various materials of recyclable value such as hard and soft plastics, vehicle tires, wood pieces and hard metal, to private companies that have negotiated with some of the scavengers on the one hand to either buy the collected recycled materials from them, and on the other hand with the Waste Management Department to allow for them to set up collection and pre processing points on the dumpsite (see Plates 5-7; 5-8; 5-9).

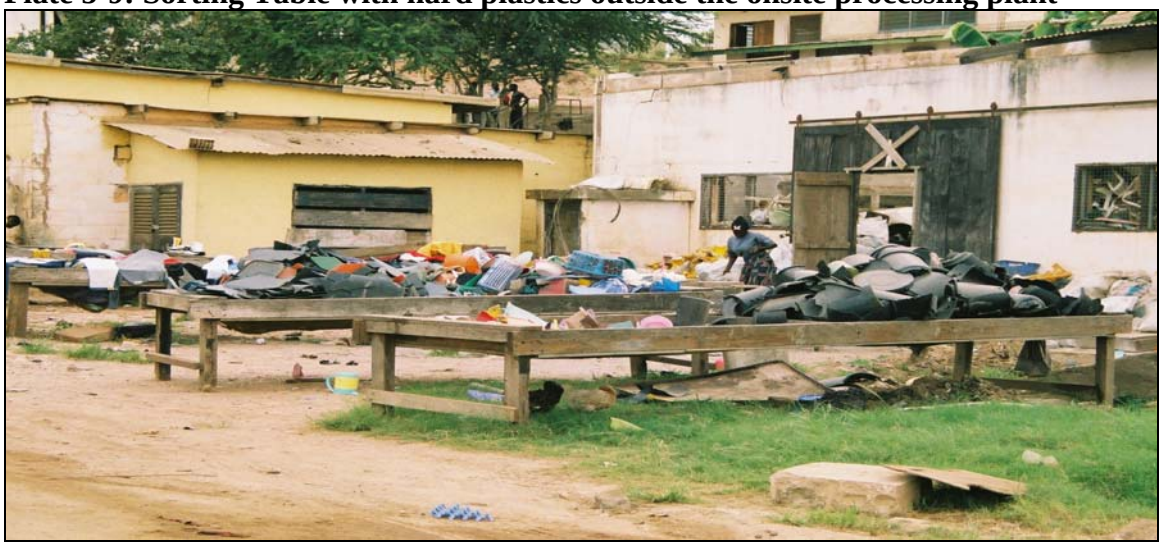
Plate 5-7: Heaps of old slippers sorted out by scavengers at the Oblogo disposal site

Source: Field Survey (2004)

Plate 5-8: Inside an on-site pre processing plant for recycling plastics

Source: Field Survey (2004)

Plate 5-9: Sorting Table with hard plastics outside the onsite processing plant



Source: Field Survey (2004)

According the Waste Management Department officials, these informal scavenging and recycling activities have allowed for more room on the dumpsite for accommodating incoming waste. At the time of this study, there were over 100 scavengers allowed to forage on the dumpsite. Even though there remains no formal registration process, almost all the scavengers know each other.

5.3.5 Disposal Arrangements in Kumasi:

Unlike Accra, in Kumasi, final waste disposal is made easy by the development of a proper landfill site located at Dompoase, under the World Bank financed Urban Environmental Sanitation Project (UESP) at the cost of US$ 4.0 million which was commissioned on January 28, 2004. It has perimeter banding, gravel, and clay lining, and leachate containment and treatment ponds, as well as gas vents for averting methane explosions. In addition waste that is dumped at the site is covered with laterite soil on a daily basis (see Plates 5-10; and 5-11).

Plate 5-10: Leachate containment and treatment ponds and gas vents at the Kumasi Landfill site

Source: Field Survey (2004)

Plate 5-11: Daily Laterite soil coverage applied to waste at the Kumasi Landfill site

Source: Field Survey (2004)

Unlike Accra, scavenging is not allowed. However, trucks are also weighed on their way in and out to determine the amount of waste dumped each day. This data is collated and tracked for the same reasons as in Accra, determining revenue by way of tipping fees, and the payment of fees by the assembly to private waste companies for the collection and disposal of central communal containers in the city.

5.4 Regulations and Legislative Control of Waste Management in Ghana

The main regulatory, legislation, and policy framework for the management of wastes in Ghana are scattered in the following documents: the *National Environmental Policy, 1988,* and *1991*; the *Local Government Act, 1990 (Act 462*); the *Environmental Protection Agency Act, 1994 (Act 490)*; the *National Building Regulations Instrument, 1996 (LI 1630)*; the *Water Resources Commission Act, 1996 (Act 522)*; the *Environmental Assessment Regulations Instrument, 1999 (LI* 1652); the *Environmental Sanitation Policy, 1999*; and the *Consolidation of Criminal Code Act, 1960 (Act 29)*. In addition to the above policies and legislation, the Ministries of Environment Science and Technology, Health, and Local Government and Rural Development have prepared the following guidelines and standards for waste management: the *National Environmental Quality Guidelines, 1998*; the *Landfill Guidelines, 2002*; and the *Guidelines for the Management of Health Care and Veterinary Waste in Ghana 2002.* All these policies and regulations place enormous responsibilities on the Metropolitan and District Assemblies for various operational aspects of waste management including collection, transportation, treatment and final disposal of waste as stipulated in the *Local Government Act, 1990 (Act 462)*. However, both the Accra and Kumasi Metropolitan Assemblies have inadequate material and human resources to handle these tasks; hence private companies on behalf of the Assemblies through franchising agreements are now taking up some of these responsibilities. In light of these private service delivery arrangements, the *Environmental Sanitation Policy (1999)* places an emphasis on private sector participation in waste management operations. The policy allows for up to 80 % of the waste delivery service to be privatized, and with no less than 20 % control held by the public sector (i.e. the Metropolitan Assemblies).

As observed by Mr. G. Ewool in an interview in Accra, the problem with such a regulatory environment is the lack of a consolidation of regulations on waste management in one manageable document, accounting for a fragmented regulatory regime, within which the various agencies and actors are unclear about their regulatory responsibilities and tasks. From interviews with the District Cleansing Officers of the Waste Management Departments of both the Accra and Kumasi Metropolitan Assemblies' it emerged that "it is the Environmental Protection Agency (EPA) of Ghana's responsibility to monitor the dumping of wastes", where as the EPA officials interviewed also state that "their mandate only allows them to act primarily in an advisory capacity" (Field Interviews A3 and EP4, 2004). A private waste company respondent also observed, that," the EPA, are not involved at the service activities, implementation, and delivery levels, but only come in with regards to policy issues" (Field Interview PWC4, 2004).

It is essential to note here that Act 490 which gives the Environmental Protection Agency its legal mandate, does not empower it to take punitive measures against Metropolitan Assemblies, and since the private waste companies that deliver the service are franchisees, to the Metropolitan Assemblies who are by their founding legislative instruments responsible for the collection and disposal of waste, the private waste companies are left answerable only to the metropolitan assemblies. This is a big loop hole in the regulatory system, since it allows for the private service providers to not have to face up to a direct and rigorous scrutiny of their activities, by a proper qualified environmental regulatory body. This weakness of the law is illustrated by the waste

management related functions of the EPA stipulated in the *Environmental Protection Agency Act, 1994 (Act 490)* listed in Table 5-1.

Table 5-1: List of the EPA's waste management functions (Act 490)

To co-ordinate the activities of such bodies as it considers appropriate for the purposes of controlling the generation, treatment, storage, transportation and disposal of industrial waste;
To secure in collaboration with such persons as it may determine the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment
To issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of waste discharges, emissions, deposits or other source of pollutants and of substances which are hazardous or potentially dangerous to the quality of the environment or any segment of the environment;
To issue notice in the form of directives, procedures or warnings to such bodies as it may determine for the purpose of controlling the volume, intensity and quality of noise in the environment;
To prescribe standards and guidelines relating to the pollution of air, water, land and other forms of environmental pollution including the discharge of wastes and the control of toxic substances;
To ensure compliance with any laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance in respect of existing projects;
To act in liaison and co-operation with government agencies, District Assemblies and other bodies and institutions to control pollution and generally protect the environment;
To conduct investigations into environmental issues and advise the Minister thereon;
To promote studies, research, surveys and analyses for the improvement and protection of the environment and the maintenance of sound ecological systems in Ghana;
To initiate and pursue formal and non-formal education programmes for the creation of public awareness of the environment and its importance to the economic and social life of the country;
To promote effective planning in the management of the environment.

5.4.1 Monitoring of the Metropolitan Assemblies' waste management Activities

Even though Legislative Instrument (L.I) 1615, and 1618 task the Accra and Kumasi Metropolitan Assemblies respectively with the responsibility of waste collection, it is the Environmental Protection Agency that has the legislative authority required under Act 490, to monitor waste management "*functions*" in Ghana. Since the Act states that the monitoring of functions is the responsibility of the Environmental Protection Agency, and

not the activities per se, the Environmental Protection Agency has its monitoring role limited to finding out if the Metropolitan Assemblies have in place some form of arrangements for the collection and disposal of solid wastes. As to the environmental appropriateness of such arrangements, they only give guidelines and advice, and do not take any punitive steps, as the Act does not give them such power. Thus, the Environmental Protection Agency has since its inception in 1994, focused its attention on the following six activities for dealing with waste management issues in the metropolitan areas of Ghana:

1. Preparing guidelines and setting standards for use in handling waste;
2. Administering environmental assessment regulations;
3. Conducting environmental education and awareness programmes;
4. Monitoring environmental quality, principally by air quality tests;
5. Investigating complaints on the environment; and
6. Compliance and enforcement.

In line with these efforts, and legal mandate, the Environmental Protection Agency has instituted a monitoring system of sorts, whereby specific Environmental Inspections Officers (EIO) from the agency, are made responsible for each of the Accra Metropolitan Assembly and Kumasi Metropolitan Assembly's sub Metropolitan Districts. These inspectors are supposed to pay regular weekly visits to the respective sub metropolitan area assigned them, and conduct surveys and investigations in collaboration with the Waste Management Department officials of the sub metropolitan area. However, inadequate staffing has hampered this program as much as a lack of cooperation between

the two actors, a theme that emerged from interviews with Environmental Protection Agency officials, in Accra and Kumasi that: “due to a lack of manpower and in some cases poor cooperation from the assemblies, these visits are now done sporadically, sometimes once a month, or even not at all, and in most cases only when, there is an environmental health crisis, or when the metropolitan assemblies request help or advice in dealing with an issue that has arisen” (Field Interviews EP1, EP2, EP3, and EP5; 2004). Consequently, the poorer neighbourhoods in both Accra and Kumasi have tended to become more severely affected by environmental health incidences due to solid waste collection and disposal activities as, central/ communal waste collection sites which by the nature of the service delivery type tend to be mostly situated in low, and some middle income areas with poor spatial organization of houses, which lack access roads, tend to be poorly managed, and produce obnoxious odors, and regularly catch fire causing smoke nuisance within the neighbourhoods of location. Also, solid waste is easily dumped into open spaces or drains leading to the blockage of drainage channels forming vector-breeding sites. In addition, a lack of domestic sanitation and over reliance on public toilets in these neighbourhoods, leads to children and some adults defecating around communal container sites at night, as well as the discharging of pan latrines, and septic tanks into communal containers, leading to contamination and typhoid outbreaks.

5.5 Financial viability of the solid waste service delivery systems in Accra and Kumasi.

One of the most difficult decisions facing the metropolitan assemblies in the provision of waste management services in Accra and Kumasi is how to fund the operational and capital costs of the service. These typically outstrip the total revenue of the Assembly,

which means that user charges and other fees are necessary considerations for the sustainability of the service. However, given the public health importance of waste handling activities, and the poor financial capability of both the Accra and Kumasi Metropolitan Assemblies in handling activities like public cleansing which cannot be directly charged for, funds have to be generated to compensate for the shortfall (Obirih-Opareh, 2002). As such, over the years, a number of financing sources have had to be sought, mainly: user charges, and pollution charges. These have been applied to the following services provided by the Assemblies: house-to-house solid waste collection, central/ communal container solid waste collection, termed as the "*Pay-As-You-Dump*" (PAYD) system by the assemblies, and dumping and dislodging charges at the cities' respective disposal and landfill sites.

Evidence from the field survey shows that presently, both the Accra Metropolitan Assembly, and Kumasi Metropolitan Assembly have established a complex financial system for funding the delivery of the service. This essentially comprises two contract types with the private waste companies who render the collection and transportation services. For areas zoned for house-to-house collection (predominantly high income with a few middle income) the residents pay (polluter pays fee principle) through franchise agreements. As part of this arrangement, the private waste companies are also tasked with the responsibility by the Assemblies, to recruit residents and businesses for the service, and to collect fees from them for the services rendered, even though it is the Assembly that has the mandate to, and sets the fee rates that are charged for the services rendered. A private waste company respondent (PWC7) asserts this in an interview, stating that:

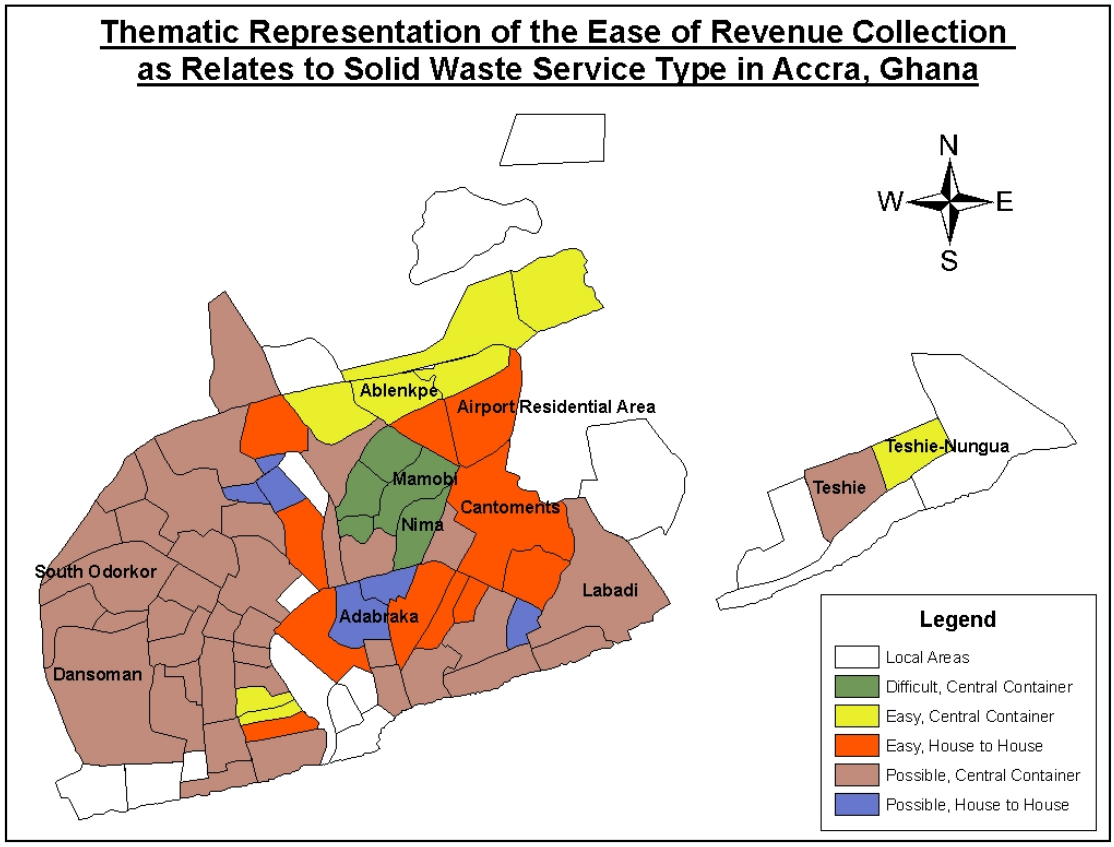
> House-to-house revenue collection is done through registration. Our teams go out and forms are used to register the houses, and then there are revenue collectors who go round to collect revenue. Clients provide their own containers for refuse, and service days are days of collection. The Assembly sets rates, we do not input. They look at the financial situation and assume the rates based on income level perception without any consultation of us the contractors, a take it or leave it situation (Field Survey, 2004).

Secondly, according to waste management officials interviewed in Accra and Kumasi, the Assembly assumes the financial responsibility for the central container service, as a "public service responsibility", because this service type covers predominantly the low income areas of the city, which are also high in population density, inaccessible, and impossible to access for revenue collection in relation to the delivery of the service. This situation is reflected in Map 5-3, an overlay of an assessment of the ability to collect revenue in relation to the service type in Accra.

As depicted on the map, the low-income areas of Nima, and Mamobi indicate a characteristic of difficult with respect to revenue collection, and as such a corresponding central/ communal container service type. The high-income areas of Airport Residential Area and Cantonments also reflect an easy revenue collection characteristic corresponding to a House-to-house service type. Other areas, Dansoman, South Odorkor, and Labadi, are served by the Central Communal container service, and indicate revenue collection possible. These areas are a mix of low and middle-income localities, as such some parts are accessible where as others are not. The same is the case for Adabraka, a

mix of low and middle-income areas with accessible localities served by house-to-house service. In the case of Adabraka, spatial accessibility may not be the key difficulty, but rather the ability to afford a house-to-house service.

Map 5-3: Ease of revenue collection in relation to solid waste service type in Accra



Source: Field Survey (2004)

For the lower-income areas' central/ communal containers service, the Assembly pays the private waste companies fees that it has set, to haul the containers to the final disposal sites. According to a private waste company respondent (PWC7):

> Revenue collection is done by our self by house-to-house, and for the central container it is paid for by the Assembly. For the Central Containers we are paid by tonnage, a fee of 60,000 cedis per tonne (as at 2001); a very unfair rate as it,

> doesn't take cognizance of price hikes and inflation; and even they are unable to pay the 60,000 cedis so a raise will still be problematic as a response to this situation (Field Survey, 2004).

These financial arrangement types are fraught with some challenges for the private waste companies, as the Assemblies have struggled to meet their financial obligations under the arrangement, leaving a lot of the private waste companies penniless and on the verge of bankruptcy, as they go for an average of 6 to 8 months without receiving any money for the central/ communal container services rendered. The Assemblies seem to always be paying the arrears for services rendered, a situation that does not augur well for the financial sustenance of these service arrangements. Even where the private waste companies have to rely on the revenue generated from rendering house-to-house service to finance their operations, they are still found wanting, as the recruitment situation is not all too encouraging. For instance in Accra, according to the Waste Management Department Monthly Performance Report on solid waste contractors, a total of only 11,741 houses out of 131,355 total houses in Accra were registered by all 15 private companies; ranging from a high of 2,602 houses by Mesk World Company Limited to a low of 206 by Yafuru Company Limited as of August 2004. There is no law mandating residents to sign up for a collection service, thus the private waste companies are left to cajole residents into signing up with them for collection, once the company has been assigned a zone by the Assembly. A situation that has made service provision costs prohibitive, as in most instances, when collection runs are made, a street in the neighbourhood being serviced may only have 5 households on it that have signed up for the collection whereas on the next one all the houses might not be subscribed. In the

former instance, these houses tend to be scattered within the area and so do not facilitate an easy and direct collection run for the collection trucks; thus, adding up to operations costs through the capacity inefficiencies created.

According to a private waste company official (PWC2):

> Even though the assembly has by-laws to prosecute customers who default, they fail to do so. As such when service is suspended for lack of payment as a last resort to get defaulting clients to pay up, the clients just decide if they want to continue or not with the service. In most cases, they discontinue the service and take " kaayaboola" to take their waste for cheap. Even so, our rates vary based on the area designation. For 2004, 46,000 cedis per month was the official rate for the middle-income areas, but we continued to collect 25,000 cedis per month (the 2001 rate) in the face of the irregularity of our services due to operational problems. The assemblies are totally insensitive to our precarious financial situation as they raise the fees arbitrarily because they do not have the responsibility for collecting the fees set at these rates (Field Survey, 2004).

It was also observed that the Payment from the Assemblies to the private waste companies for central communal container waste collection services rendered has not been always regular, even though they have been presently making attempts to pay some amount of the monies owed the private companies for the services every month. Hence, both the Accra Metropolitan Assembly and Kumasi Metropolitan Assembly have arrears owed to most of the private waste companies varying in sums up to the volume of waste collected, by each company. This is evidenced by several news media reports on this situation, for example the Daily Graphic report in the June 4th, 2002, metro section of the

paper titled: "*Non payment frustrates private contractors"*, detailed the difficulties the Accra Metropolitan Assembly was facing with respect to paying private waste companies for their service. The article quoted the Greater Accra Regional Chairman of the Environmental Service Providers Association, (ESPA) an association of the private waste companies operating in Accra in stating that, "the Accra Metropolitan Assembly owes the Association's members more than 10 billion cedis (equivalent to Cdn$1.429million) in arrears for a period of six months for central communal waste collection services, a situation which he said had placed severe financial constraints on members of the Association". It was further emphasized that even a restructured payment agreement under which the AMA was to make payments in installments calculated on a rate of 60,000 cedis per ton for only 30,000 tonnes (i.e. 1.8 billion cedis; equivalent to Cdn$ 257,142) per month of the total amount owed until all the areas were met could not be adhered to by the Accra Metropolitan Assembly.

Rates set by the assemblies for house-to-house solid waste collection service varies according to the size of containers. However due to the difficulty of recruiting and keeping clients who pay regularly for the service rendered, most of the private companies have stated in the interviews that they employ their "local knowledge" of their area of assignment, and its inhabitants, to set the level of their charges to be collected by their revenue officers. These rates vary from a low of 25,000 cedis (Cdn$3.57) to the official rate of 35, 000 cedis (Cdn$5) for a 120 litre container, and 78, 000 to 80,000 cedis (Cdn$11.14 to Cdn$11.43) for 240 litre container per month. The 1100 litre, $3m^3$, and $10m^3$, containers are usually used for commercial and industrial companies, so the private companies negotiate on a one on one basis with the respective company. It is worth

noting that in all these cases, the private waste companies conform to the Assembly's standard rates, and when they do not conform, they write to inform the Assembly through the Waste Management Department. According to the Operations manager of a private waste company interviewed, (PWC6) the use of the local knowledge of an area with respect to tackling fee charges and collection is very important, since:

> Fee recovery is challenging and depends on business; if you find that the areas that you charge they pay, then it is better to charge a smaller fee for that area and get something back than nothing at all. Also there are informal collectors (kaayaboola) who go to these houses on a daily basis to collect waste for as little as a 1,000 cedis and so the residents then make rational choices and this also affects our getting of people to pay or subscribe to the service, so we go to all lengths, and have resorted to strategies like going from house to house and then count the number of inhabitants, and assess charges for the service on a per head per month basis (ranges 5,000; 10,000 to 12,000), depending on our knowledge of their affordability, which is based on the experiences gathered by our staff through their engagements with the inhabitants of the area. So even though the assembly may designate an area as a middle or high income area, we find that the inhabitants there actually do not have the level of affordability designated to them by the assembly's rate charge (Field Survey, 2004).

It is obvious that much of the efforts of city authorities in Accra and Kumasi have been focused mainly on the collection service type provided, and disposal activities of the waste management system, which by themselves pose formidable challenges. According to Ewool (2004), nearly 80 % of the cost of solid waste management in Accra and

Kumasi can be attributed to collection activities alone. In addition to the collection cost, which average about ¢75,000 (Cdn$10.71) per tonne, it is estimated that the current disposal arrangements cost the Assemblies about ¢15,000 (Cdn$2.14) per tonne to manage. These expenditures cannot be deferred, as it very quickly results in accumulation of waste in the streets, public outcry and disease, and yet in most cases they are far in excess of the internally generated revenues of the Accra and Kumasi Metropolitan Assemblies (Ewool, 2004: 11). Table 5-2 outlines the estimated costs per tonne of waste collected by service type.

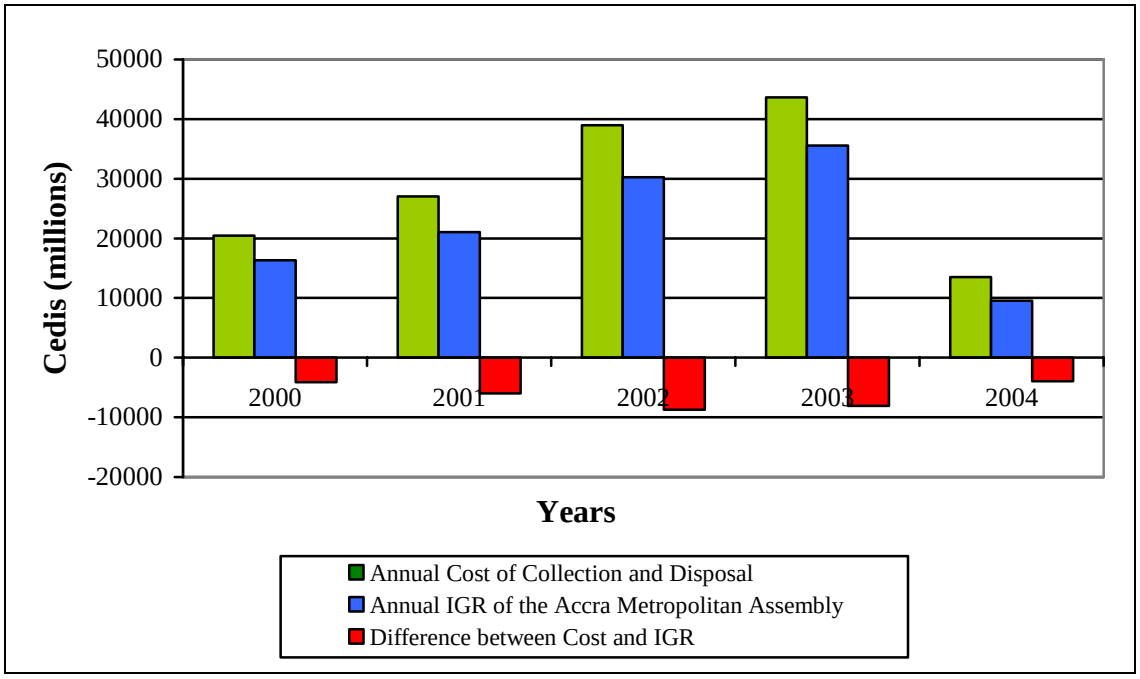
Table 5-2: Estimated costs of solid waste collected by service type in both Accra and Kumasi

Collection method	Estimated Cost per tonne	Comments
House to House	¢80,000 (Cdn$11.43) /tonne	Preferred but expensive. Feasible if high cost recovery can be achieved.
Central Communal Containers	¢50,000 (Cdn$7.14) /tonne	Provision of communal containers without regular collection results in the container sites turning into uncontrolled dumpsites, thus regular collection service is imperative.
No collection	Nil	Uncontrolled refuse dumps develop in open spaces when no provision is made for collection.

Source: Ewool, 2004: 11

Hence, a comparison of the annual cost of collection in the cities' of Accra and Kumasi, with the total annual Internally Generated Revenue (IGR) of the respective Assemblies is relevant in understanding the financial viability of the solid waste collection approaches in place. Figures 5-3; and 5-4 following are a graphical representation of a comparison of the annual collection costs with revenues generated internally, i.e. from market tolls, property rates, and other sources that exclude central, government grants and revenue, by the Accra and Kumasi Metropolitan Assemblies respectively.

Figure 5-3: Comparison of annual cost of waste collection service with internally generated revenues by the Accra Metropolitan Assembly (AMA)

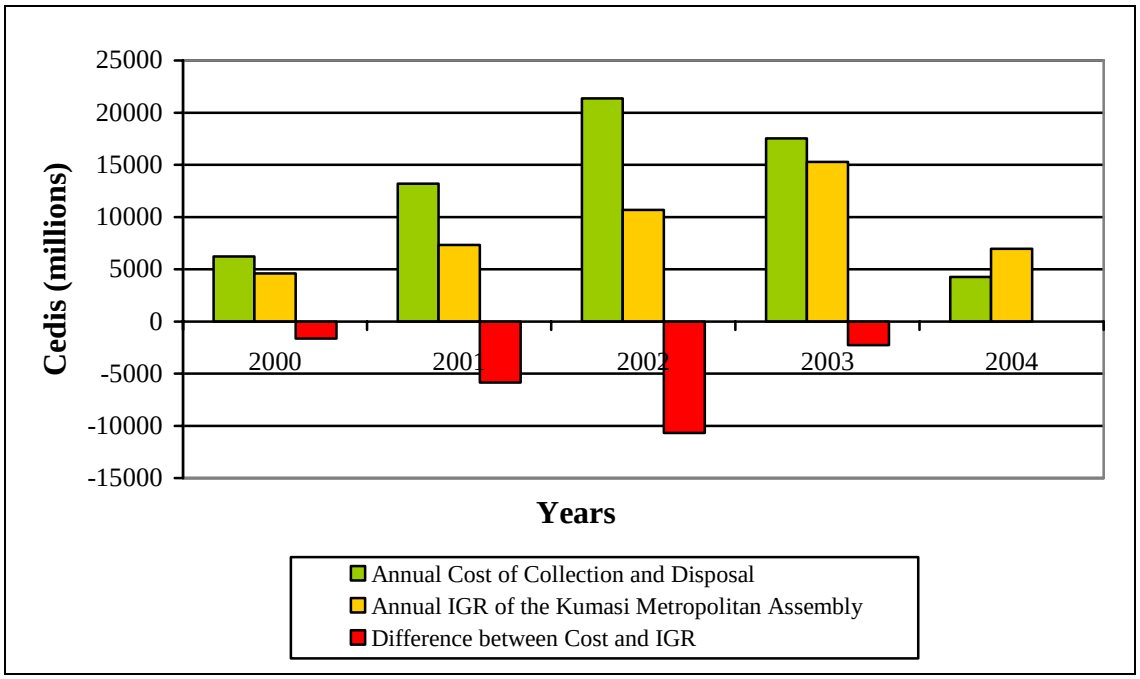


Source: Ministry of Local Gov't & Rural Development, and Accountant Generals, Dept. Annual Reports

As Figure 5-3 shows, the Accra Metropolitan Assembly is financially constrained, since its annual costs have exceeded its internally generated revenue successively from 2000 to 2004, an indication that the Assembly finds itself in a position of spending way more than it generates internally on solid waste collection and disposal. For instance, the total internally generated revenue of the Accra Metropolitan Assembly in 2002 was 37 billion cedis, (Cdn$5.29million); while, its internally generated revenue was 30 billion cedis (Cdn$4.29million), these funds are to be used to attend to the Assembly's various responsibilities such as health education, liquid waste services, infrastructure maintenance, and salaries. The shortfall between the costs and revenue was 7 billion cedis (Cdn$1million). However, with almost 2 million people in Accra, the internally generated revenue is not adequate to be able to maintain the necessary services,

especially when the Accra Metropolitan Assembly spends well in excess of its internally generated revenue amounts on solid waste management alone. According to Waste Management Department estimates, only about 60 % of the solid waste generated in the city is collected and disposed off despite the high proportion of funds required for waste management activities.

Figure 5-4: Comparison of annual cost of waste collection service with internally generated revenues by the Kumasi Metropolitan Assembly (KMA)



Source: Ministry of Local Gov't & Rural Development, and Accountant Generals, Dept. Annual Reports

In the case of the Kumasi Metropolitan Assembly, Figure 5-4 above shows that internally generated revenues also fell way short of the cost of collection and disposal of solid waste between 2000 and 2003. However in 2004, the internally generated revenue was 6.9 billion cedis (Cdn$985,714); while, the costs were 4.6 billion cedis (Cdn$657,142), the only year in which revenue exceeded costs by 2.3 billion cedis (Cdn$328,572). Such

financial insolvency hinders the ability of the Assembly to effectively deliver the waste management services that it is mandated to.

5.5.1 Cost Recovery:

Attempts at cost recovery for the service have been very poor. In highlighting some of the difficulties faced with operating the collection service and being able to collect user fees to fund their activities, the General Manager of Golden Falcon Waste Company, stated that:

> The AMA sets the user fee rates irrespective of the appropriate costs of fuel. So the prices for delivering the service are not economic, because they are set and projected based on subsidized fees. Also not all people in the residential areas where we offer the house-to-house service subscribe due to lack of a by-law that makes this mandatory. For example, when we ran a route for collection, you could end up picking just 2 people's garbage on one street and then have to pick the next up at 500 meters away. This really kills our operations cost wise (Field Survey, 2004).

This observation is corroborated by the response of the Managing Director of Almanuel Waste Company Limited that:

> People refuse to subscribe to be franchised for the House-to-house collection service because of the once weekly service and choose to use the "kaayaborlas" who are cheaper, but in turn dump the wastes they collect from the households into our Central Containers. For instance; we have power tillers and they use 30,000 cedis of diesel a week but for the trucks we spend 300,000 a day on fuel

> alone, but the use of power tillers in an attempt to counteract losing the little business that we have to the "kaayaborlas" is proving problematic due to a lack of adequate transfer sites (Field Survey, 2004).

Evidently, the cost of operation by way of equipment and fuelling are playing a key role in cost recovery as they hamper the frequency of collection, which in turn generates apathy from residents towards subscribing for the collection service from households. The situation is no different in Kumasi, where equipment holding is also very expensive, and acquisition and maintenance have been observed as key factors influencing cost. The Operations Manager of ABC Waste Company Limited who are operators in Kumasi, observed that:

> In the face of these challenges, there is a need for the community's involvement in funding the service provided. It is very important because without this we the private companies will never be financially sustainable, since relying solely on the metropolitan assembly's funds will lead to an eventual collapse. Cost recovery through charging for garbage services is a must, and could probably be encouraged as an add-on through property rates (Field Survey, 2004).

Reechoing this point, a respondent from the Kumasi Waste Company Limited noted:

> Indebtedness is common for the private waste companies due to the fact that in 2001 after a wholesale allocation of franchises to private companies was done in both Accra and Kumasi for collecting waste, only meager amounts of the monthly bills were paid from 2001 July until late November 2003, when a lump sum was paid to cover about 9 months, in arrears, but this year (2004) no such lump sum

has been paid, so only regular monthly part payments are being made whiles we are still owed several amounts of money by the Assemblies. So cost recovery is not very current, at the moment the central government has intervened to put in place a mechanism to pay what is due us, about a quarter of the outstanding monthly bill and then close to the end of the year there will be a lump sum added (Field Survey 2004).

Also in Accra, the Operations Manager of Daben Cleansing Limited, stated that:

> "Financial solvency is a big issue for us. For instance for the central container services rendered that the Metropolitan Assembly has to pay for, we are given a constant figure of 50 million cedis where as for instance our bill for September 2004 alone stands at 198 million cedis of which we are only sure to get the 50 million cedis. Our monthly expenditure is at about 120-140 million cedis, and our monthly fuelling costs for our trucks alone is almost close to their 50 million cedis. We are only able to stay solvent through our House-to-house services or else we would have been out of business. For the delivery of the House-to-house collection, our areas of responsibility are the Kpeshie area; Labone; Cantonments; Teshie; La and Nungua; and Spintex Road, which are all high-income residential estates, so they are keen on subscribing to the service. Also, our workers try to identify new clients, and our revenue collectors collect our user fees on a monthly basis. Some of the residents opt for a quarterly basis option, especially in the Labone, and Cantonments area. Also in these areas, our commercial sector clients, led by the 5 star La Palm Beach, and Manet Hotels assure us of prompt and good payment about 6.5 million cedis monthly, so we are lucky in those respects, which

> enable us, to stay solvent. But not all the companies are as fortunate; most of our colleagues go for over 6 months without any money coming in for the services they render. I know for a fact that some companies owe the banks in the hundreds of millions and even their equipment and all their assets have been used up as collateral. It is a very bad situation (Field Survey, 2004).

5.5.2 The Pay-As-You-Dump (PAYD) System:

This system was introduced for the first time in 1985 by the Accra Metropolitan Assembly and was later adopted for use by the Kumasi Metropolitan Assembly. The waste management authorities under the pay-as-you-dump arrangement, required people being served by the central/ communal container system to pay a fee in order to dump their waste in the central containers located within their neighbourhood. The arrangement was unsuccessful, as patronage of the service dropped off considerably as users resorted to dumping their wastes illegally into open drains, gutters, or burying them in their backyards, rather than take them to the central collection points and pay for them. This failure can be said to be due to the fact that this service type was predominantly employed in low income neighbourhoods, where inhabitants could either not afford to pay even the smallest amounts charged, or chose to dump illegally since they could get away with that due to a lax regulatory system to either curtail the practice or deter them. To compound this situation, the staff stationed at the container sites to collect the fees from service users often embezzled the monies according to a Waste Management Department official interviewed in Accra, hence by 1995 a decision was taken by the

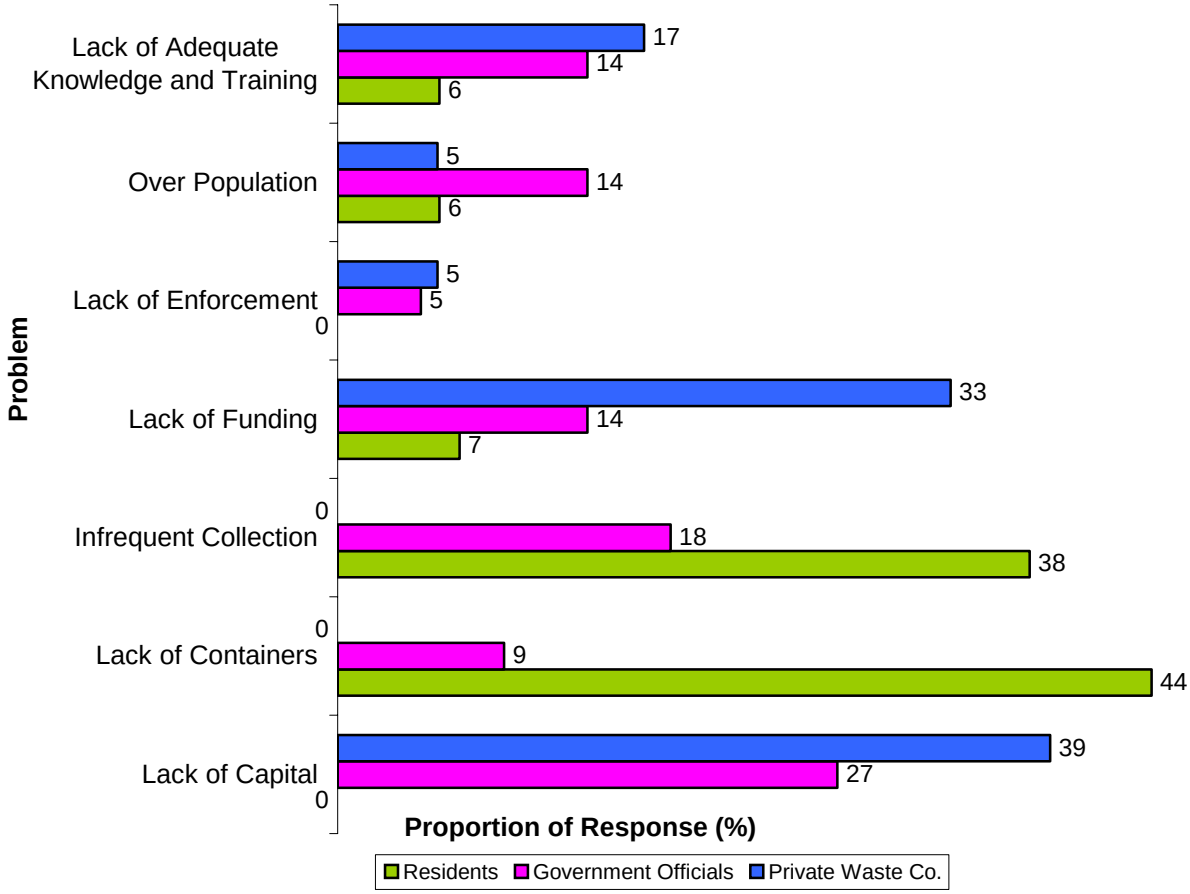
Ministry of Local Government and Rural Development to abandon the policy, since it had failed to yield the required revenue to sustain the provision of the service, and also led to some severe environmental degradation and deterioration in sanitation.[18]

5.6 Problems identified by residents, private waste companies, and government officials with the current solid waste management arrangements in Accra, and Kumasi

In total there were seven main problems identified from the surveys to be associated with the current solid waste management practices in Accra as follows: lack of containers, infrequent collection, lack of capital, lack of funding, lack of adequate knowledge either for residents in proper waste handling practices or government officials, and private waste companies in training, the lack of enforcement capabilities, and increasing population (Figure 5-5). These problems identified from the interviews focus on dealing with current management issues.

[18] During this period of time over 105 illegal dumping sites were discovered scattered all over the city of Accra, whilst in Kumasi several waterways such as the Subin River were found to be engulfed in waste, illegally dumped by inhabitants. Daily newspaper headlines of the period vividly portrayed the issue: *"Garbage drowns Accra…as AMA faces cash problems"* People's Daily Graphic, February 19th, 1995; *Accra to be swallowed by refuse?"* People's Daily Graphic, February 4th 1993; *"Refuse mountain (mounting) at Sukura"* Ghanaian Times, February 19th 1991; and "*Residents want refuse cleared*" People's Daily Graphic, March 23rd, 1990.

Figure 5-5: Problems with the current solid waste management services identified by respondents in Accra, Ghana



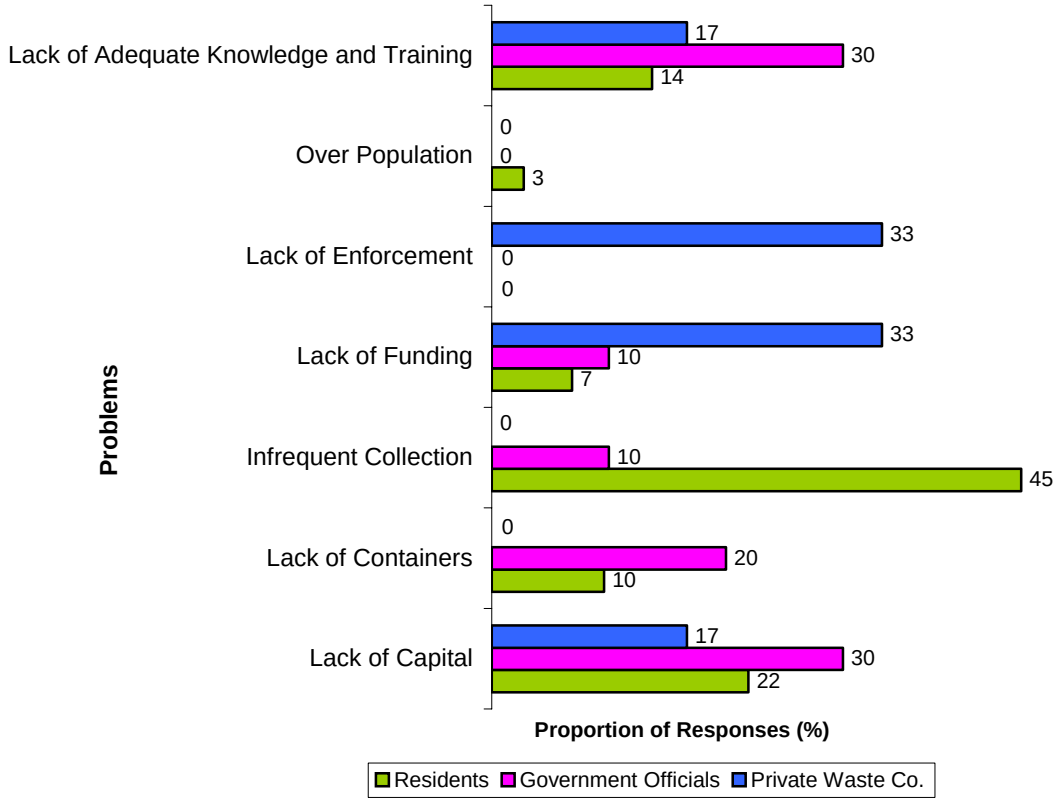
Out of the seven identified problems, most of the residents in Accra identified the lack of containers, 44% (40/90), and infrequent collection, 38% (34/90), as main problems. None of the private waste companies, and only a few of the government responses, 9% (20/220), acknowledged the lack of containers as a problem; whilst, they showed significant concern-18% (40/220), of their responses (the 2nd highest proportion)-for the infrequent nature of collection.[19] The responses of the residents reflect the problems with solid waste in the city at the level of the individual, whereas the government and private

[19]Total number of responses per question varies because of the open-ended structure of the questionnaires, which allowed for qualitative data, and did not limit the responses given by the respondents. This allowed for multiple responses by some and single or no responses by other respondents per question. Therefore the proportion of themes was generated using the Nvivo® software based on the number of times a coded theme was identified over the total number of responses for each question.

companies tend to have focused on the citywide scale of issues, i.e., lack of funding 14% (30/220), and 33% (86/257) respectively, and lack of capital, 27% (60/220), and 39% (100/257) respectively as what is rendering service delivery unsuccessful. The private waste companies and government officials noted both issues in the highest proportions. This suggests that enough capital, and adequate funding are the biggest constraints to the delivery of efficient solid waste collection services in Accra. The lack of knowledge of the public in proper disposal practices, and of the private waste companies, and government officials in training, were also acknowledged marginally more by private waste companies, 17% (14/257), than government officials' responses, 14% (30/220), indicating that this is another hindrance to the implementation of effective service delivery strategies. There was only a 5% response acknowledging lack of enforcement by both the private waste companies (14/257), and government officials (10/220). This could be because of the lack of clarity with respect to the regulatory and legislative environment discussed in preceding sections. Increasing population was identified by 14% (30/220) of the government responses, 5% (14/257) and 6% (5/90), respectively, for the private waste companies and residents. It is clear that overpopulation is recognized as a problem through its emergence as one of the theme category of responses, as more people leads to more waste being generated, placing increased strain on services.

In the case of Kumasi, which is presented in Figure 5-6, the same seven themes emerged as the key problems identified by the three stakeholder groups interviewed, the residents, private waste companies, and government officials.

Figure 5-6: Problems with the current waste management service arrangements identified by respondents in Kumasi, Ghana



In this case, lack of enforcement, 33% (2/6), and lack of funding, 33% (2/6), were the top two identified problems by the private waste companies, and lack of capital, 17% (1/6), and lack of adequate knowledge and training 17% (1/6), were the only other two problems identified by the private waste companies. The government officials also, noted a lack of capital, 30% (3/10), and a lack of adequate knowledge and training, 30% (3/10), as their top most problems. The lack of containers was also noted at 20 % (2/10) of responses. Notably, none of the government officials indicated lack of enforcement as a problem in Kumasi, suggesting either their lack of understanding or clarity around their role or responsibility with respect to the enforcement of legislations and regulations on waste activities. It may also be that it was not mentioned to avoid implicating themselves.

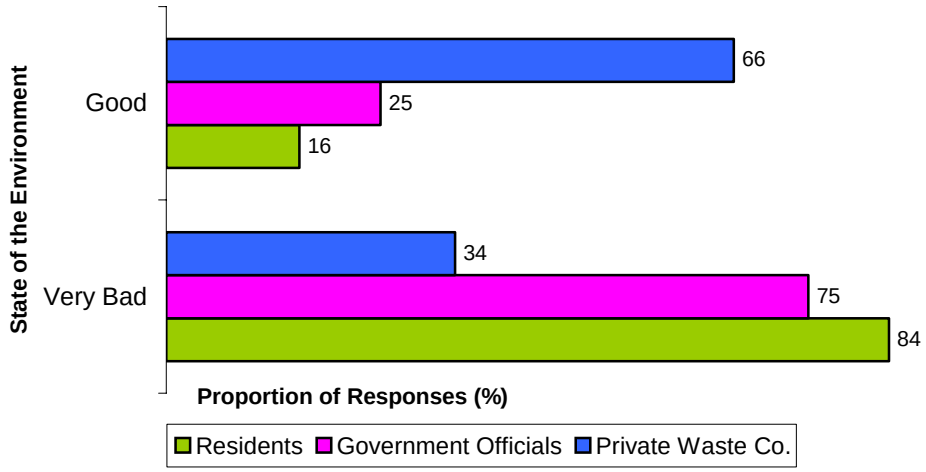
Further, only a negligible 3% (2/73) of residents' responses suggested overpopulation to be a problem, an issue not indicated by both the government officials, and private waste companies. For the residents, infrequent collection was identified as the biggest problem- 45% (33/73) of responses, and then 22% (16/73) also indicated a lack of capital, suggesting that amongst the residents of Kumasi there is a reasonable level of awareness of the difficult financial situation regarding the management of their waste. Only, 10% (7/73) of the residential responses indicated a lack of containers as a problem.

Also, notable is the fact that corruption did not emerge amongst the themes identified by the respondents as a problem in both Accra, and Kumasi. This is significant because prior to the current privatization arrangement, corruption was stated extensively in the literature (see: Anku, 1997; Annor and Schweizer, 1996; Porter et al., 1997, and Post, 1998, and 1999) as a key problem particularly with revenue collection and cost recovery with respect to the delivery of solid waste services in Accra and Kumasi. However the absence of corruption among the key problems identified here by respondents in both cities, is consistent with findings in the recent post privatization of solid waste management arrangements literature (see: Adarkwa and Post, 2001; Ewool, 2004; Obirih-Opareh, 2002; and Obirih-Opareh and Post, 2001), which suggest that the privatization of both revenue collection, and cost recovery have resulted in the nullification of opportunities within the public sector for the embezzlement of these funds.

5.7 State of the natural environment in Accra and Kumasi

With infrequent collection, and the lack of containers noted as significant problems with the solid waste services in both Accra, and Kumasi, it is important to understand the effect this has been having on the natural environment in both cities. Overall, a greater proportion of the private waste companies' responses, 66% (57/86), than that of government officials, 25% (15/60), and the residents, 16% (14/90), recognized that the natural environment was in a "good" state in Accra (Figure 5-7).

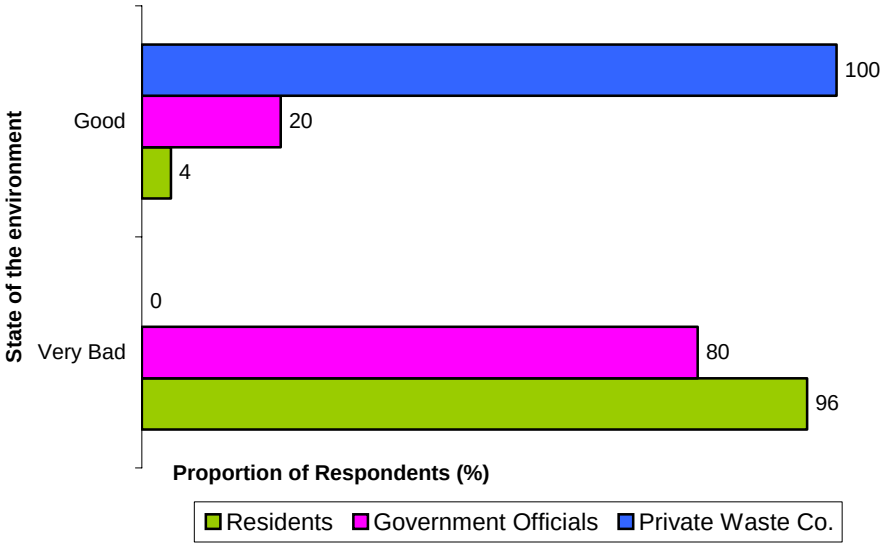
Figure 5-7: State of the natural environment in Accra, Ghana as identified by respondents



It is notable that, the overwhelming majority of the residents, and government officials' responses indicate that there is a negative effect on the environment as a result of the solid waste services in the city. An overwhelming proportion, 84% (76/90), of the responses of residents, and 75% (45/60) of government officials' responses, described the nature of the environment to be in a "very bad" condition.

In Kumasi, the situation with the state of the environment is no better. The perceptions of the stakeholder groups interviewed (Figure 5-8) show that, the overall majority of the proportion of respondents for the residents, 96% (91/95), and government officials, 80% (80/100), overwhelmingly see the environment as being in a "very bad" condition, with the exception of the private waste companies, 100% (5/5), who overwhelmingly state that the surrounding environment is in "good" condition.

Figure 5-8: State of the natural environment in Kumasi, Ghana as identified by respondents



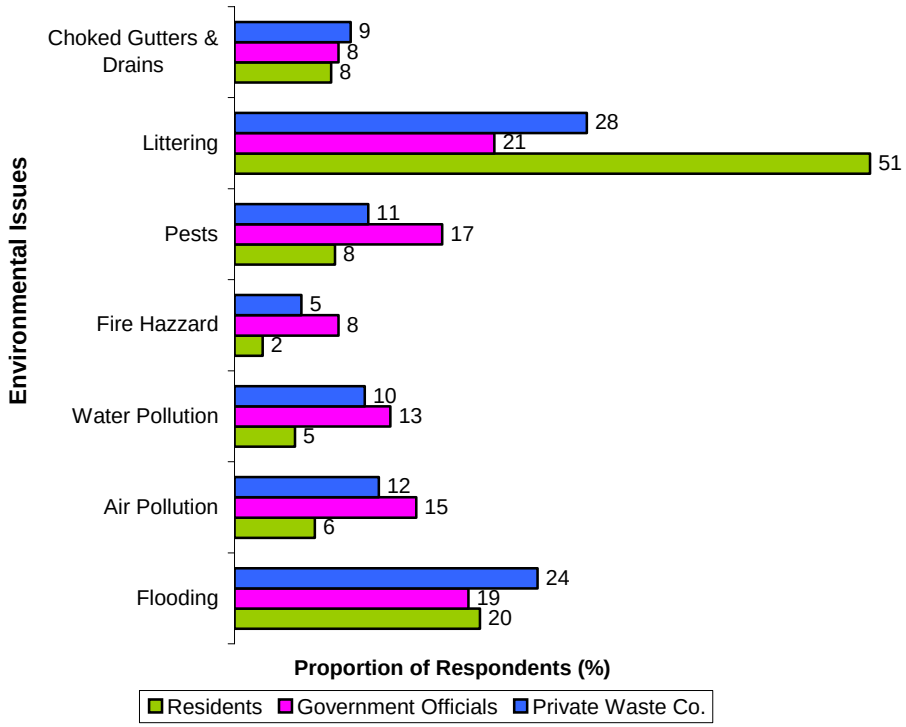
What is interesting about the responses concerning the natural environment in both cities presented here is the polarization of the responses as either: "very bad" or "good". This study does not account for the respondents' definitions of "very bad" as opposed to or "good", but the extremes in responses and the fact that mostly the private sector and some government agreed that the environment is in good condition in both cities, could be attributed to an unwillingness to allude to the fact that poor service provision may be contributing to an obvious deterioration in the natural environment, or that they are not

exposed to the most affected areas of these cities which in most cases are high density, low income, and inaccessible or they live in the better areas of the city that are less degraded.

5.8 Environment and Health in Accra:

To explore the environment and health issues that this very poor nature of the natural environment presents in Accra, in relation to solid waste management, several different summaries were created from the field survey interviews using the NVivo software in order to show the occurrences of different themes within the interview data. There were seven major environmental problems identified by residents, government officials, and the private waste collection companies as a result of solid waste management practices in Accra. These are flooding, air, and water pollution, fire hazards, pests, littering, and choked gutters and drains. Littering and flooding were the most identified consequences of poor solid waste management in Accra. Figure 5-9, shows that all three stakeholder groups interviewed – residents, 51% (79/310), government officials, 21% (10/48), and private waste companies, 28% (100/354) of responses - identified littering, as well as, - 20% (61/310) residents, 19% (9/48) government officials, and 24% (86/354) private waste companies – flooding, as the most prevalent environmental consequences of current solid waste management practices in Accra.

Figure 5-9: Environmental Issues identified by respondents in Accra, Ghana



Littering is clearly the most prominent issue, with a significant proportion of all the responses from government officials, 21% (10/48), private waste companies, 28% (100/354), and residents, 51% (79/310), acknowledging it as such. This suggests littering as one of the major attitudinal challenges facing the waste collection and public cleansing authorities in Accra. As shown in the pictures (Plates, 5-12, and 5-13) following, Accra faces a severe problem with littering and illegal dumping of refuse all around town.

Plate 5-12:An illegal solid waste dump behind the International Trade Fair Center in Accra, Ghana

Source: Field Survey, (2004)

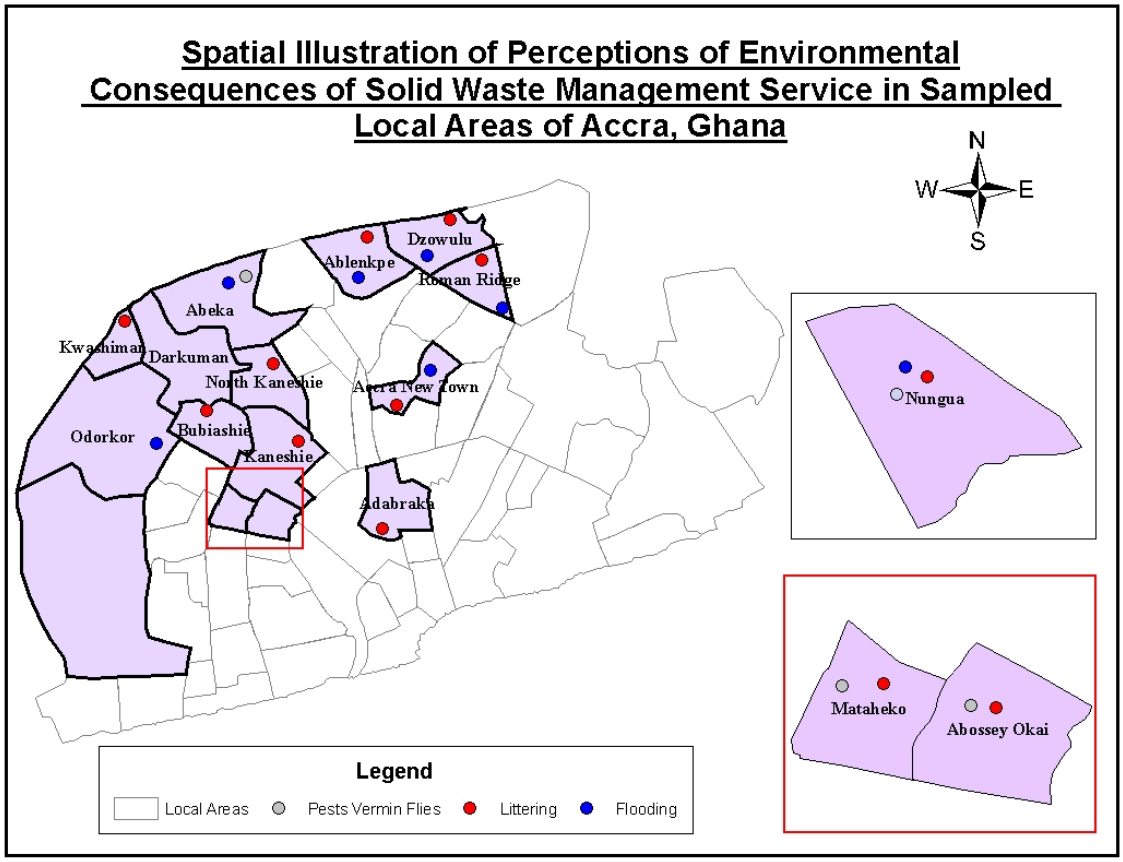
Plate 5-13: Open drain littered with waste in central Accra, Ghana

Source: Field Survey, (2004)

The residents, (6%; 20/310, and 5%; 15/310), government officials, (15%; 7/48, and 13%; 6/48), and private waste companies, (12%; 41/354, and 10%; 37/354) also expressed concerns regarding air, and water pollution respectively. In regards to pests, (8%; 25/310, 17%; 8/48, and 11%; 38/354), and choked gutters and drains, (8%; 24/310, 8%; 4/48, and 9%; 33/354), of residents, government officials, and private waste companies respectively indicated them as environmental issues. It was observed that the government officials, and private waste companies' responses, were generally much closer in proportion with respect to the identified consequences of solid waste collection and disposal on the environment than that of the residents. These observations are consistent with the assertions in the literature on solid waste management in Accra in particular, and Ghana as a whole, that littering continues to be a hindrance to solid waste management in Accra (see: Post, 1999; 1998; Obirih-Opareh, 2001; Annoh and Schweizer, 1996).

Following these findings on environmental issues, the spatial observations of the environmental consequences of solid waste management in Accra were mapped. Of the seven environmental issues the top three identified by residents: littering, flooding, and pests are outlined, covering 14 of the 16 locations of interviews of residents in Accra. The environmental issues identified in Figure 5-11 in the preceding discussion, were observed to have occurred throughout the sampled interview residents' localities. This is presented in Map 5-4

Map 5-4: Spatial illustration of perceptions of environmental consequences of solid waste management in Accra



Source: Field Survey (2004)

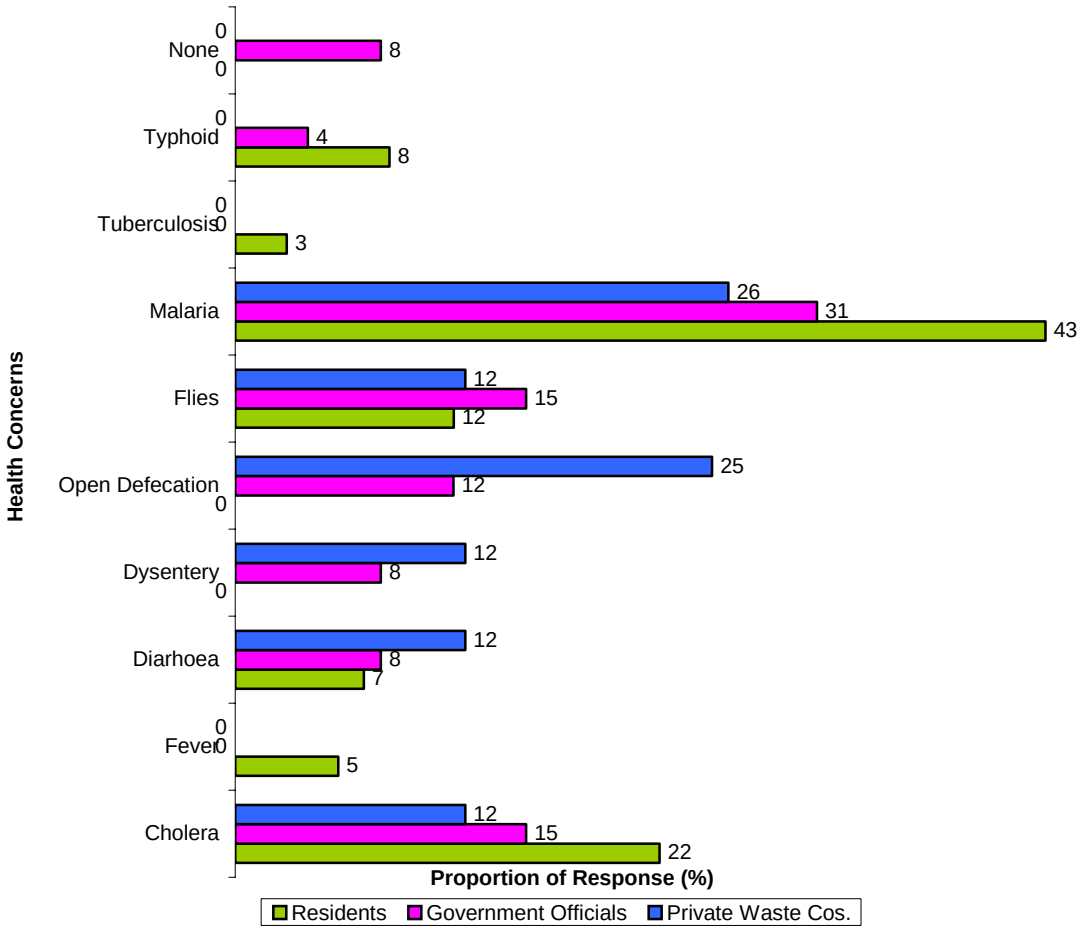
Fire hazard is identified as an issue occurring only in Adabraka and Abossey-Okai. Littering on the other hand was the most common issue with a high rate of occurrence, having been identified in 12 of the 16 localities, the exceptions being Darkuman, Odorkor, Dansoman, and Abeka. Also, flooding which was identified as a major concern has occurrences in Nungua, Abeka, Odorkor, Abelenkpe, and Accra New Town. Pests were identified in Abeka, Nungua, Mataheko and Abossey-Okai.

Also notable is the cluster of issues identified in Mataheko, Abossey-Okai, Nungua, Dzorwulu, Abeka, Abelenkpe, Accra New Town, and Roman Ridge. Of these, Mataheko, Abossey-Okai, Abeka, Nungua, and Accra New Town are densely populated, with

population densities of 150 to 350 people per km^2 and have been designated either low-income, or lower-middle income areas (GSS, 2000). The most notable patterns that emerge in map 5-4 are that, in most of the areas that identify littering as a concern, flooding was also identified as a problem. This is evident in Nungua, Dzorwulu, Abelenkpe, and Accra New Town, and in the case of Abeka, and Odorkor which show flooding without an indication of littering, they are both located adjacent to North Kaneshie, and Bubiashie, respectively, localities that both indicate littering.

With respect to health issues, the open-ended design of the interview questions in the field survey resulted in nine health concerns: cholera, fever, diarrhea, dysentery, flies, open defecation, typhoid, and tuberculosis, being identified by the three stakeholder groups, illustrated in Figure 5-10. Of the proportions of responses depicted, 43% (63/147) - residents, 31% (40/130) - government officials, and 26% (30/115) private waste companies, and 22% (33/147)- residents, 15% (20/130)- government officials, and 12% (14/115) private waste companies, identified malaria and cholera respectively as significant health problems. Also, tuberculosis, 3% (4/147), and fever, 5% (8/147) were only mentioned by residents, and none of the other respondents. Government officials identified the presence of flies, 15% (20/130), and open defecation, 12% (15/130), as notable health concerns apart from malaria, whiles the private waste companies recognized open defecation, 25% (29/115) as big an issue as malaria (figure 5-10).

Figure 5-10: Health concerns identified by residents in Accra, Ghana

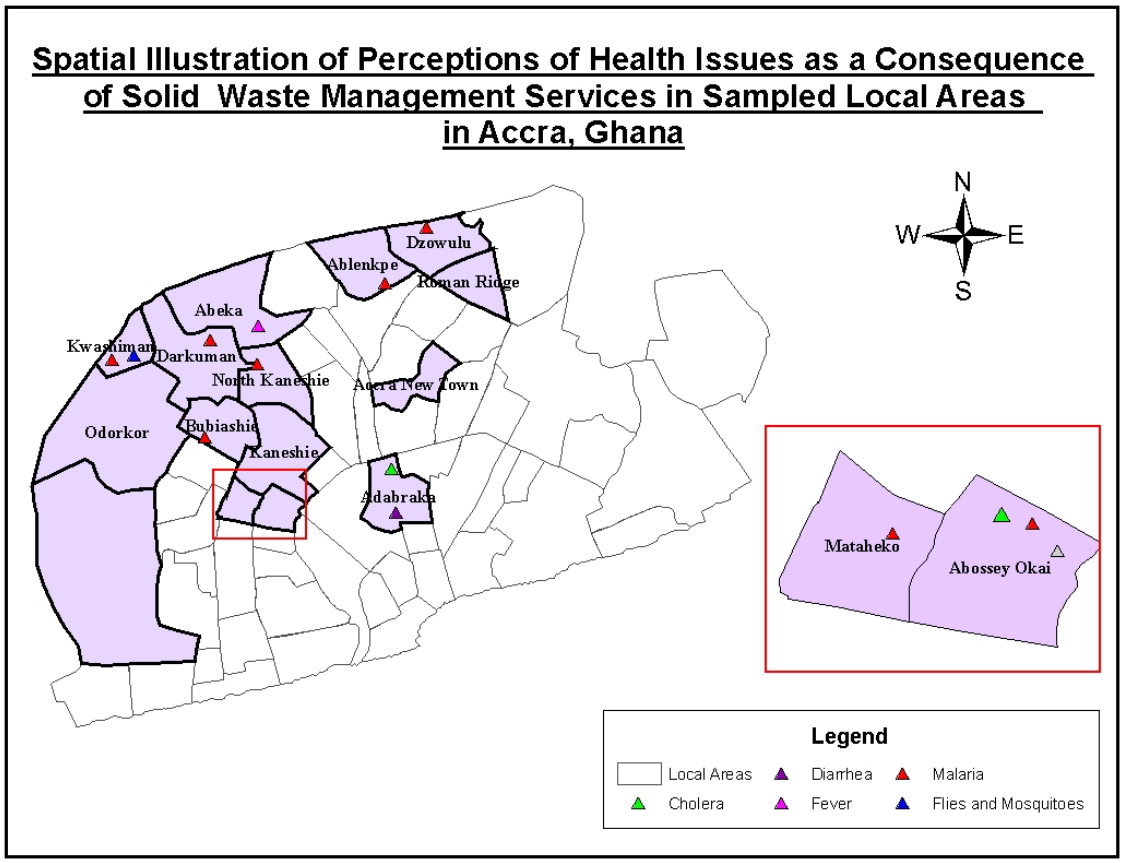


Notable from the analysis of the interview data was the fact that responses for the environmental issues were more consistent, and were recognized by more proportions of respondents. This can be attributed to several reasons. Firstly, the structure of the interview allowed listed choices for the environmental conditions present, while the questions regarding the health consequences were open ended. The different structures could have influenced, albeit minimally, the different patterns in results. Secondly, environmental issues are more prevalent to the larger community. For instance, if gutters are blocked with litter everyone has the opportunity to see it. This suggests some spatial correlation between littering behaviour and flooding. However, with health issues,

occurrences are spread through word of mouth when people get sick and are not necessarily known to all members of the community.

Map 5-5 depicts spatially the major health issues identified in Accra, with malaria being the most prevalent, appearing in Mataheko, Abelenkpe, Dzorwulu, Abeka, Abossey-Okai, Bubiashie, and North Kaneshie. Cholera is presented in Adabraka, and Abossey-Okai, and diarrhea show up in Adabraka. Abossey-Okai, Adabraka, and Kwashiman all have a clustering of health issues, with Kwashiman showing flies, and malaria, Adabraka, cholera and diarrhea, and Abossey-Okai, cholera, malaria, and diarrhea.

Map 5-5: Spatial illustration of perceptions of major health issues of solid waste activities in Accra



Source: Field Survey (2004)

Evidently, malaria was the most common issue, present in all but one locality: Adabraka. The most notable pattern is the predominance of malaria, which could be as a result of choked gutters and drains, and flooding from choked gutters, caused by littering, all identified as environmental issues of solid waste management services.

5.9: Environment and Health in Kumasi:

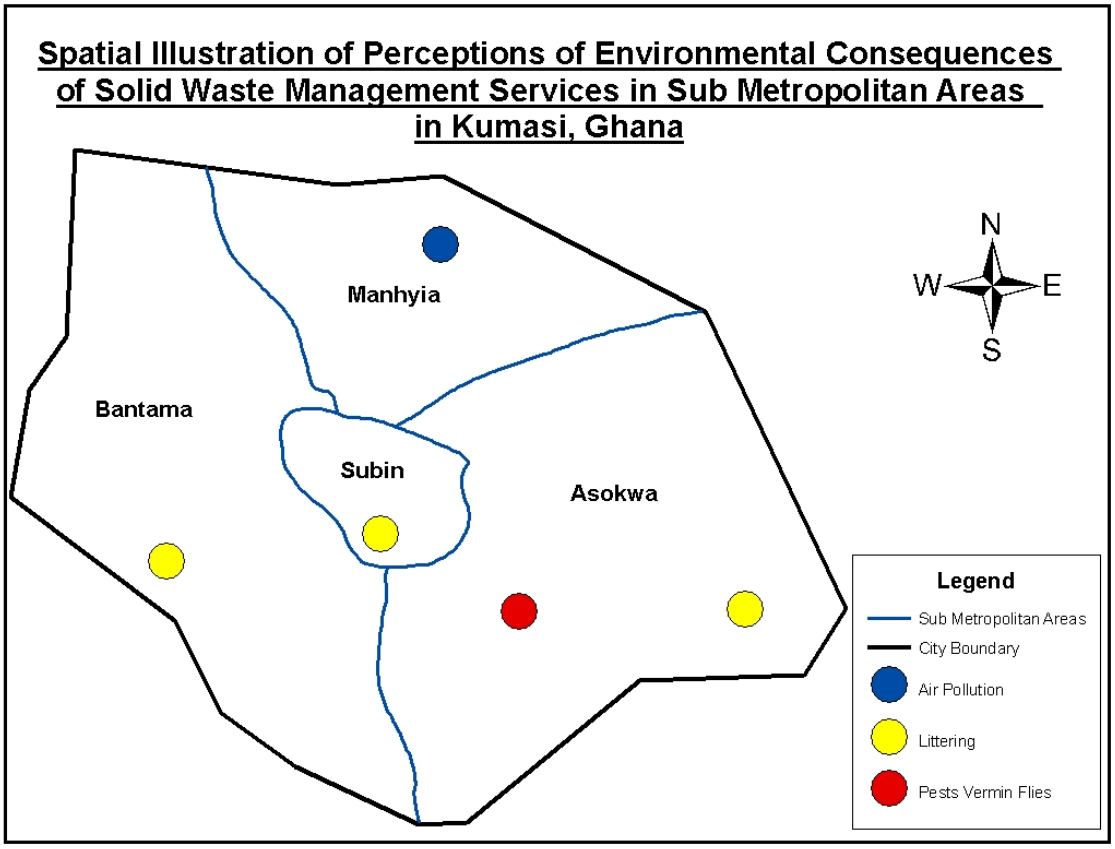
In Kumasi the observed trends (presented in Figure 5-11) with environmental issues resulting from solid waste practices is noticeably interesting, in that, even as littering is noted as a major environmental problem, by residents 26% (57/218), government officials 20% (10/50), and private waste companies 20% (2/10), so is air pollution, residents, 21% (43/218), government officials, 17% (8/50), and private waste companies, 20% (2/10); pests, residents 21% (43/218), government officials 20% (10/50), and private waste companies 20% (2/10); and water pollution residents 11% (23/218), government officials 13% (6/50), and private waste companies 20% (2/10), respectively.

Figure 5-11: Environmental Issues identified by respondents in Kumasi, Ghana

Unlike Accra, flooding, and choked gutters and drains did not emerge as consequences of solid waste services in Kumasi, instead residents, 17% (34/218), government officials, 13% (6/50), and private waste companies, 10% (1/10), identified smoke from burning garbage containers at central sites as a notable environmental issue. Also, the residents, 3% (5/218), government officials, 13% (6/50), and private waste companies, 10% (1/10) distinctly note fire hazzard.

For the mapping spatially of the environmental issues identified in Kumasi, the top three environmental consequences identified by residents were outlined, covering locations in all four sub metropolitan areas, with the three most influential consequences identified by the respondents being littering, pests, and air pollution (Map 5-6).

Map 5-6: Map of perceptions of environmental consequences of solid waste management in Kumasi

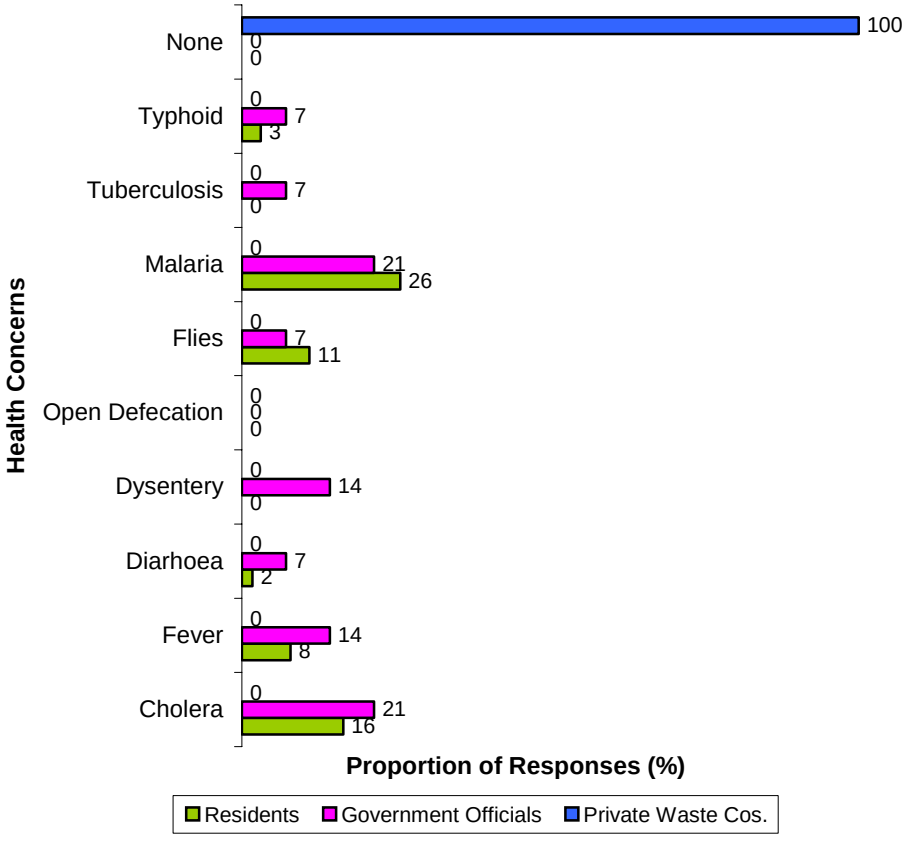


Source: Field Survey (2004)

Of the three issues represented on the map, Asokwa sub metropolitan area was the only one to have the occurrence of pests. Three of the four sub metropolitan areas: Bantama, Subin, and Asokwa presented with littering. Air pollution was only raised in the Manhyia sub metropolitan area, which is the only notable environmental issue occurring there. The Asokwa sub metropolitan area is the only one with a cluster of both littering and pests. In the case of Kumasi, the incidence of pests and vermin in the Asokwa sub metropolitan area may be due to the fact that it is the area in which the city's various dumpsites have been located in the past decade, without adequate coverage of the garbage dumped there.

The high amount of littering evidenced in both Accra and Kumasi, has been attributed in the interviews to being one of the causes of flooding in Accra, and several health issues such as malaria and cholera in Kumasi, respectively. However, the private waste companies did not acknowledge any of the health concerns identified by the residents and government officials; in fact the full proportion of their responses, 100% (5/5), stated that there was none. This is illustrated in Figure 5-12. As in the case of Accra, the same nine health concerns were identified in regards to waste management in Kumasi: cholera, fever, diarrhea, dysentery, open defecation, flies, malaria, tuberculosis, typhoid

Figure 5-12: Health concerns identified by respondents in Kumasi, Ghana

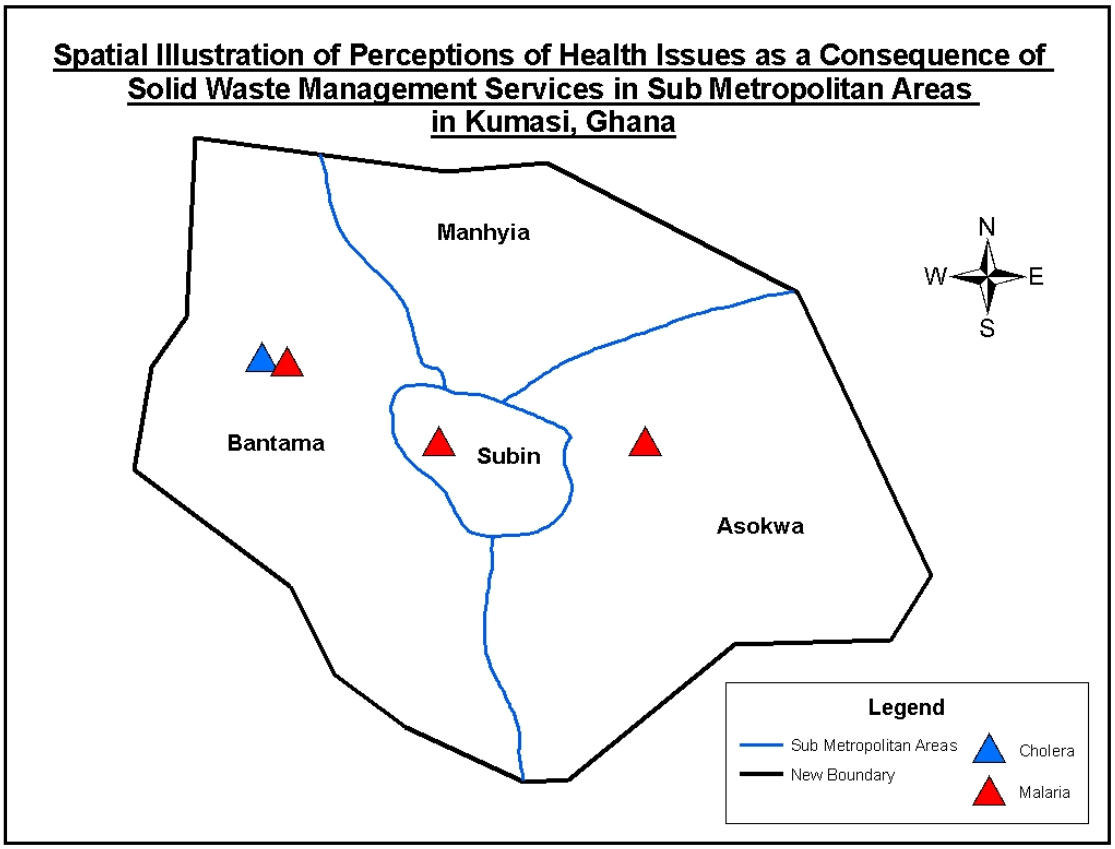


Government officials identified cholera 21% (6/28), and malaria 21% (6/28), as the main health concerns. Fever, 14% (4/28), and dysentery, 14% (4/28), are also noted. Residents

mostly indicated malaria, 26% (75/292), cholera, 16% (48/292), and flies or mosquitoes, 11% (32/292), as significant health concerns. Further, the indication by private waste companies that there were no health concerns of significance suggests that they either are unaware of the health issues in question here or are unwilling to allude to the fact that poor service provision contributes to serious health concerns. Also, the Environmental Health Management Department (EHMD) of the Kumasi Metropolitan Assembly in their Annual report for 2003 noted in regards to their monitoring of disease trends in the metropolis that, "sporadic cases of typhoid, diarrhea diseases, and other intestinal infections were among the top ten Out Patient Department (O.P.D) diseases reported in the city; where as malaria continued to maintain its top spot as the number one morbidity and mortality disease within the metropolis" (KMA/EHMD, 2004: 5).

With respect to the spatial mapping of the health concerns in Kumasi, depicted in Map 5-7, malaria is presented in three of the four sub metropolitan areas, Bantama, Subin, and Asokwa, with cholera presenting only in the Bantama sub metropolitan area. The Manhyia sub metropolitan area is the only area that did not present with any of the two major health issues identified by the residents (Map 5-7).

Map 5-7: Map of perceptions of major health incidences in Kumasi

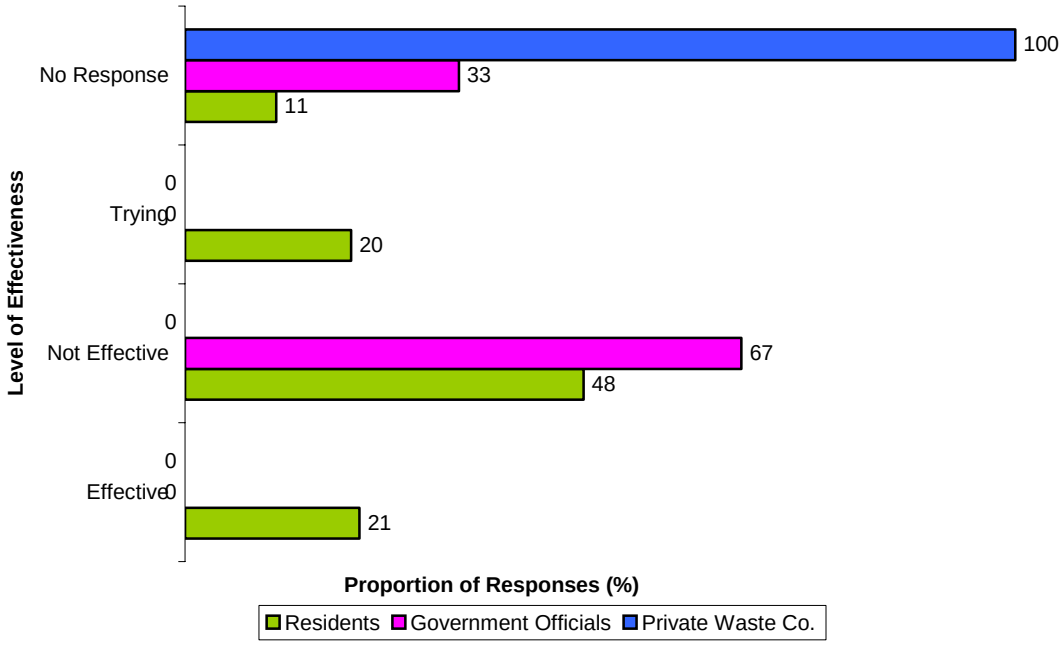


Source: Field Survey (2004)

5.10 Effectiveness of the current solid waste management arrangements in Accra and Kumasi, Ghana

The majority of respondents interviewed in both Accra and Kumasi indicate that they do not find the current solid waste management service to be effective. This is illustrated in Figures 5-13, and 5-14, respectively.

Figure 5-13: Identified Levels of Effectiveness of solid waste management arrangements in Accra, Ghana

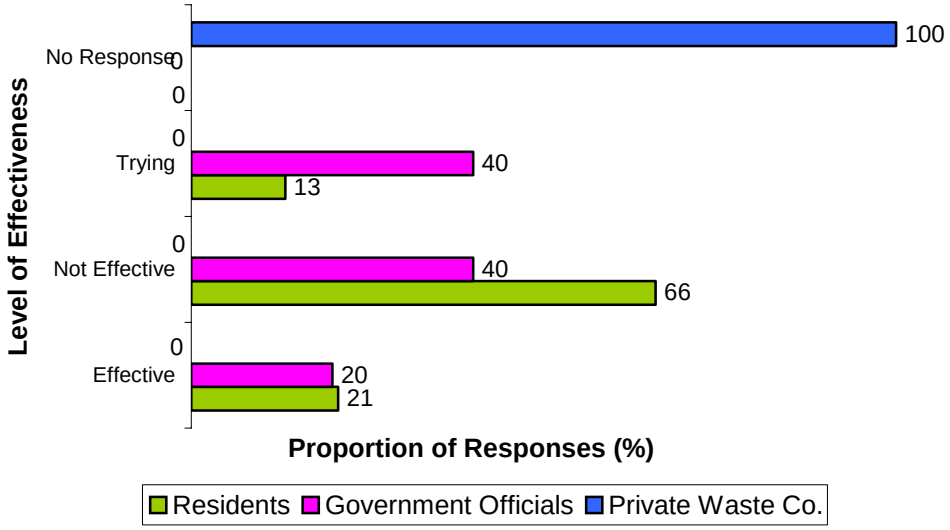


In the case of Accra all of the private waste companies' respondents chose not to respond to the question on the effectiveness of the solid waste arrangement system. About two-thirds, 67% (67/100) of the government officials indicated that the arrangements were not effective whereas the remaining third did not respond at all. Among residents, a higher proportion, 48% (48/100) indicated ineffectiveness, however 21% (21/100), and 20% (20/100) indicated arrangements to be effective, or that the service providers were trying to be effective, respectively. A small proportion 11% chose not to respond.

In the case of Kumasi (Figure 5-14), all of the private waste companies' respondents chose not to respond. A higher proportion of residents 66% (79/120), indicate the arrangements are ineffective, with 13% (16/120), and 21% (25/120) stating that officials

were trying and effective, respectively. Only 20% (1/5) of government officials indicated the arrangements to be effective, whiles a higher proportion, 40 % (2/5) indicated both times that they were either trying to be effective or not effective at all.

Figure 5-14: Identified Level of Effectiveness of solid waste management arrangement in Kumasi, Ghana



The results illustrated in the two figures above are in line with commentary in the literature on the effectiveness of waste management practices in the two cities, as well as the fact that just over half of the total volume of waste generated per day is collected and properly disposed off (see: Post, 1999; Obirih-Opareh, 2001; Annoh and Schweizer, 1996). In both instances, a slightly significant proportion of the government respondents in the case of Accra, and none of the private waste companies chose to comment on their level of effectiveness in delivering services. The results also suggest that government officials are aware of the fact that the services delivered currently were not effective at meeting the needs of the city. The overwhelming non-response from the private waste companies suggests an unwillingness to accept or acknowledge the fact that there are still significant areas of the city, and volumes of refuse being generated that is not being dealt

with. Further, some of the results of residents' responses suggest that they perceive the current arrangements to effective at dealing with their solid waste, which indicates that there are areas within both Accra and Kumasi that receive adequate waste management services and are most likely the high income, low-density areas. Also, responses from residents indicating, "the authorities are trying/doing their best" suggest that despite the obvious problems experienced throughout the two cities in the provision of the service, there is some public acknowledgement of the constraints being experienced by the Accra Metropolitan Assembly, Kumasi Metropolitan Assembly, and the private waste companies. Indicating that some of the residents remain supportive of the system by acknowledging the efforts of the service providers at trying, even though the arrangements are not entirely responsive to their needs, and the current practices do not meet their expectations.

CHAPTER 6

RESEARCH FINDINGS: LOCAL KNOWLEDGE IN THE CITIES OF ACCRA AND KUMASI, GHANA

6.0 Introduction

A central theme of this research is to explore local knowledge as it pertains to solid waste management. In this chapter, the research's findings on the beliefs, norms, and practices, and land tenure in Accra and Kumasi and how they influence the decision making of residents, government officials, and private waste companies, as well as what possible roles local knowledge plays, or can play in waste management activities are presented. The role of culture in this is also touched upon. Further, a presentation of the findings on the knowledge and experiences of barriers to the use of local knowledge in planning and managing solid waste is made; as well as results on the complementarities or implications of local knowledge's involvement in solid waste management and planning at the institutional level in both Accra and Kumasi, Ghana. The findings presented here were collated from field survey conducted in Accra and Kumasi, Ghana. The intention was to explore the roles of, and avenues for, the incorporation of local knowledge and practices in solid waste management.

6.1 Identified beliefs, norms and practices in Accra and Kumasi

The study identified indigenous beliefs, norms, and traditional practices through interviews conducted in both Accra and Kumasi that are relevant to the inhabitant's perceptions of, and relationships to the environment, and solid waste management activities. These are aspects of actions that exist within the lifestyle and behaviour patterns of the people, and give rise to cultural and environmental practices within the

neighbourhoods. Similar observations have been noted in studies by Amanor, (1991; and 1994), and Dei (1989; 1990; and 1992). The beliefs, norms, and practices identified from the focus group discussion with 10 chiefs in Accra and the *Bantamahene*'s court in Kumasi are summarized in Table 6-1.

Table 6-1: Summary of Examples of beliefs, norms and traditional practices noted in Accra and Kumasi

Stakeholder groups	Examples of norms beliefs and practices
Residents	• In preparation for the celebration of the local "*Homowo*" and "*Akwasidae"* festivals, community wide general cleaning is mandated and people clear paths, clean gutters and burn all solid waste in the area with the belief that the ancestral gods will be paying them a visit so the neighbourhood should be cleaned to be fit for receiving such revered guests. In relation to the "*Akwasidae*" this repeats every 6th Sunday over a 40 day cycle, whiles with the "*Homowo*" it is once a year in August. • "*Prokan*" was frequently mentioned amongst residents as a way by which their back yard gardens were fertilized by dropping of organic wastes there to rot, and compost • Land is believed to be bequeathed by the ancestors, and the onus is on the living to preserve it and hand it to descendants. Ancestors are believed to be spirits who observe the behaviour of the living and punish deviants whiles rewarding and protecting those who observe good behaviour. For e.g. in regards to solid waste management, residents noted that their traditional knowledge is that, if their solid waste handling behaviour is bad the ancestors will depart from guiding and protecting the community. • The chiefs' courts resolve land use and ownership conflicts, and are often guided by precedents, experiential knowledge, and the wisdom of court elders. • Sweeping after dark is considered taboo. • Dumping and disposal of waste after dark is not permitted. • Days of rest known as taboo days during which the land was expected to rest and no farming or fishing and hunting activity takes place was common knowledge amongst residents. The resting periods coincided with the periods that fishes, trees and the like regenerated.
Government Officials	• Land tenure is based on communal or group ownership, and the chief holds the land in trust for their people. • Government officials also noted both the "*Tomo*" and "*Prokan*" practices as two traditional composting methods that they were aware of to be in use by residents in both

	cities. • It also emerged from the officials that in the same vein as Sunday are seen as a Sabbath for God almighty, so also is the earth, and in this regard, the "rest day" as it were for land is Friday so no farming activities are pursued in *Ga*-land (area inhabited by Accra). As well, for Tuesday fishermen do not fish because that's their holy day so they stay on shire to mend their nets. This knowledge is useful according to the officials, for timing educational events and clean up exercises on waste activities for the most patronage by people since they are available in their homes.
Private waste companies	• The chiefs' courts resolve land use and ownership conflicts, and are often guided by precedents, experiential knowledge, and the wisdom of court elders. • Days of rest known as taboo days during which the land was expected to rest and no farming or fishing and hunting activity takes place. The resting periods coincided with the periods that fishes, trees and the like regenerated. • When traditional funeral rites are being performed in a locality, or when children are being outdoored, the locality is barricaded or sealed off under traditional oaths, and so in order to run waste collection routes we have to tailor arrangements to suit these occasions by going out of the normal schedule to accommodate these practices.
Chiefs	• It is believed that when we litter around with solid waste, the gods protecting the environment become angry, therefore they plague or curse mankind with sickness, death etc. • Traditionally, solid waste was dealt with through "*Tomo*" (it's a place where everything locally generated waste is deposited). At a point in time the "*Tomo*" is dug out as compost or manure. • Decision-making is based on collaboration and transactive processes. • There is a great respect for "mother" earth. • Land was bequeathed by the ancestors, and the onus is on the living to preserve it and hand it to descendants. • Land was bequeathed by the ancestors, and the onus is on the living to preserve it and hand it to descendants. • The earth is believed to have a power of its own which if not respected is harmful. • Sweeping after dark is not allowed. • Dumping and disposal of waste after dark is not permitted. • Sanctions for the propitiation of the spirit(s) are in place for delinquents who contravened norms and customary practices, thus defiling the land. A culprit is taxed with an offering of a sheep and two bottles of schnapps.

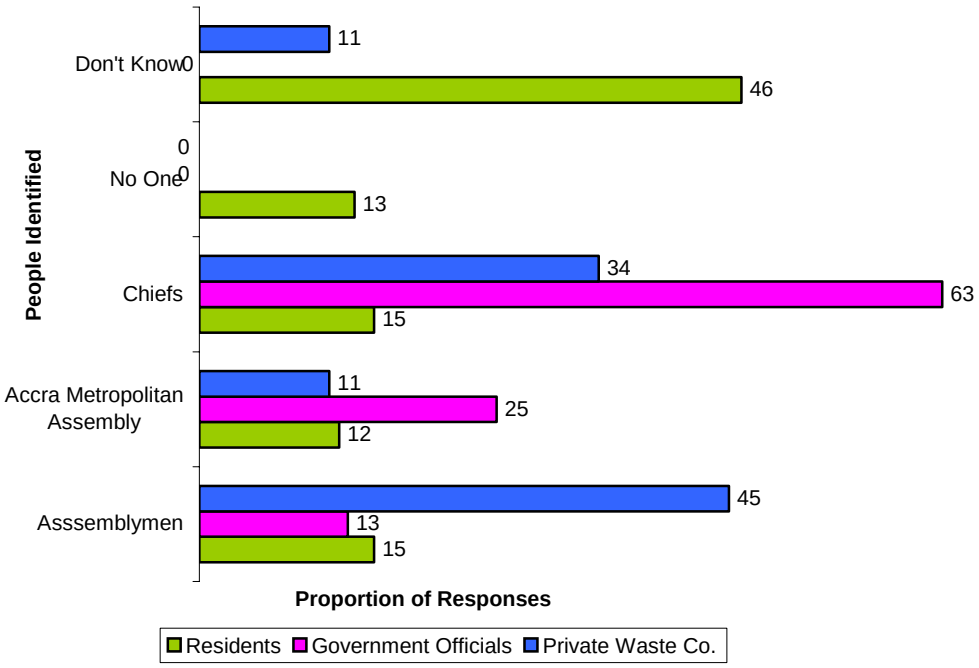
Source: Field Survey Interviews & Focus Group Discussions (2004)

It must be noted that even though there are countless taboos, norms and customary practices in Accra and Kumasi, those noted in Table 6-1 are the most relevant and relate directly to environment practices, solid waste handling activities, and land use.

A notable finding was the wide acknowledgement of the involvement of chiefs[20] in waste management by the residents, government officials, and private waste companies in both Accra and Kumasi. The well entrenched position of chieftaincy within both the political and social fabric of the country is evident in the theme of responses of participants of this study regarding who they identified as being involved with the decision making process on managing solid waste in their city. Figure 6-1 illustrates the results in the case of Accra.

[20] The chief is a person in the position of the leader of a group of people for e.g. the *Asantehene* of the *Ashantis*, and the *Ga Mantse* of the *Ga*, who are revered as the lineal successors of the founder of the state, its sub divisions, and village. His subjects feel beholden to him for their well-being, and he is the head of their political community exercising judicial functions in relation to offences to ancestral spirits and other spiritual beings to whom he offers prayers for the prosperity of the community.

Figure 6-1: People identified by respondents to be involved in the decision-making process on managing solid waste in Accra, Ghana



As shown, 63% (50/80) of the responses from government officials, and 34% (43/128) of private waste companies' identified chiefs as involved in the decision-making around waste management in Accra.[21] Also, 45% (57/128) of the private waste companies' responses noted the involvement of Assemblymen.[22] 46% (31/68), and 13% (9/68) respectively of the residential responses either did not know who was involved in decision making on waste management, or indicated that no one was. This suggests a lack of communication by government officials and private waste companies to residents

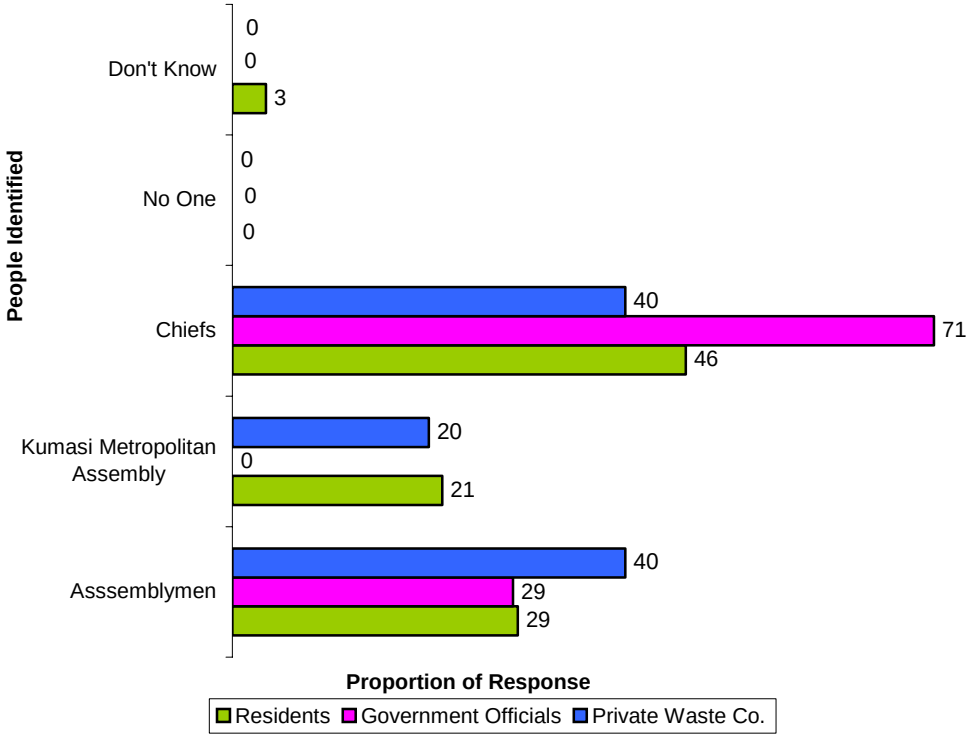
[21]The total number of responses per question varies because of the open-ended structure of the questionnaires, which allowed for qualitative data, and did not limit the responses given by the respondents. This allowed for multiple responses by some and single or no responses by other respondents per question. Therefore the proportion of themes was generated using the Nvivo® software based on the number of times a coded theme was identified over the total number of responses for each question.

[22] An Assemblyman or Assemblywoman is either an elected or appointed official into the Metropolitan Assembly. These representatives run for the position on non partisan basis and constitute the Assembly, in the local government system which is similar to a city council in a western style metropolitan administrative system.

around who is involved in making decisions on solid waste management, and possibly almost a total exclusion of Accra's residents from decision-making around solid waste management service activities. Residents' identification of chiefs, 15% (10/68), assemblymen, 15% (10/68), and the Accra Metropolitan Assembly (AMA), 12% (8/68), as involved in the decision-making were about the same. Also, the wide disparity between responding groups in awareness of who is involved in the process is symptomatic of the top down approach to managing waste in the city.

In the case of Kumasi, as seen in Figure 6-2, unlike Accra, all the three groups interviewed, the private waste companies, 40% (10/25), residents, 46% (54/117), and government officials, 71% (100/140), overwhelmingly identified the chiefs, as being involved in decision making around waste management activities.

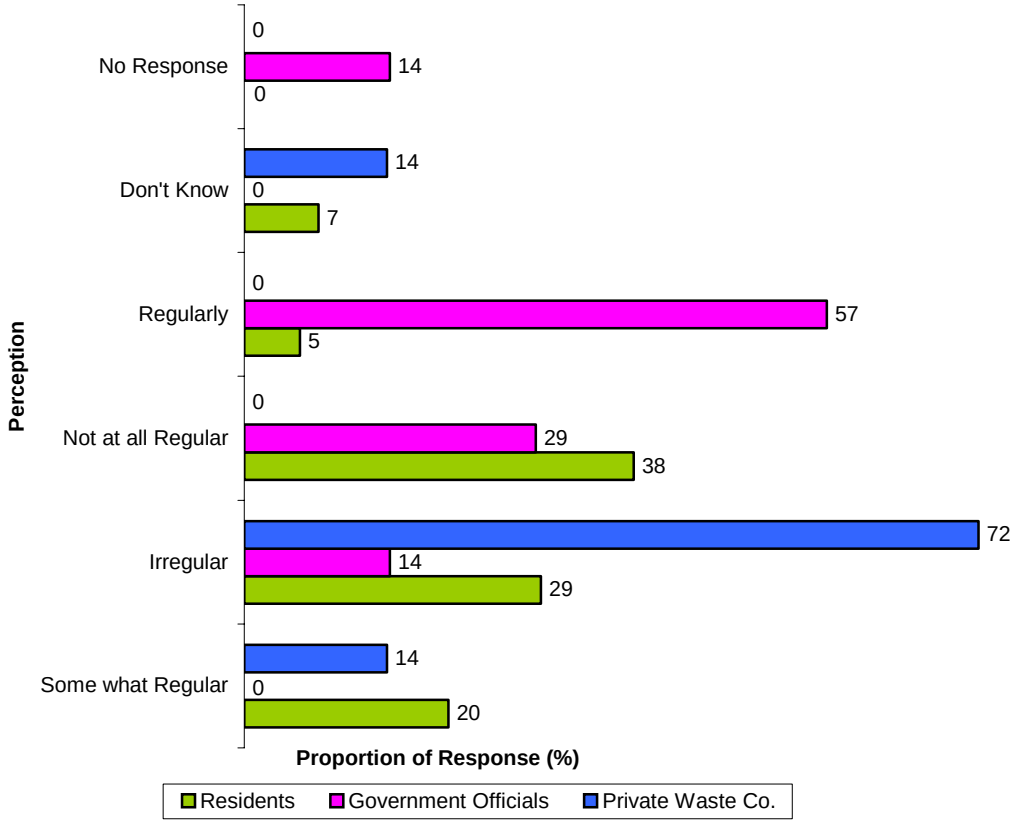
Figure 6-2: People identified by respondents to be involved in the decision making process on managing solid waste in Kumasi, Ghana



Assemblymen and the Kumasi Metropolitan Assembly (KMA) were also noted in responses as being involved. The significant departure in the Kumasi case from that of Accra, especially by the residents with respect to their awareness of who is involved in decision-making around their solid waste services is interesting. As it may not only suggest that the residents of Kumasi are more aware of involvements in waste management decision-making, but also with the level of visibility of the people identified to be involved. Thus, their strong indication of the involvement of chiefs, may be an indication of a much higher level of influence of the chief of Kumasi, the *Asantehene* in the life of the residents and their well being whereas in Accra due to the more dispersed nature of the chieftaincy tradition, and the growing cosmopolitan form of the city, the chiefs' involvement is less visible to the inhabitants of the city. Further, it indicates a more proactive approach to decision making around waste issues adopted by the Kumasi Metropolitan Assembly and the private waste companies in involving the residents and their chiefs.

In line with these findings are the outcomes of interview questions on the perception of the chiefs' involvement in waste management as a whole in both Accra and Kumasi (Figures 6-3, and 6-4).

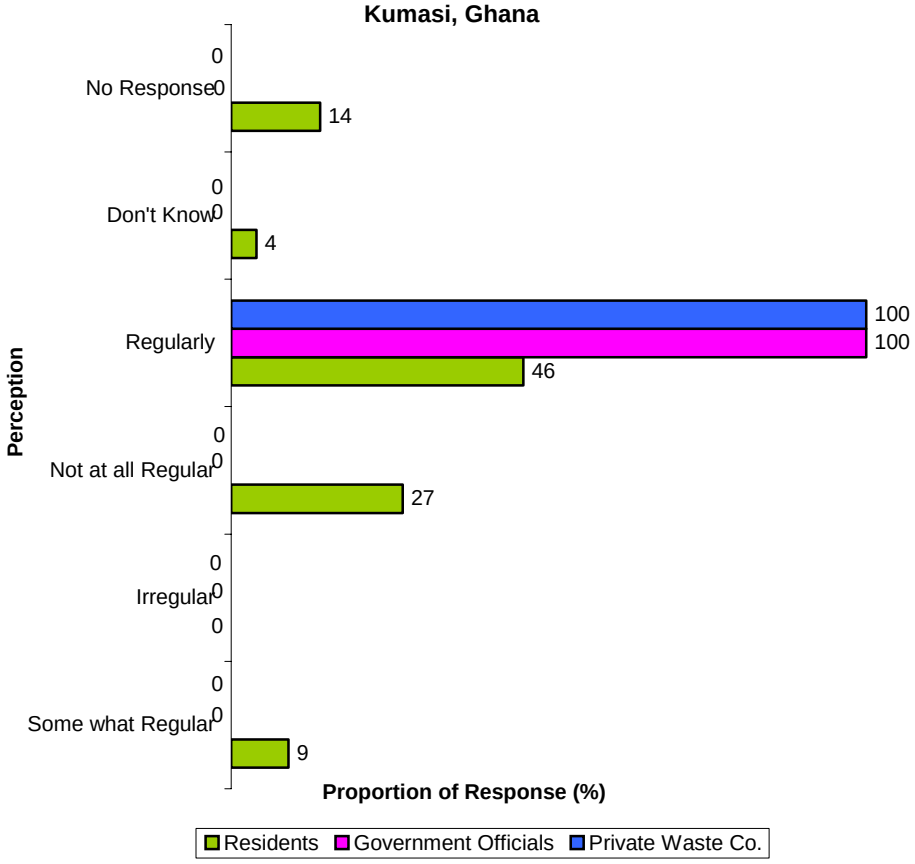
Figure 6-3: Perceptions of Chief's involvement in solid waste management in Accra, Ghana



It is apparent that in Accra, (Figure 6-3), where the cultural ties have some what weakened due to the cosmopolitan nature, most of the private waste companies 72% (72/100), see the involvement of chiefs as “irregular”, whereas they are perceived to be more regularly involved by the government officials, 57% (40/70), even though 29% (20/70) indicated that they were “not at all regular”. Also, chiefs are seen to be somewhat regularly involved by the residents, 20% (11/55). A higher proportion of residents’ responses 29% (16/55), and 38% (21/55) respectively, perceived the chiefs’ involvement as “irregular” or “not at all regular”

In Kumasi on the other hand, (figure 6-4) the residents, 46% (46/100), government officials, 100% (10/10), and private waste companies, 100% (5/5), state overwhelmingly that the chiefs are regularly involved in solid waste management activities. Only 27% (27/100) of the residents' responses perceived chiefs as "not at all regular".

Figure 6-4: Perceptions of Chief's involvement in solid waste management in Kumasi, Ghana



The involvement of chiefs in the solid waste management process is aptly exemplified by the observation of the process that the Accra Metropolitan Assembly had to go through in order to acquire the land for its Oblogo final disposal site as a stop gap measure due to the delay in finalizing the Kwabenya landfill site in Accra. In several interviews with Waste Management Department officials and the Oblogo disposal site manager, it emerged that the chief of Oblogo was instrumental in the acquisition of the land for use

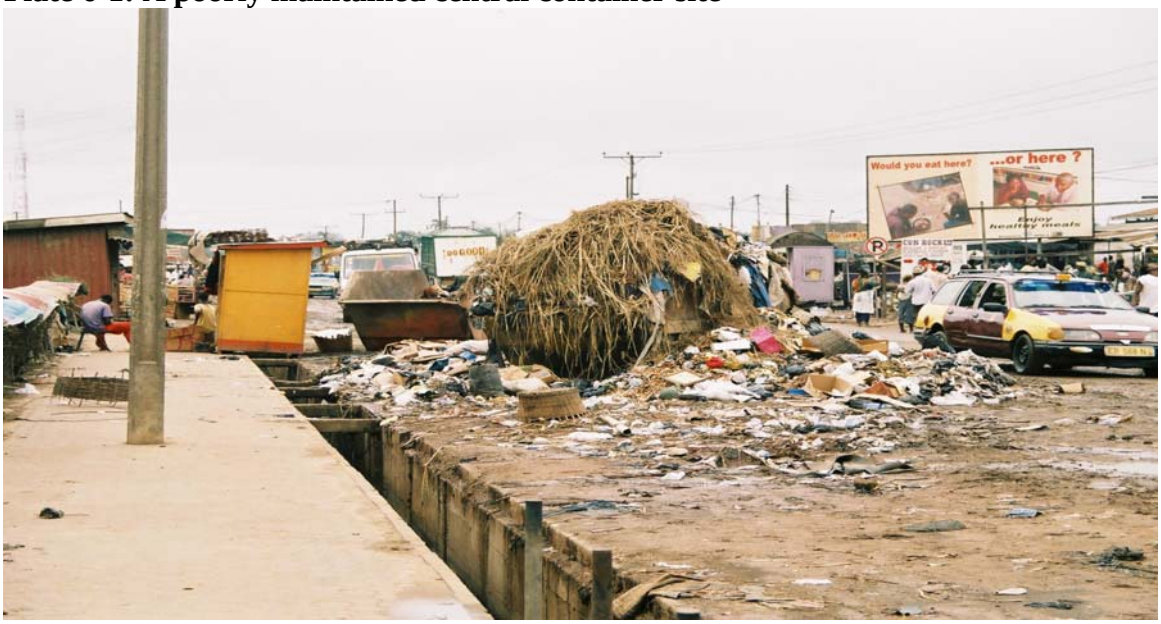
as the current disposal site. In fact it was even noted that most of the land needs for locating solid waste communal container sites in both Accra and Kumasi were either acquired from the chiefs of the areas in which the container was sited or were stationed at such sites with the chiefs' consent. Hence, customary rites have to be performed and a monthly royalty has to be paid to the chiefs as custodian of the land for the people and their ancestors, so as to perform rituals for cleansing the land, and appeasing the land gods for any abomination that such use of the land might bring. In the case of the Oblogo dumpsite, the royalty demanded is a cow, and a number of bottles of schnapps drinks, which are paid every quarterly by the Waste Management Department. This has facilitated a cordial relationship between the chief, residents of the Oblogo area, and the disposal site and Waste Management Department staff, a situation that has been helpful in settling conflict and disagreements that have arisen over the use of the place.

This involvement of chiefs is well documented in the Ghanaian print media with respect to how difficult it is to acquire land for not only locating landfill or final disposal sites in Accra and Kumasi, but also for skip station sites, and central communal container location points. Daily newspaper headlines underline this issue: "*Kwabenya landfill project suffers set back*"[23], "*I have not given go ahead – Chief*"[24], "*Leave our Chief alone*"[25], "*AMA seeks title to landfill site*"[26], "*Is Kwabenya landfill still born?*"[27]

[23] Daily Graphic, Monday, March 18, 2002
[24] Daily Graphic, Wednesday, October 17, 2001
[25] Daily Graphic, Friday, October 12, 2001
[26] Ghanaian Times, Saturday, June 26, 2004
[27] Daily Graphic, Monday, January 7, 2002

Thus in Accra and Kumasi which have some 264 and 105 communal container sites respectively, for a vast majority of them, the land had to be negotiated for from the chief of the area or else the placement of a central container was bound to meet strong resistance from the inhabitants of the neighbourhood. This situation has not been helped much by the past record of poorly organized cleansing of the central communal container sites (Obirih-Opareh, 2002: 190). Also, most skip stations for the central communal container sites in both Accra and Kumasi, are not kept clean (Plate 6-1), and so residents and property owners situated next to skip station locations often object to having such stations set up next to their property. In the face of such objections, it is the chiefs who use their authority and position within the society to intervene and resolve such conflicts by reassigning land for the relocation of container sites where necessary.

Plate 6-1: A poorly maintained central container site



Source: Field Survey, (2004)

Skip container location is a major concern for the Waste Management Departments in Accra and Kumasi because skip location sites need to be accessible to both the

inhabitants of the area, as well as the pick up trucks of the service providers, and finding ideal locations in several areas of the city is problematic. As such residents objections to the placement of containers, complicates the collection ability of the private waste collector. There are several instances of residents blocking pick up trucks from gaining access to skip sites noted in interviews with both private waste companies and Waste Management Department officials. The most prominent of such issues was the violent protest by the residents of Kwabenya, an area in Accra, earmarked for the construction of a sanitary landfill site, but which has been put on hold due to the objection to the siting by the chief of the area (Daily Graphic, 2002: 23). The situation was reported to be so severe, that the vice president of the country had his motorcade blocked when he attempted to pay a working visit to the site, and was reported in the press media to have been violently chased out of the community by the chief and his people.[28]

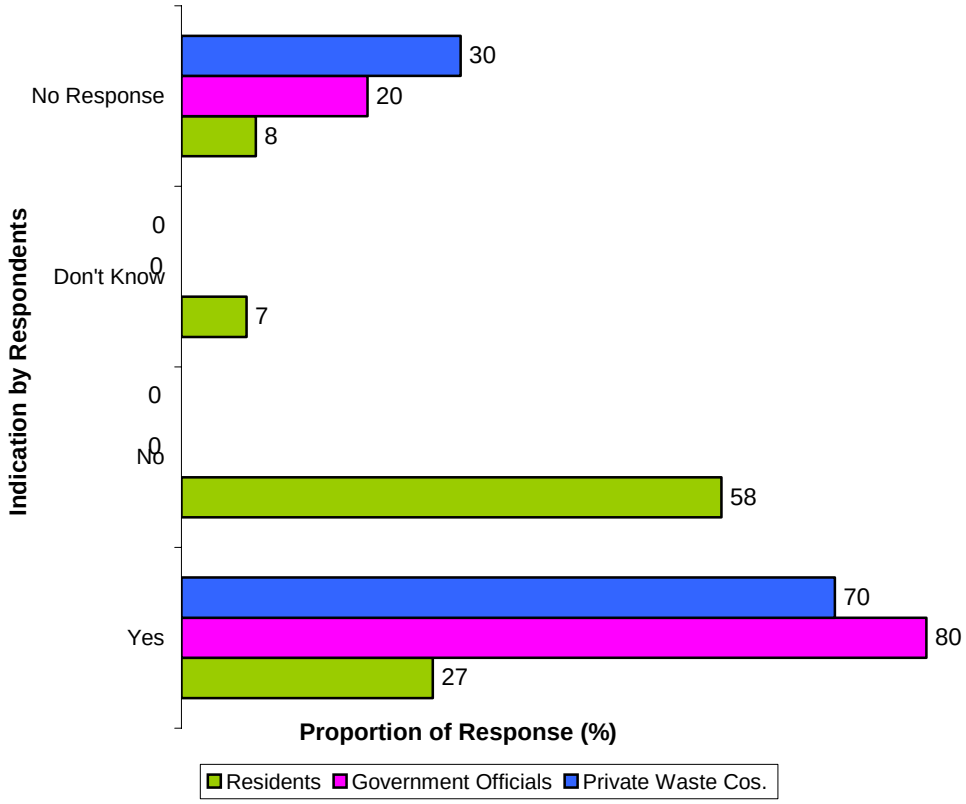
Clearly, the involvement of chiefs in waste management in Accra, and Kumasi is widely acknowledged, by residents, government officials, private waste companies, and within the press media, and plays a critical role in the citing of waste collection points throughout the city suggesting that land acquisition arrangement play a key role in linking the culture with the service delivery options of solid waste management in both Accra and Kumasi through its influence over the location of both collection points and final disposal sites.

[28] Daily Graphic, Monday, January 7, 2002

6.2 Local knowledge, decision-making and solid waste management in Accra and Kumasi

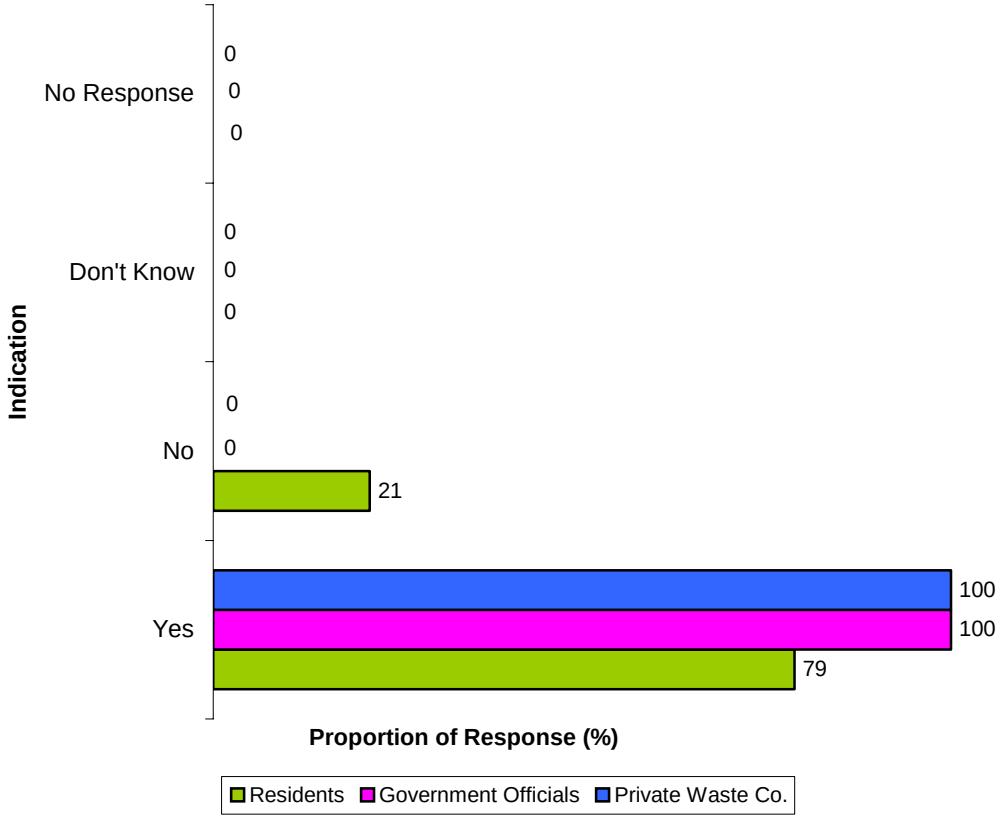
In order to get at the roles local knowledge plays in planning and managing waste, the study further explored how local knowledge was a part of decision-making of individuals, the community, and at the institutional level. It was observed in Accra as illustrated in Figure 6-5 that both the private waste companies, 70% (70/100), and government officials, 80% (80/100), overwhelmingly indicated that local knowledge has a role to play in their decision-making process of their day-to-day activities. Where as only 27% (27/100) of residential responses indicate that it does have a role to play in their daily decision-making, a greater proportion, 58% (58/100), indicated that it did not.

Figure 6-5: Indication by respondents as to whether Local Knowledge plays a role in the decision-making process of their day to day activities in Accra, Ghana



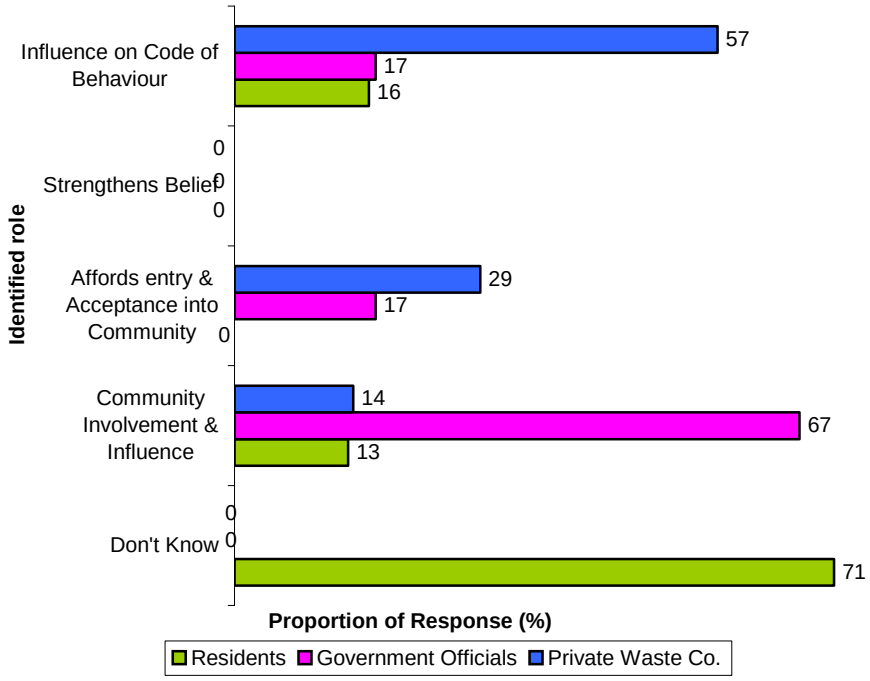
In Kumasi (Figure 6-6) all of the government, 100% (10/10), and private waste companies, 100% (5/5), responses, as well as an overwhelming majority, 79% (52/66) of residents responses indicate that local knowledge plays a role in their daily decision-making. Only 21% (14/66) of residents' responses indicated that it did not.

Figure 6-6: Indication by respondents as to whether local knowledge plays a role in the decision-making process of their day-to-day activities in Kumasi, Ghana



Following the strong indication in both cities that local knowledge plays a role in daily decision-making, the study explored what roles local knowledge is identified to play in day-to-day decision-making. In this regard, influence on code of behaviour, strengthens belief, affords entry and acceptance into community, and community involvement and influence emerged as the four themes of roles identified. With respect to Accra, presented in Figure 6-7, 71% (58/82) of residents' responses indicate that they could not identify specifically a role local knowledge plays in their day-to-day decision-making.

Figure 6-7: Identified roles that local knowledge plays in daily decision-making process in Accra, Ghana

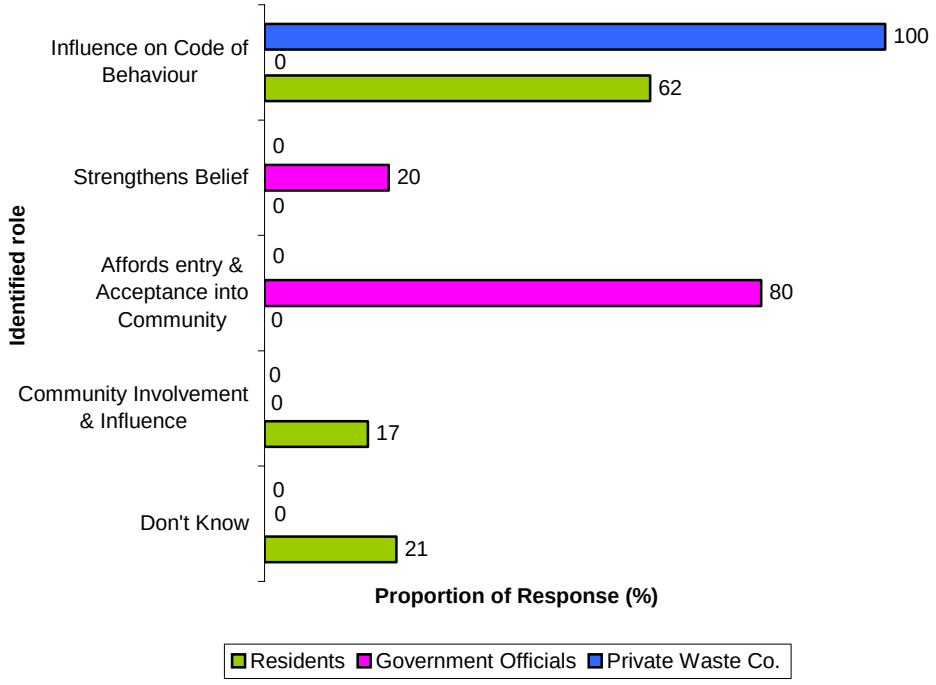


67% (40/60) of government officials' responses identified local knowledge's role in daily decision making with community involvement and influence, and 17% (10/60) identified it with the ability to afford them entry and acceptance into the community. Another 17% (10/60) identified its influence on code of behaviour; a role, which a greater proportion, 57% (57/100), of private waste companies identified it with. Further, the private waste companies, identified community involvement and influence, 14% (14/100), and the ability to afford entry and acceptance into the community, 29% (29/100). The identification of local knowledge's nuance role in influencing the code of behaviour of the people is corroborated by observations made in a focus group discussion with the Chief of the Sempe Stool and his court at his palace in Accra, when he opined that,

> Traditional knowledge plays an important role in our daily lives. It involves language, lifestyle, etc., so it influences people's perceptions, attitudes and conception of the people in a living area and becomes very important. The question of the behavioral problem and mental attitude and what one conceives of waste in one area, may be perceived differently in another area, so how to marry behaviors so as to change it is important, especially through traditional knowledge. Language use for instance can be important for communicating. I mean when I was growing up, gutters at "Bukom" were cleaned regularly by the neighbours who told us the kids stories in Ga about why cleanliness was good for us because it pleased the ancestors but now this passing of understanding of the relationship between us, our culture, and the environment doesn't happen any more because there are urbanization pressures, and also poverty plays an important role because people have to pay to dump their waste and so they would rather do it in a rubber bag and dump it in the gutter (Field Survey, 2004).

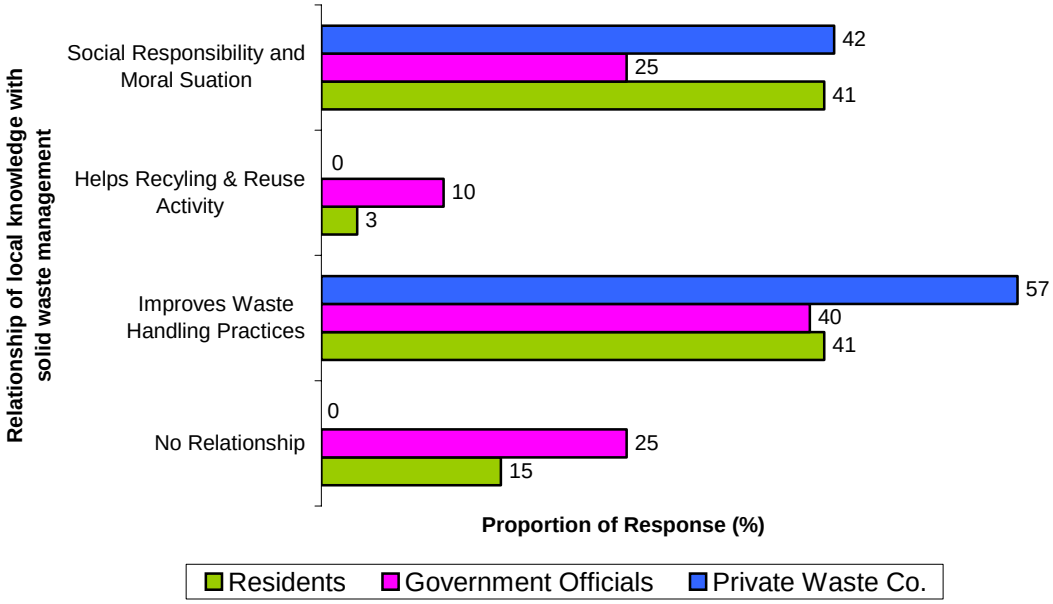
With respect to Kumasi, presented in Figure 6-8, 62% (41/66) of residential responses and all of the private waste companies' responses, 100% (5/5), identified local knowledge's role in day-to-day decision making to be key with respect to influencing code of behaviour. The government officials 80% (80/100) overwhelmingly identified affording entry and acceptance in to the community. Also, they identified the strengthening of beliefs, 20% (20/80).

Figure 6-8: Identified roles that local knowledge plays in the daily decision making process of respondents in Kumasi, Ghana



Further, four main themes: improves waste handling practices, helps recycling and reuse, social responsibility and moral suation, and no relationship, emerged as the reasons given by the residents, private waste companies, and government officials interviewed for their identification of a relationship between the roles they outlined local knowledge as having in their day-to-day decision making, and managing solid waste management activities in both Accra, and Kumasi. In the case of Accra (Figure 6-9), improvements in waste handling, residents 41% (14/34), government officials 40% (40/100), and private waste companies 57% (57/100), and social responsibility and moral suation, residents 41% (14/34), government officials 25% (25/100), and private waste companies 43% (43/100), were the most noted by all three stakeholders in high proportions.

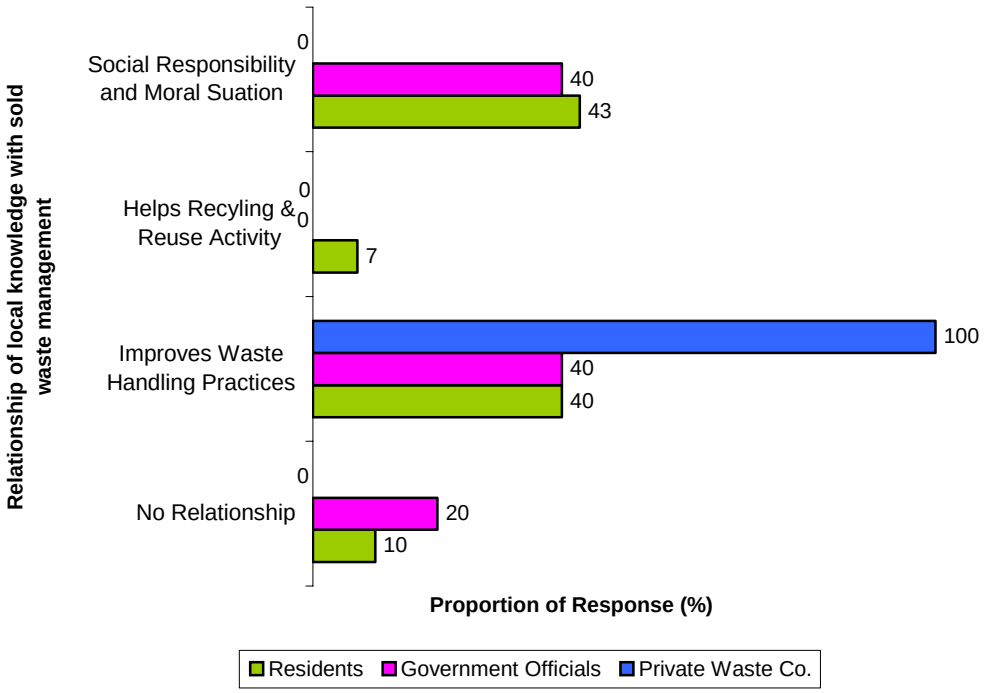
Figure 6-9: Stakeholders identification of relationships between local knowledge and solid waste management in Accra, Ghana



Also, 15% (5/34) of residents', and 25% (25/100) of government officials stated no relationship, however the government officials, 10% (10/100), and the residents 3% (1/34), identified help with recycling and reuse activity.

In Kumasi, it is most notable that the only identified relationship between their day-to-day use of local knowledge and solid waste management activities by the private waste companies 100% (10/10) is that it affords improvements in waste handling practices (Figure 6-10).

Figure 6-10: Stakeholders identification of relationships between local knowledge and solid waste management in Kumasi, Ghana

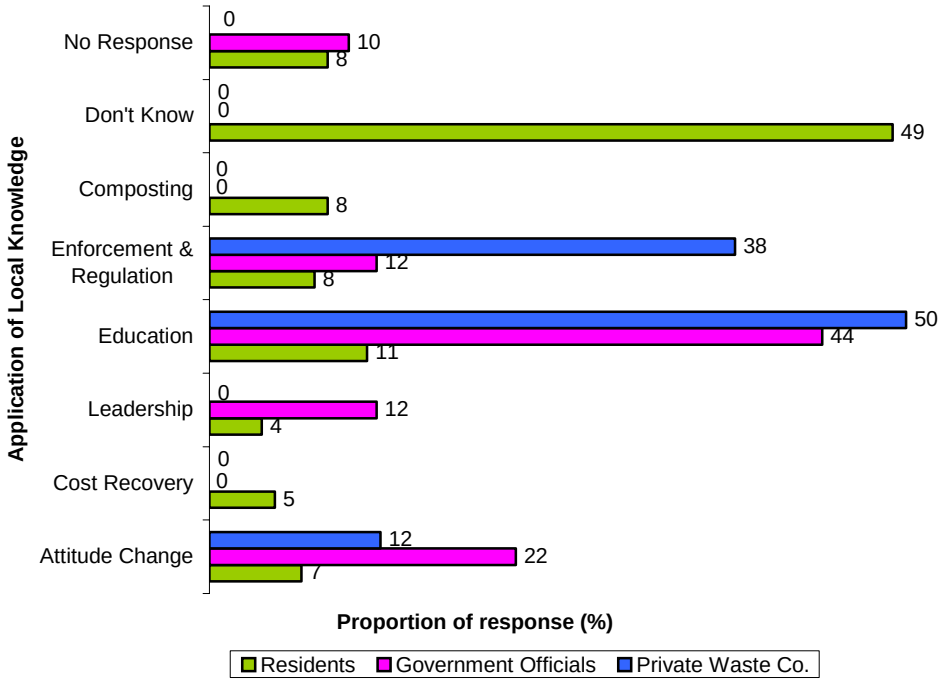


Also, only the residents, 7% (5/70), identified help with recycling and reuse activity. Both the government officials, 40% (40/100), and residents, 40% (27/70), identified improvements in waste handling practices. Again, they identified social responsibility and moral suation, 40% (40/100), and 43% (30/70) respectively. A small proportion, 10% (7/70) of residents' responses, and 20% (20/100) of government officials' responses stated that there was no relationship.

Closely linked to the identification of the relationship between local knowledge use in day-to-day decision-making, and solid waste activities in both Accra and Kumasi, are the applications to which the residents, government officials and private waste companies have put their local knowledge with respect to solid waste activities in the cities. In this

regard, six themes were identified for local knowledge application in decision making around solid waste activities as follows: attitudinal change, cost recovery, leadership, education, enforcement and regulation, and composting. There are also responses of don't know, as well as some non-responses (Figure 6-11).

Figure 6-11: How Respondents apply their local knowledge to solid waste activities in Accra, Ghana

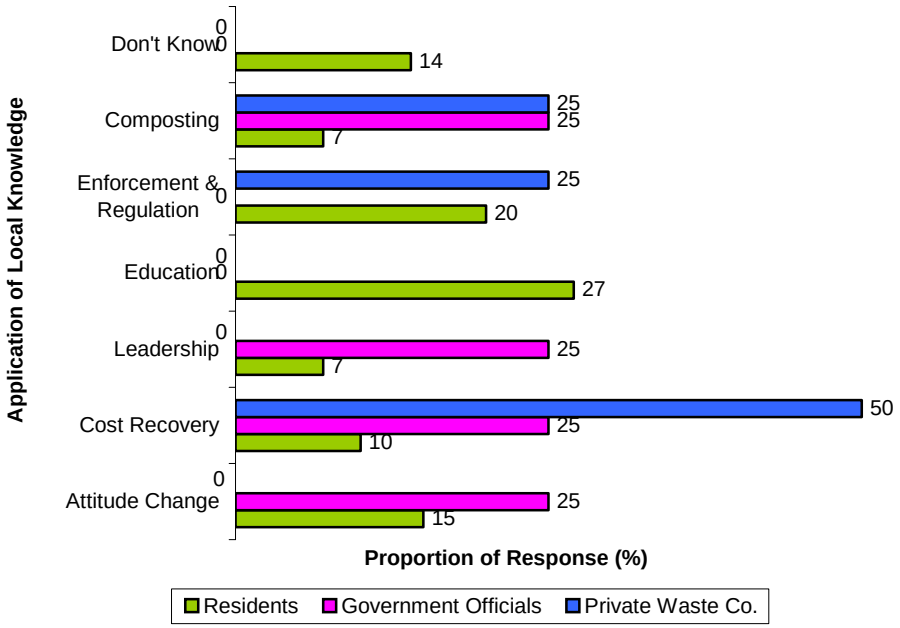


With respect to Accra, the private waste companies stated education 50% (57/114), enforcement and regulation activities, 38% (43/114), and attitude change, 12% (14/114) as what they apply their local knowledge to. Also, 44% (44/100), 22% (22/100), and 12% (12/100) of responses by government officials indicated education, attitude change, and enforcement and regulation respectively. A further 12% (12/100) of government responses also identified leadership. Only the residents indicated applying local knowledge to composting activities, 8% (9/106). Also notable is the fact that the residents were the only ones to identify cost recovery as well, 5% (5/106). Education, 11%,

(12/106) enforcement and regulation 8% (8/106), and attitude change 7% (7/106), were the top three ways in which residents applied their local knowledge to solid waste activities in Accra.

Also, in the case of Kumasi (Figure 6-12), the distribution of responses with respect to the various themes indicated, reflect a wide application of local knowledge with respect to solid waste activities by the stakeholder groups.

Figure 6-12: How Respondents apply their local knowledge to solid waste activities in Kumasi, Ghana



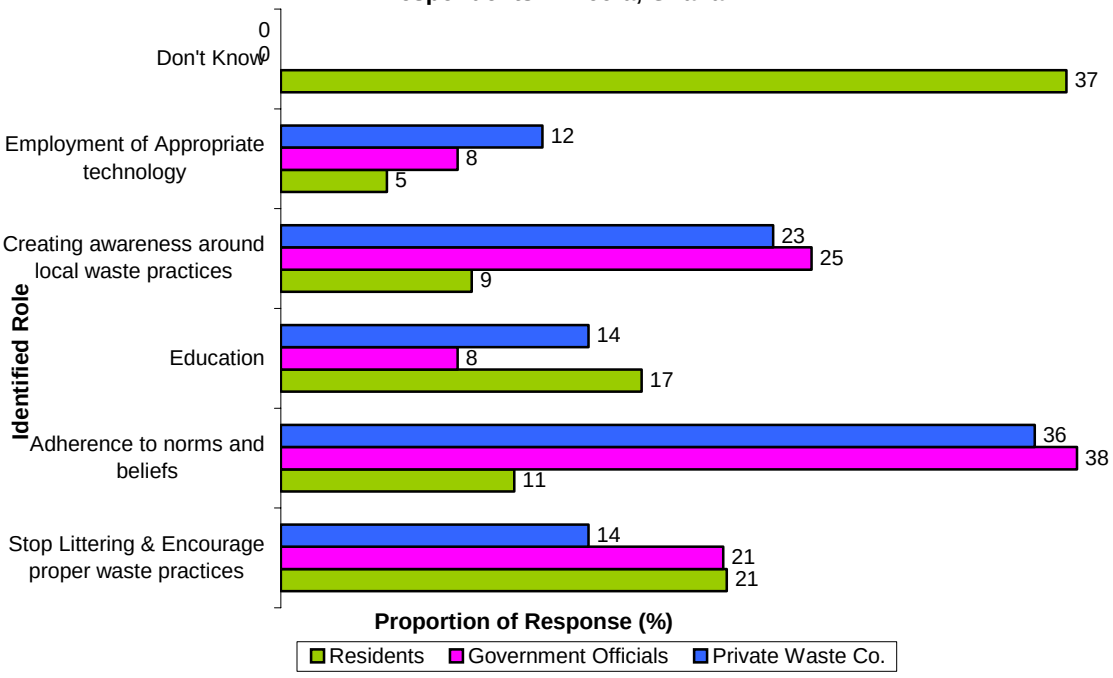
The government officials' responses indicated, attitude change, cost recovery, leadership, and composting in equal proportions of 25% (25/100) each. The private waste companies identified cost recovery, 50% (4/8), enforcement and regulation, 25%(2/8), and composting 25% (2/8), whiles the residents identified education 27% (27/100), enforcement and regulation 20% (20/100), attitude change, 15% (15/100), and cost

recovery and leadership, 10% (10/100) and 7% (7/100) respectively. 14% (14/100) also stated that they did not know.

6.3 Identified roles for local knowledge in solid waste management in Accra, and Kumasi

In both cities, respondents identified five roles for local knowledge in planning and managing solid waste. These are to stop littering and encourage proper waste practices, adherence to norms and beliefs, education, creating awareness around local waste practices, and the employment of appropriate technology, all presented below.

Fig 6-13: Roles identified for local knowledge in solid waste management by respondents in Accra, Ghana

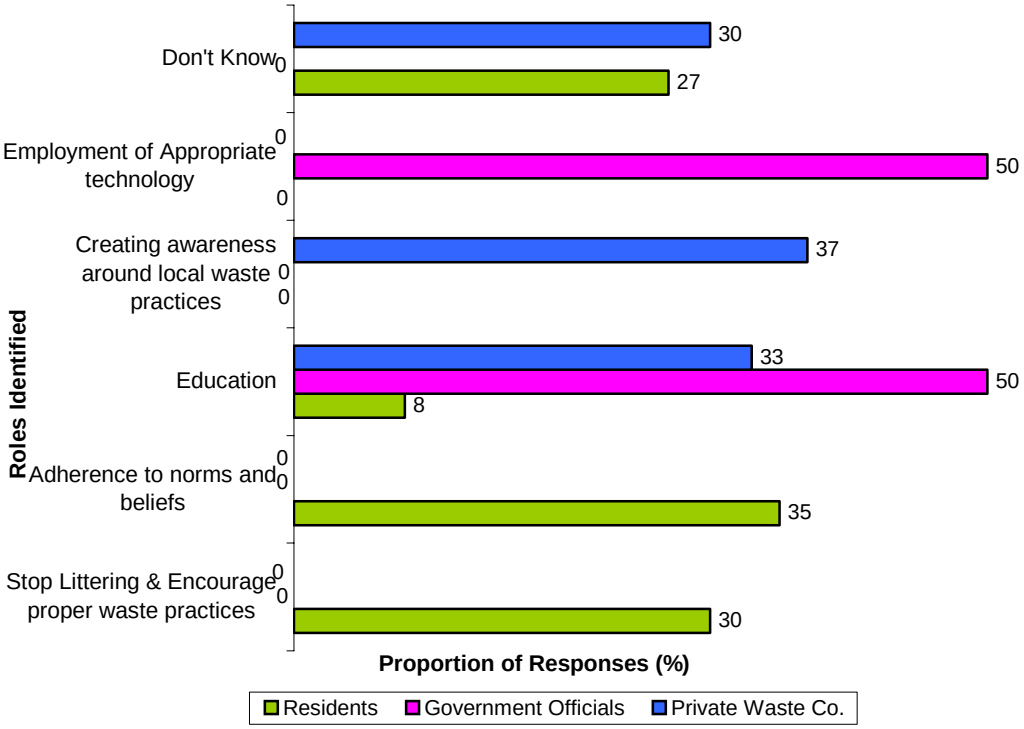


For the private waste companies in Accra, adherence to norms and beliefs, 36% (49/138), and creation of awareness around local waste practices, 23% (32/138), are the key roles. The majority of the residents' responses, 37% (37/100), stated that they did not know. However, 21% (21/100) of residents' saw local knowledge as potentially helping to deal

with littering and encouraging proper waste handling practices; whiles, 17 % (17/100) identified a role for it in education around waste management, with 11% (11/100) identifying the adherence to norms and beliefs. For government officials' adherence to norms and beliefs, 38% (45/120), creating awareness around local waste practices, 25% (30/120), and 21% (25/120) for stopping littering and encouraging proper waste practices, were the top three roles identified for local knowledge. In regards to education, and the employment of appropriate technology, 8% (10/120) each of the government officials' responses respectively, identified them.

In Kumasi (Figure 6-14), for government officials, the most prominent roles for local knowledge with respect to solid waste activities are the employment of appropriate technology, 50% (2/4), and education, 50% (2/4). For the private waste companies, 33% (30/90) noted education, and 37% (34/90) the creation of awareness around local waste practices, with a further 30% (26/90) stating they did not know of any roles. The residents in Kumasi only identified three roles: education, 8% (8/100), adherence to norms and beliefs, 35% (35/100), and stopping littering and encouraging proper waste practices, 30% (30/100). It is notable that neither the government officials nor the private waste companies indicated the adherence to norms, and stopping littering as roles for their local knowledge use. Also worth noting is the fact that only the government officials indicated the employment of appropriate technology.

Fig 6-14: Roles identified for local knowledge in solid waste management by respondents in Kumasi, Ghana



In line with the identification of the roles local knowledge plays in solid waste activities, the indications of the present use of local knowledge at the institutional level of solid waste management in Accra and Kumasi was explored. Strikingly similar thematic trends were observed in both cities, illustrated in Figures 6-15 and 6-16. In the case of Accra, it was notable that a high proportion of the residents' responses, 89% (80/90) indicated that they were not aware of the use of local knowledge at the institutional level. This may be due to the fact that most residents are not well aware of the inner workings of the Waste Management Department. Also, 47% (47/100) of the private waste companies, and 30% (30/100) of the government officials indicated not knowing of its use. Alternatively, the majority of government officials, 70% (70/100) and private waste companies, 53%, (53/100) indicated that local knowledge was being used presently at the institutional level

by the Waste Management Department of the Accra Metropolitan Assembly; suggesting that the Waste Management Department uses local knowledge in its day-to-day waste management activities.

Figure 6-15: Indications on the present use of local knowledge in relation to the institutional arrangements of the Waste Management Department (WMD) of the Accra Metropolitan Assembly (AMA) by Respondents in Accra, Ghana

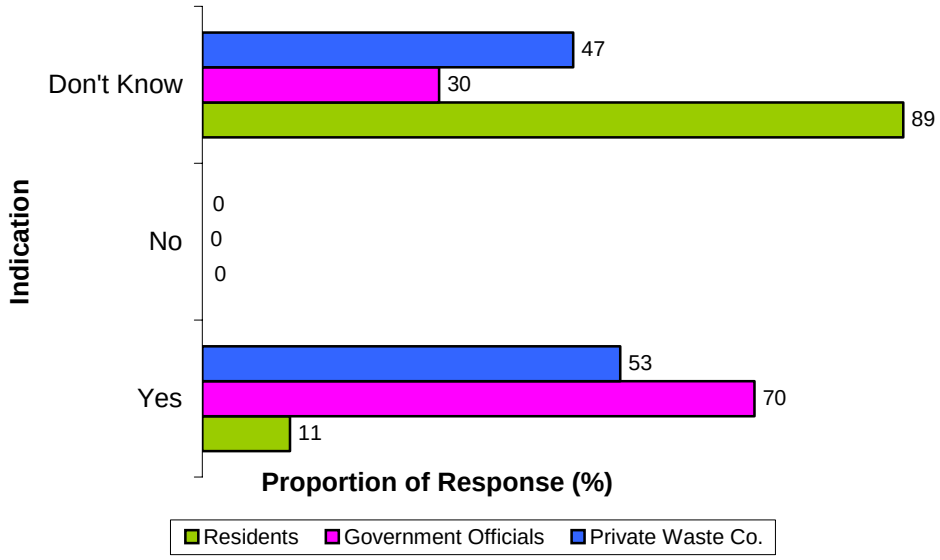
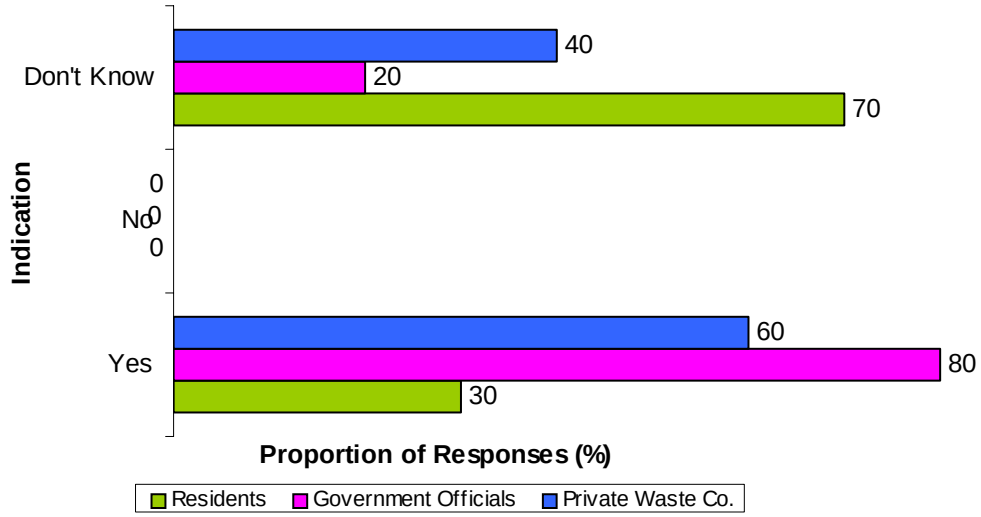


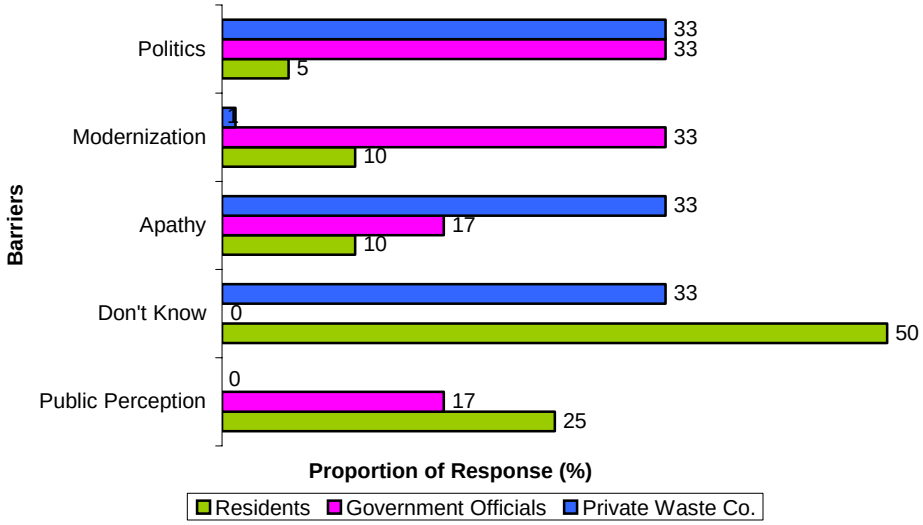
Figure 6-16: Indications on the present use of local knowledge in relation to the institutional arrangements of the Waste Management Department (WMD) of the Kumasi Metropolitan Assembly (KMA), by Respondents in Kumasi, Ghana



In Kumasi, the trend is quite similar with regards to the indications on the present use of local knowledge at the institutional level (Figure 6-16). Here, the government officials, 70% (70/100), and the private waste companies 60% (6/10) strongly indicate local knowledge's use presently by the Waste Management Department of the Kumasi Metropolitan Assembly in its day-to-day solid waste management activities. Also, a 30 % (30/100) of residents' responses acknowledge this indication; however, the overwhelming majority, 70% (70/100), indicated the residents' lack of awareness of local knowledge use at the institutional level in Kumasi. Further, 40% (4/10) of private waste companies, and 20% (20/100) of government officials indicated that they did not know of local knowledge use either.

Additionally, a number of themes emerged in regards to constraints experienced with the use of local knowledge in solid waste management activities in both Accra and Kumasi, presented here in Figures 6-17 and 6-18:

Figure 6-17: Knowledge or Experience of Barriers to the use of local knowledge in planning solid waste management in Accra, Ghana

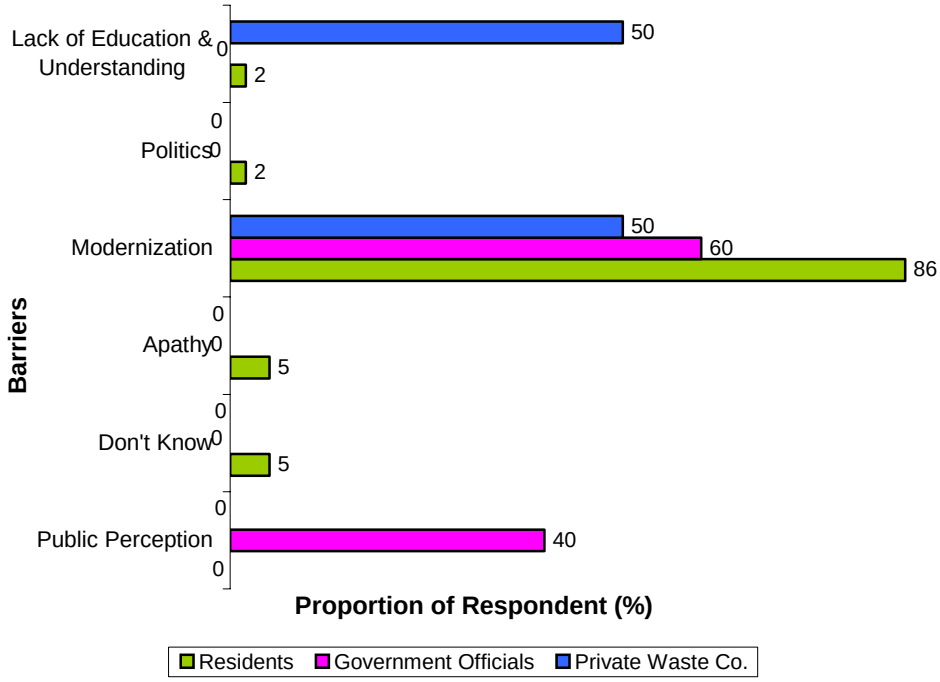


In Accra, (Figure 6-17) the four themes identified by residents, government officials, and private waste companies as constraints to the use of local knowledge in managing solid waste activities are politics, modernization, apathy, and public perception. The residents mostly, 50% (10/20), noted that they did not know; however they also indicated, the general public's perception, 25% (5/20), apathy and modernization, 10% (2/20), each, and politics, 5% (1/20) as constraints. The private waste companies barely acknowledged modernization, where as they either expressed strong indications for apathy, 33% (14/44), and politics, 33% (14/44) or did not know, 33% (14/44). The government officials were the only ones who indicated all four themes, politics 33% (20/60), modernization, 33% (20/60), apathy, 17% (10/60), and public perception also 17% (10/60), as key constraints in their experience of using local knowledge in the planning and management of solid waste activities in Accra.

In Kumasi, (Figure 6-18), the five themes identified by residents, government officials, and private waste companies as constraints to the use of local knowledge in planning and managing solid waste activities are the lack of education and understanding, politics, modernization, apathy, and public perception. Unlike the case of Accra, politics is not a main constraint here, and the lack of education and understanding has emerged as a constraint. The residents overwhelmingly, 86% (86/100), put down the constraints to local knowledge use from their experience, to modernization. They barely acknowledged politics and the lack of education and understanding, 2% (2/100) each, and only marginally note apathy, 5% (5/100), as constraints. The private waste companies only

acknowledged two of the five themes as constraints: modernization, 50%, (5/10) and the lack of education and understanding, 50% (5/10). Government officials also only indicated two themes: public perception 40% (4/10), and modernization 60% (6/10) as the key constraints in their experience of using local knowledge in the planning and management of solid waste activities within Kumasi.

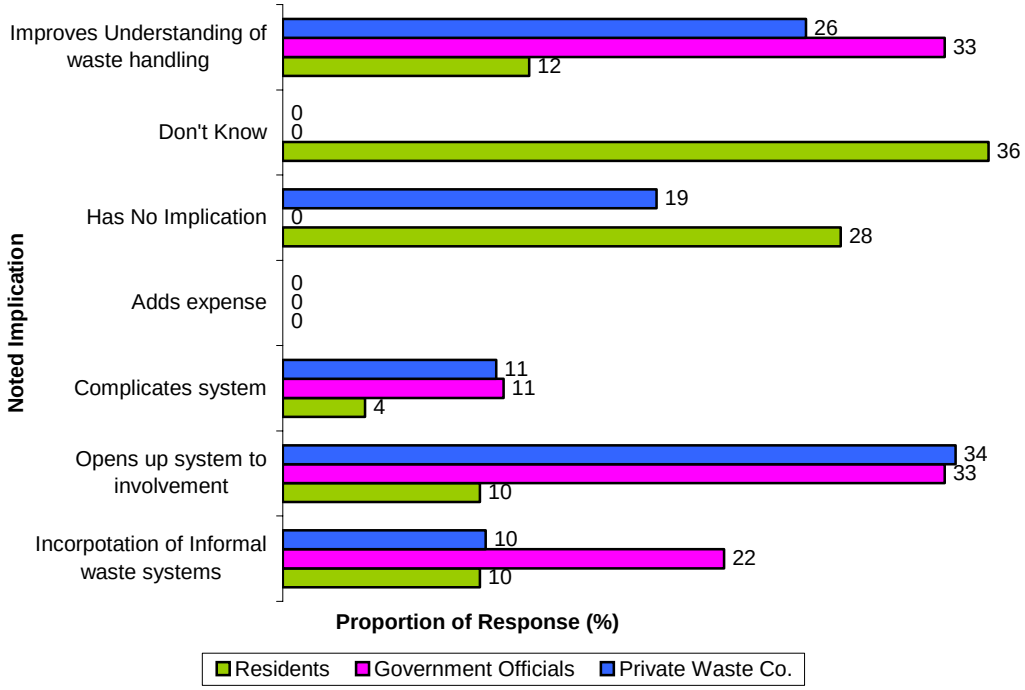
Figure 6-18: Knowledge and Experience of Barriers to the use of local knowledge in planning solid waste management in Kumasi, Ghana



It is worth noting that in both sets of findings presented above, the structure of the particular question on the experience of barriers to local knowledge use was targeted at the know how of private waste companies, and government officials, who are better acquainted with the institutional arrangement for planning solid waste management in Accra and Kumasi.

A similar set of themes emerged in both cities regarding the implications of local knowledge use in solid waste management and planning. These are that it allows for the incorporation of informal waste systems into the institutional solid waste arrangements, opens up the solid waste system to wider involvement, complicates the system, adds expense, and improve the understanding of waste handling. There were also responses of no implication, and don't know. In Accra (Figure 6-19), four themes stand out: the improvement of understanding of waste handling practices, the incorporation of informal waste systems, the openness of the system to the involvement of a wider section of the general public, and the complication of the system, as the themes to have emerged from responses from residents, government officials, and private waste companies. No one in Accra thought the use of local knowledge in managing and planning solid waste activities adds expense. Also notable is the fact that only the private waste companies, 19% (35/186), and residents, 28% (34/121), stated that there are no implications for using local knowledge, however all of the government officials' responses indicated an implication for use.

Figure 6-19: Implications of Local knowledge involvement in solid waste management and planning in Accra, Ghana

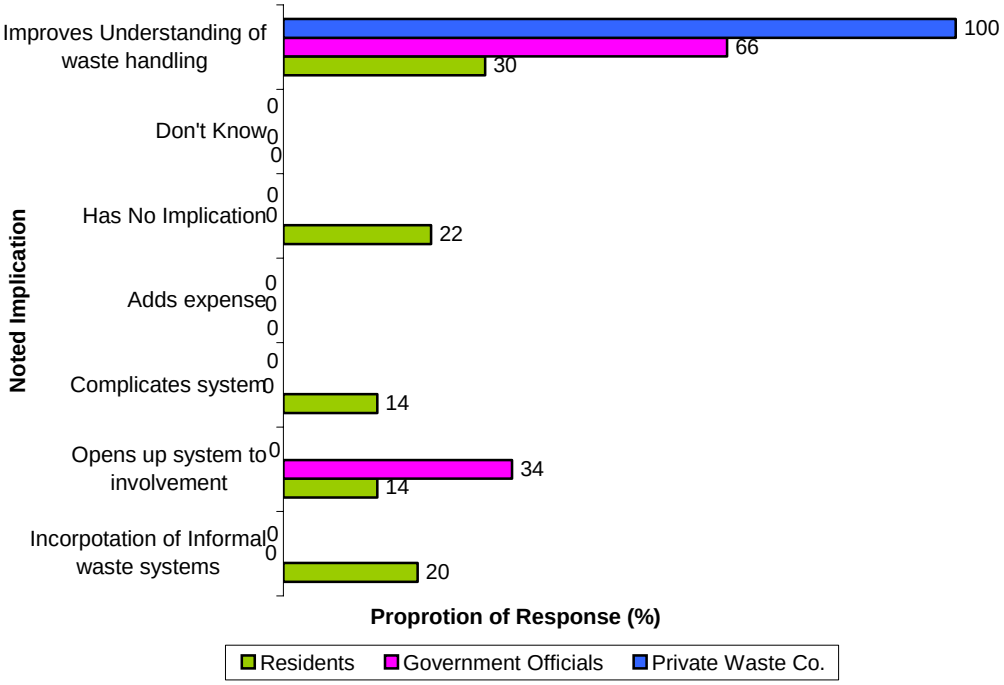


Also, the government officials identified the opening up of the system to involvement, 33% (30/90), and improving understanding of waste handling, 33% (30/90) as the two most distinctive implications. They also note the incorporation of informal waste systems, 22% (20/90), and then complication of the system, 11% (10/90), as their least stated implication. The majority of the private waste companies, 34% (63/186), stated that local knowledge use opens up the system to involvement, and 26% (49/186), noted that it improves the understanding of waste handling. However, 11% (20/186) state that it complicates the solid waste system.

In Kumasi (Figure 6-20), improvement of the understanding of waste handling practices was the distinctive implication identified by all three, stakeholder groups residents, 30%

(30/100), government officials, 66% (80/120), and private waste companies, 100% (15/15). The other notable trend was the only other acknowledgement of the fact that the waste management system in place in the city could gain more involvement from the general public through local knowledge use. It is interesting to note that none of the three groups identified the addition of expense as an implication of local knowledge use. Also, the residents, 22% (22/100), stated that local knowledge use had no implications. Complicates system, 14% (14/100), and the incorporation of informal waste systems, 20% (20/100), were identified by only residents' responses as observed in Figure 6-20.

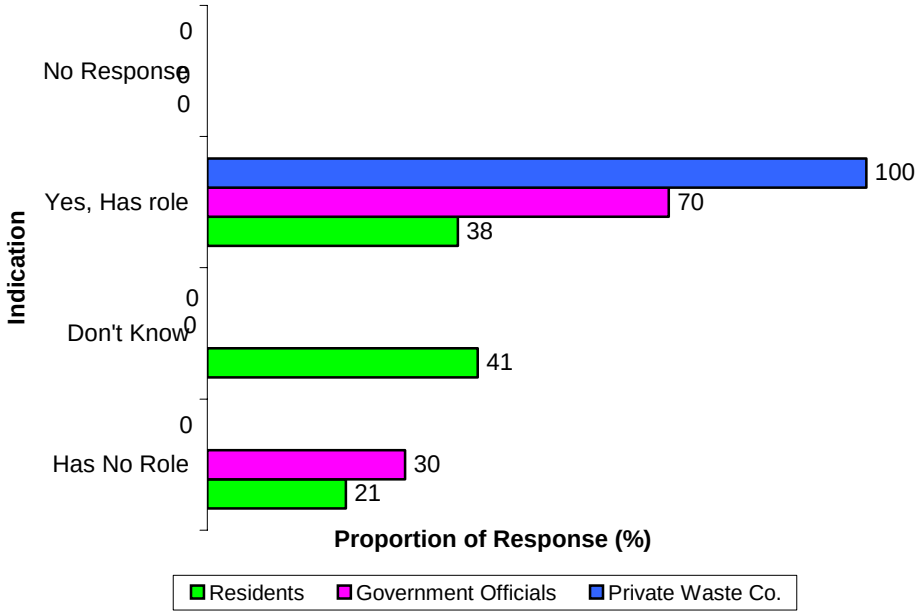
Figure 6-20: Implications of local knowledge involvement in solid waste management and planning in Kumasi, Ghana



In spite of the implications outlined in the preceding findings, all three, stakeholder groups: residents, private waste companies, and government officials indicated that local

knowledge still has a role to play in solid waste management. The results are presented in Figure 6-21.

Figure 6-21: Stakeholders' indication as to whether local knowledge has a role to play in solid waste management in Accra, Ghana

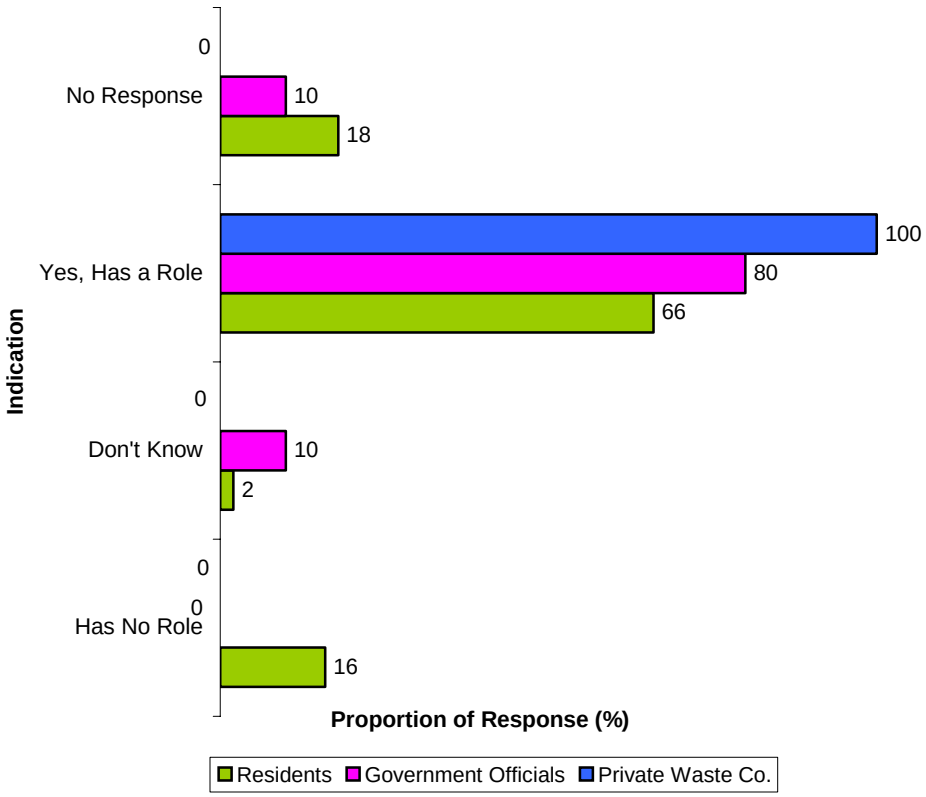


As presented, all the private waste companies' responses, 100% (17/17), affirmed that local knowledge still has a role to play; while, 70% (7/10), of the government officials', and 38% (38/100) of the residents' indicated that it still has a role. Only 30% (3/10) of government officials, and 21% (21/100) of the residents' indicated that it had no role. A notable majority, 41% (41/100) of residents, stated that they did not know if local knowledge still had a role to play in solid waste management in Accra.

In the case of Kumasi (Figure 6-22), all the private waste companies, 100% (5/5), indicate that local knowledge still has a role to play in solid waste management in spite of the implications. Government officials, 80% (8/10), and residents, 66% (66/100), also

affirm that local knowledge still has a role to play. Only 16% (16/100) of the residents' state that it no longer has a role to play, and 10% (1/10) of government officials indicate that they do not know.

Figure 6-22: Stakeholder's indication as to whether local knowledge has a role to play in solid waste management in Kumasi, Ghana



CHAPTER 7

DISCUSSION OF FINDINGS: LINKING THE FINDINGS TO THE CURRENT THEORETICAL DEBATE

7.0 Introduction:

The presentation of findings in the preceding chapters provide some insight into the role local knowledge is playing in planning and managing solid waste in both Accra and Kumasi. In linking the findings of this research to the current theoretical debate, the research seeks to build on the existing discourse on waste management in the cities of Accra and Kumasi in particular, and in African cities and the developing world in general. Thus, to assess the theoretical implications of these findings, this chapter discusses the findings with respect to: (i) the institutional arrangements of solid waste management; (ii) the environment and health issues; (iii) the financial viability and effectiveness of the solid waste management system; (iv) the chieftaincy (indigenous political) institution in local governance; (v.) the role local knowledge plays in planning and managing solid waste activities; and (vi.) integrating local knowledge in planning. The subsections that follow outline this discussion.

7.1 Institutional arrangements of solid waste management

The system of solid waste collection in Accra and Kumasi are organized and run through institutional arrangements. It emerged from this study that the institutions dealing with waste management range from government agencies to households themselves, operating at different levels. The households, the local governments (district assemblies), and private companies weave a complex and complicated institutional framework within which solid waste services are delivered in Accra, and Kumasi. There were two basic

types of institutional arrangements for waste collection found in Accra and Kumasi: (i) the house-to-house collection, and (ii) the central communal container collection. This manifestation of the solid waste arrangement is akin to solid waste service provision arrangements discussed in the literature by Obirih-Opareh (2001), Doan, (1997), and Roth (1987). Also, it emerged from the study in Accra and Kumasi that there is a correlation between the type of institutional arrangement and the socio-economic status of the area within which it is deployed. As such, the institutional arrangements in a particular area depend on, the socio-economic characteristic of the area, the physical characteristics, and the prevailing policy of the local government. In high income areas where the house-to-house collection system operates, the service is comparatively more reliable, and residents pay user fees. In contrast, the communal container collection system operates in low-income areas, and is free of charge to residents, and financially unsustainable for the local government, which bears the cost.

Within this arrangement, the waste is collected and sent straight to disposal, even though the collection in operational situations does not always conform to the stipulated frequency. Infrequent collection was found to be the main problem with service provision for residents. The only disposal option in use in both Accra and Kumasi is landfilling. This approach to managing solid waste has focused on getting rid of the trash, with little attention to minimization or recovery efforts. This is characteristic of the conventional approach to solid waste management outlined in the literature by Paerbo (1991), and Cointreau (1982). The conventional approach to waste management has been noted by Furedy (1994, and 1995) to be increasingly unable to cope with the problems of urban

waste management, a fact corroborated by findings in this study on the problems of solid waste management in Accra, and Kumasi. In this regard, the lack of containers, infrequent collection, lack of capital, lack of funding, lack of adequate knowledge either for residents in proper waste handling practices, or private waste companies, and government officials in training, and the lack of enforcement were all found to be problems of the solid waste management services in Accra and Kumasi. Of these, the lack of capital, and funding were the two main problems for the service providers, a finding characteristic of the conventional approach also noted in the solid waste management literature by Arlosoroff and Bartone (1987), Sicular (1992), Cointreau-Levin, (1994), Ali and Saywell (1995), UNCHS (1996), and Onibokun and Kumuyi (1999) amongst others.

It also emerged in the study that there is little public awareness, limited public participation, and communication between the residents, government officials, and private waste companies, characteristic of solid waste management problems noted in the literature by Soerjani, (1984), Ogawa, (1989), Ouano, (1991), Sinha (1993), and Ali and Saywell (1995). This was manifested through the major problems identified with the solid waste services. For the residents, the major problems with the current solid waste management practices in Accra and Kumasi were the inadequate number of solid waste collection bins, and their infrequent collection. Whereas, the government and private waste companies did not acknowledge this as an issue, but were focusing on larger scale problems like funding and insufficient capital available for collection, disposal, and enforcement. This variation in noting the major problem type to each group suggests, the

scales at which the stakeholder groups observe these issues: the individual and household level by the residents, and the citywide level by the government officials and private waste companies. Understanding this helps with the strategic planning of potential interventions to improve the solid waste management system. As such, specific intervention efforts can be targeted at specific groups of stakeholders or at the level at which they can be best successful in resolving these problems.

Another notable finding of the study was the relationship between the collection arrangements within this conventional approach to waste management, and environment and public health consequences in both Accra and Kumasi. For instance choked gutters and drains were found to be one of the environmental issues in both cities; this is also consistent with observations made by Mosha (1990) that in most African cities, most sewers and drains are often blocked by garbage, and end up attracting harmful insects and bacteria. As is the case in Accra, and Kumasi, the perceptions of incidences and prevalence of malaria, and cholera were both found to be the two highly occurring health issues associated with waste handling practices, by the residents, and government officials. Also it was found that apart from the private waste companies that delivered the waste collection services, the residents and government officials perceived the natural environment to be “very bad”. Forbes (1995), Pfammatter and Schertenleib, (1995), UNHCS (1994), and Medina (1993) have also all noted environment and public health risks in relation to solid waste management in developing countries.

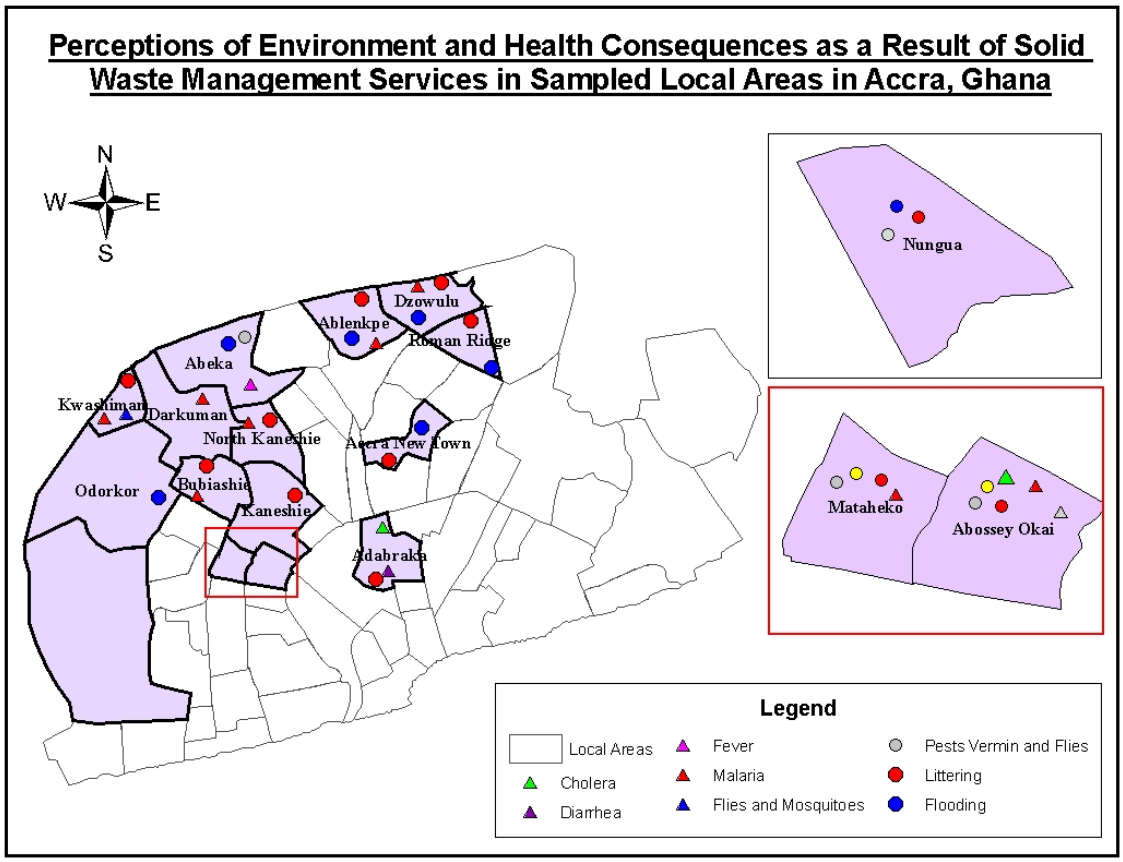
Also, the different types of solid waste collection services were found to be related to the degree of environment and health consequences perceived to be experienced in the various parts of the cities. Even though the environment and health consequences of solid waste management are experienced throughout both cities, areas serviced by communal containers are the most impacted by current solid waste management services. While the neighbourhoods with house-to-house collection showed fewer occurrences of environment and health concerns. Furthermore, regulation and enforcement of collection, and disposal is fragmented legislatively, and weak in both Accra and Kumasi. This is akin to the observations on regulation and enforcement in solid waste management in African cities noted by Segosebe and Van der Post (1990). In the following subsection (7.2), a more comprehensive discussion is made of the environment and health issues.

7.2 Environment and Health issues

Silitshena (1996) has noted that the main environment and health problems that occur as a result of solid waste management are at the citywide level. In this regard there were altogether, 16 environment and health issues found by this study as a result of solid waste management in Accra and Kumasi, and in combining the spatial representations (Maps 5-4 and 5-5 for Accra, and Maps 5-6 and 5-7 for Kumasi) of the major environment and health issues, several themes become apparent. With regards to Accra, there is a relationship between the perceptions of the occurrences of malaria and littering illustrated in Map 7-1. These two issues are consistently located in the same districts, or in adjacent districts, the only exceptions are Kaneshie where only littering was identified, and Odorkor where only flooding presented. According to Ezzati (2005: 18) the presence of

flooding is closely related to littering, and to areas that have high rates of malaria or flies and mosquitoes. As such, flooding as a result of littering can be seen as a cause of creating breeding grounds for mosquitoes.

Map 7-1: Map of perceptions of Environment and Health issues identified as consequences of solid waste management activities in Accra, Ghana



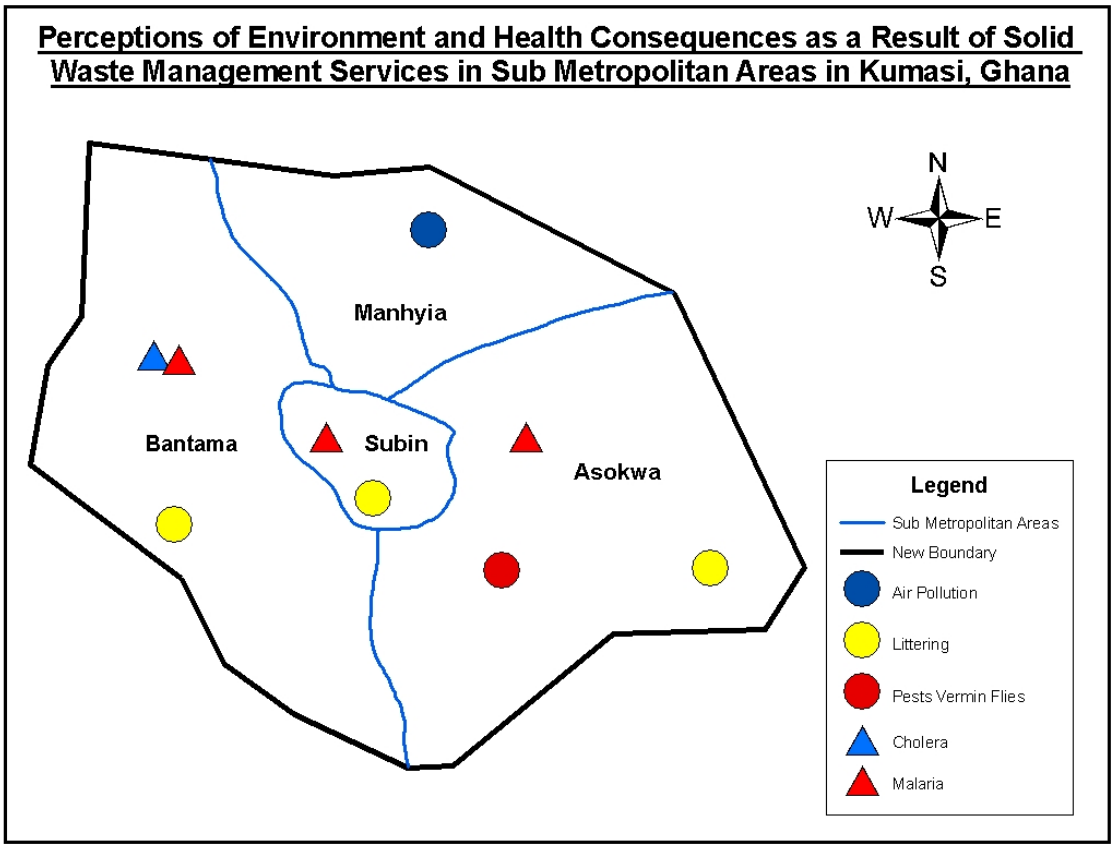
Source: Field Survey (2004)

Also notable is the clustering of the perceptions of incidences and prevalence in all but three of the localities, Odorkor, Darkuman, and Kaneshie. Mataheko, Abossey-Okai, and Nungua present with the highest clustering of environment and health issues, indicating the poor state of sanitation in these localities. The clustering of the environment and health consequences of solid waste management activities in Accra reflect similar

observations made by Songsore et al., (1998) attributing the 10 most common health problems in Accra to poor environmental sanitation conditions.

In Kumasi, illustrated in Map 7-2, littering and malaria both occur within the same sub metropolitan areas: Asokwa, Subin, and Bantama, indicating a relationship between their ocurrances.

Map 7-2: Map of perceptions of Environment and Health issues identified as consequences of solid waste management activities in Kumasi, Ghana



Source: Field Survey (2004)

Also, both Asokwa and Bantama present with the highest clustering of environment and health issues, three each, indicating the poor state of sanitation in the sub metropolitan areas. Clearly, a spatial environmental health relationship might be perceived between the

occurrences of littering and the perceptions of occurrences of malaria in both Accra and Kumasi. These findings regarding the correlation spatially between malaria and littering occurrences in both Accra and Kumasi, is corroborated by Amofah, Knott, and Amexo (2001) who note malaria as the most prominent health concern in regards to environmental sanitation, accounting for over 40% of the outpatients in health centers in Accra and Kumasi. Also, the Environment and Metropolitan Health Department (EMHD) of both the Accra Metropolitan Assembly, and the Kumasi Metropolitan Assembly have stated that, the emergence of malaria as a result of solid waste management practices is significant because it is a disease that contributes to the rather high morbidity, and mortality rates in these cities (EMHD/KMA/AMA, 2004).

7.3 The financial viability and effectiveness of the solid waste management system

Several studies, official government documents, and news media reports suggest that the outlook for financial viability for waste collection systems in both Accra and Kumasi are bleak. Van der Geest and Obirih-Opareh (2002), Post (1998), Demanya (2001), and Ewool (2004) have all commented extensively on the weak financial capabilities of the Accra Metropolitan Assembly, and Kumasi Metropolitan Assembly with respect to waste management activities undertaken. Besides the commentary in the literature, the lack of capital, and funding emerged as major problems facing solid waste management in both Accra, and Kumasi in the study. In this regard, considerations around the collection service types provided to various parts of the cities of Accra, and Kumasi, together with the choice of appropriate equipment, and budgetary allocations for their operation, and maintenance of the equipment are very important for the financial viability and

sustainability of the solid waste management system. Thus, for the system to be viable, it must retain an ability to sustain itself. Obirih-Opareh (2002: 224), states that "the continuity of an activity ultimately depends on its financial viability, and the assurance that revenue will continue to balance the costs incurred". In both Accra and Kumasi, internally generated revenue was found to fall way short of the costs for delivering waste services by the Metropolitan Assemblies. However, considering the public good nature of solid waste management, solvency for financial sustainability depends on the revenues that are internally generated by the local administration running the system.

The most important financial problem encountered with regards to the central container collection service was the tardy payment by the Metropolitan Assemblies of invoices to the private waste companies. The major repercussion of is irregular collection services that lead to waste pile ups at collection sites. The financial viability of the house-to-house collection arrangements is considerably better than that of the communal container collection and so the collection efficiency in the areas with communal containers is poor as this type of service still does not attract user fees instead, contractors are paid for each recorded trip of waste to the dumpsite or landfill; while, in the house-to-house, the willingness of residents to pay depends on their willingness to pay in regards to whether they receive value for money. As a result, the Assemblies' financial weakness, and inability to implement appropriate cost recovery has made the system financially unsustainable, thus a better fee recovery systems needs to be put in place to make the system more durable. Such a set is needed more so for the localities where the communal container collection system is operating.

Also, it has been noted that the volume of waste generated in both Accra and Kumasi has outpaced the growth in resources for collecting solid waste. It was found that the expenditures on waste collection far outstrip revenues internally generated by the metropolitan assemblies (see Figures 5-3, and 5-4 in chapter 5) or revenues recouped through user fees. This negative variance underscores the magnitude of the funding gap. Thus, poor cost recovery, inadequate funding, and capital, put the long-term financial viability of the service at risk. For instance, central communal container collection, according to Obirih-Opareh, (2002) accounts for 70% of the total waste collection set up in Accra, and is free. This puts a severe financial burden on the Metropolitan Assembly, and affects its ability to pay private waste companies regularly. This explains the constraints that financial considerations place on the effective delivery of solid waste services.

Furthermore, it was found that without having convenient access to a collection bin or having them collected frequently, residents have resorted to dispose off garbage in alley's or gutters and drains, choking them and consequently worsening the littering problem. In this regard, Obirih-Opareh (2002), and Nunoo-Amarteifio (1991:1) have noted that the severity of the incidence of littering increases the clean up costs to Metropolitan Assemblies. Also, Anku (1997:5), and AMA (1997) have noted that although it is not a significant portion of the city's budget, the funding allocated to street sweeping could be spent in other areas of the budget such as to provide more garbage bins and containers, and also facilitate more frequent pick up of the bins and containers. As such, the high amounts of littering increase the costs needed to clean up the city. It is clear from this

that, if the collection arrangements are properly analyzed by the Waste Management Department to set up low cost operations, it will go a long way to improve the efficiency of collection, as, planning based on the frequency of collection people want, and their income levels will most likely get more people to subscribe for the service than there are now.

It was also found that, the private waste companies were not inclined to comment on the effectiveness of the solid waste management system in both Accra and Kumasi, since the system was put in place by the government. However, both the residents and government officials do not see the current solid waste provisions instituted within Accra and Kumasi to be effective in dealing with the solid waste generated within the cities.

7.4 The chieftaincy (indigenous political) institution in local government

The results of this study indicate that local knowledge has a role to play in planning solid waste management activities in both Accra and Kumasi. The study's findings on local norms, beliefs, and practices conform to those noted in the literature by Danquah (1968), Rattray (1923), Busia (1951, and 1968), Henderson-Quartey (2002), and Abayie Boaten (1998) that in Ghanaian cultures, land (the earth) is regarded not only as the giver and sustainer of life, but also as having a spiritual power that makes it fertile to support the growth of plants and animals. In this regard, Busia (1968: 41) recorded the following drum language poetry used in appellations by the *Ashanti* people of Kumasi:

"Earth condolences!

Earth condolences!

Earth and dust,

The Supreme Being,

I lean upon you,

Earth when I am about to die,

I lean upon you.

Earth, while I am alive,

I depend upon you…"

As well, this relationship of dependence on the earth and respect for the land is further actualized during all libation prayers, where the earth is mentioned next to God the Creator indicating its power as follows:

"Oh God the Creator,

I show you a drink.

Earth Yaa take a drink,

Let me avoid all accidents…" (Abayie Boaten, 1998: 45).

Also, Adarkwa and Post (2001), Arhin (2001:2), and Busia (1968: 44) have noted that the chiefs were the custodians of land, and with the elders of their courts held local knowledge which was essential not only for guiding daily life but for adjudicating conflicts.[29] Thus, they were at the center of an elaborate indigenous political system, which even though was heavily eroded by British colonial rule has survived with a lot of

[29] The chief is a person in the position of the leader of a group of people for e.g. the *Asantehene* of the *Ashantis*, and the *Ga Mantse* of the *Ga*, who are revered as the lineal successors of the founder of the state, its sub divisions, and village. His subjects feel beholden to him for their well being, and he is the head of their political community exercising judicial functions in relation to offences to ancestral spirits and other spiritual beings to whom he offered prayers for the prosperity of the community.

influence on the daily lives of people, and land tenure, affecting planning and land use, even with respect to the type of solid waste service provided today by the Metropolitan assemblies in Accra and Kumasi. This relevance of chiefs in present day Ghana is emphasized both by the findings of the study, noting chiefs' involvement in solid waste management, and the fact that chieftaincy has been institutionalized in the national constitution, and has successively featured prominently in both the 1969, and 1979 constitutions, as well as the current 1992 constitution of the Republic of Ghana. Together with the chieftaincy Act 370 of 1971, the constitutional provisions have been the basic law on chieftaincy up to date with minor amendments by instituting, National and Regional chieftaincy assemblies called the House of Chiefs.

With the study's identification of chiefs' involvement in the solid waste management decision making process by the three main stakeholders, and the noted role of the chiefs in influencing land use, the general behaviour of people through the observation of norms, beliefs, and practices, as well as their courts holding local knowledge in trust for the people, it is clear in linking local knowledge to solid waste management that an overview of the political organization of chieftaincy is necessary, to better understand a chief's connectedness with all other aspects of the society (i.e., land tenure, religion, and economic activity), and to solid waste management activities in Accra and Kumasi. This is outlined in the subsequent discussion.

Since it is believed that the indigenous rulers or chiefs hold knowledge in trust for their people (Arhin, 2001; Abeyie Boaten 1990), it is understood that before British colonial

rule commenced in 1844, the only form of administration in Ghana was carried out by the chiefs, otherwise referred to in the colonial historical literature as native or traditional authorities (Rattray, 1923; Fortes, 1940; Busia, 1968). Under this system head chiefs or paramount chiefs headed councils of sub-chiefs and elders, and Ghana comprised many parts under such paramountcies. Kessey (1996: 56-57) notes that the traditional system of government evolved along ethnic lines of affinity, with the paramountcy as the basic jurisdictional unit.[30] This is still reflected in the present day spatial organization of the country, where particular ethnic groups predominantly inhabit specific regions of the country; in the case of the cities of Accra and Kumasi, the *Ga* and *Ashanti* ethnic groups respectively. With the advent of colonial rule, this local indigenous system and modern western systems of government were merged as the British adopted the paramountcies as the basic units of administration through their "indirect rule" approach.

This development of the traditional government system has influenced greatly the current local government system in use in Ghana, as chiefs have continued to play significant roles in the social structure of Ghanaian communities, as well as the local government (Metropolitan and District Assemblies), which is taxed by law (LI1615, and LI1618) with the responsibility of solid waste management. This is made manifest by the fact that the 1992 Constitution of the country recognizes chiefs and their importance to both the socio-cultural organization of the country, and as an important institution for local level governance. Hence, chieftaincy is a well-developed institution in Ghana, having different layers of hierarchy. Chiefs also play the very important role as the custodians of the land

[30] The paramountcy is an autonomous or semi-autonomous entity with a defined spatial territory headed by a paramount chief and administered through a council of elders. It was therefore the indigenous unit of administration and development.

and culture of the people (Busia, 1968; Arhin, 2001;and, Ayisi, 1979). An acclaimed advantage of the chieftaincy system is that it is in accordance with the existing social fabric; thus, the institution continues to exert considerable influence within the society including the formal ones prescribed under the 1992 National Constitution, and *Local Government Act 462*.[31] Indeed, in some areas chiefs are still revered as intermediaries between the people, and their gods and ancestors (Yankah, 1995).

It emerged from the study that, waste management activities in Accra, and Kumasi have been faced with land availability and acquisition problems because of the complexities of the land tenure system. Since 1979, the rights of allocation of land in most parts of the country have been vested in chiefs, by the 1979 constitution. This follows the 1969 constitutional provisions that provided for the management of stool lands and their distribution for revenues.[32] The current constitutional provisions essentially follow those of 1979 in stating that: "all stool lands in Ghana shall vest in the appropriate stool on behalf of, and in trust for the subjects of the stool in accordance with customary law and usage even though all transactions ultimately have to be certified by the Lands Commission of Ghana" (Constitution of Ghana, 1992: Arts. 276(1); and Arts. 258-261). This signifies the strong influence of chiefs in land holdings and transactions in Ghana.

[31] The traditional authorities play significant roles as evidenced by their representation in local assemblies. Chiefs are represented in the 30% slot of the membership of district assemblies appointed by the president of the country. The same applies to Accra, which also has two representatives in the regional coordinating councils. Besides, chiefs are also represented in the Council of State an advisory body to the president, which functions like the Second Chamber of Parliament in some countries.

[32] The stool symbolizes the ethnic community of which a chief is a ruler. As such stool lands refer to the land that is held in trust for a community by its chief.

Within this legal framework, the highest interest in the land ownership regime is the allodial interest.[33] This absolute interest in land in Kumasi for instance is vested in the *Asantehene*, even though state intervention over the years has led to successive national governments systematically acquiring portions of these lands for state use. The situation in Accra only differs on the basis of the fact that unlike Kumasi where all interests are vested under the authority of one stool, the Golden Stool of the *Asantehene*, in Accra up to 10 paramount chiefs are vested, with a complicated right to claim by various clans and kin ("*We*"). Also, government intervention in acquiring land mostly without compensation has been more actively pursed in Accra for state use, especially during military regimes because of its status as a national capital compared to Kumasi. Presently, however, the democratic political dispensation in the country no longer supports such forfeitures. Further, it must be noted that, chiefs in both Accra and Kumasi, as occupants of the stool, possess the allodial interests to the stool lands in a manner analogous to that of a trustee, with control of the land, the ownership of which remains in the entire community. Thus, the chiefs and their subjects have the same relationship with the stool land in that they have an equal stake in the land, not withstanding the chief's authority to make allocations of parcels of land (Hammond, 2001: 81).[34]

The complexities of the land acquisition process as outlined have made the availability of land for solid waste service delivery to say the least challenging in both Accra and

[33] Allodial interest is referred to as the paramount or absolute interest. It is the highest interest capable of being owned in land in Ghana (Hammond, 2001: 81).

[34] In the case of allocation of a land by the chief, the grantee, first needs to identify the legitimate custodian who is the caretaker chief and his court of elders, and then enter into negotiations for a grant. If successful, "drink money" (as demanded by custom) is paid after which an 'allocation note' which is a written consent from the caretaker chief to grant a lease is issued. The drink money is not the purchase price.

Kumasi where land is of a high premium as these cities rapidly grow and urbanize. In an interview conducted with Mr. Godfrey Ewool of the Institute of Local Government Studies in Accra, on July 1, 2004, he emphasized this issue by stating that:

> A major problem that needs to be addressed is the acquisition of land for the treatment and disposal of waste. Out of 14 urban towns known to have acquired sites for waste disposal in Ghana, 7 sites encountered various problems. For instance the site in Sunyani, a piece of land on the outskirts of the town that had been earmarked for controlled dumping in 1994 had to be changed to another location 2 years later, as local residents buoyed by their chief objected to having waste on the land bequeathed them by their ancestors, hence the site selection process had to begin all over again causing an additional 18 months of delay. Similar land acquisition problems have occurred in Accra, at Akplaku and currently at Kwabenya where the construction of a sanitary landfill site has been on hold for over 2 years (Field Survey, 2004).

Due to the delay in finishing the construction of the landfill site at Kwabenya, the Accra Metropolitan Assembly has had to resort to finding alternative sites for disposing off waste in Accra. Currently, the Oblogo dumpsite is being used. It has also, been established in earlier chapters that the acquisition of land for citing collection sites for central containers depends mostly on allocations by chiefs.

7.5 The role local knowledge plays in planning and managing solid waste activities

The findings of beliefs, norms, and practices in the two cities distinctively possess the characteristics of local knowledge outlined by Howes (1980) as the concrete expression of a worldview that emphasizes the unity, and interrelation of man and nature. As such to get at the roles local knowledge plays in managing solid waste, the study explored and made findings regarding the involvement of local knowledge in the daily activities of the three stakeholder groups. It was found that in both Accra and Kumasi, residents, government officials, and private waste companies all used local knowledge in making decisions in their day-to-day activities. A survey of the literature, Clement (1995), Mabry (1996), Reij et al., (1996), and Schultes and Reis (1995) show such an extensive use of local knowledge. In Accra, and Kumasi, influence on code of behaviour, affording entry and acceptance into community, community involvement and influences, and the strengthening of belief were found to be how residents, government officials, and private waste companies use local knowledge in daily decision-making. Following this, the residents, government officials and private waste companies on the relationship between their daily local knowledge use and solid waste management were identified. This has been outlined to include: the improvement of waste handling practices, social responsibility and moral suation, and helps with recycling and reuse activity. This information could not have been unearthed using only quantitative methods (Lalonde, 1993). Again, findings emerged from residents, government officials, and private waste companies, on how they apply their local knowledge to solid waste activities in Accra and Kumasi. In this respect, composting, enforcement and regulation, education, leadership, recovering costs, and attitude change, emerged as the ways in which people

from the stakeholder groups applied their local knowledge to solid waste activities. With the emergence of its use, it became obvious that local knowledge was playing a role in solid waste activities. Bnuri and Apffel-Marglin (1993) have observed that local knowledge and environmental management practices advance on the basis of new experiences. Which this study will argue is how local knowledge has come to be used in solid waste management in Accra and Kumasi through its nuanced role in day-to-day decision-making of people. As a result, the study found that a number of roles were identified for local knowledge use in solid waste management, as well as the implications of this use or involvement in solid waste management, and planning in both Accra, and Kumasi. The roles identified were education, creating awareness around local waste practices, adherence to norms and beliefs, the employment of appropriate technology, and to stop littering, and encourage proper waste practices. The implications of these were twofold, positive and negative. On the positive end of the spectrum, it was found that, it improves understanding of waste handling, it adds no expense, opens up the system to greater public involvement, and allows for the incorporation of informal waste systems into the current institutional arrangements. On the negative side, it is noted to complicate the system. Further, local knowledge users were found to have experienced some barriers to doing so. These were modernization, a poor public perception, apathy, a lack of education and understanding around it, and even politics.

In spite of these, stakeholders in solid waste management in both Accra and Kumasi overwhelmingly indicated that local knowledge still continues to play a role in their solid waste management activities. This establishes the fact that local knowledge even though

it may not be immediately obvious, influences day-to-day behaviours and attitudes, as it continues to play a key role in daily decision-making. This establishes the fact that intuitional judgment, and wisdom of local people about their local environment and systems are based on their proficiency and skills gained through lifelong day-to-day experiences which are quite useful for valid and right decision-making in situations for the management, planning, and use of these systems. Hence such intuitive judgment should be integrated into the management decision making for their environment and systems. Therefore, it can be concluded that local knowledge use in decision-making influences each stakeholder group's solid waste management activity, behaviour and involvement. Furthermore, it must be noted that the value of intuition based judgments and wisdom is becoming more and more recognized within the academic discourse (see for example, Kahneman and Frederick, 2002; Finucane et al., 2000; Chaiken and Trope, 1999; Gilbert, 1999; Sloman, 1996), especially in developed countries with regards to economic decision-making in uncertain situations. The outcome of this result of the research indicates that recognition of such knowledge of local peoples should be useful for solid waste planning and management in African cites, and developing countries, as well as environmental management in general.

7.6 Integrating local knowledge in planning

There are numerous ways of attempting to answer the question of what the implications of this research's findings are for planning practice and theory. At the most general, one starting point is to consider what a planner should know. Thinking of what a planner should know leads to what a planner should do. In this regard, John Friedmann (1996)

defines a “substantive domain” of planning—which refers to the areas in which all professional planners should be knowledgeable, regardless of their individual specialties. According to Friedmann (1996), the substantive domain of planning encompasses the following interrelated socio-spatial processes: urbanization processes, regional and interregional economic growth and change, cultural differentiation and change, transformation of natural and physical environments, and urban and rural politics and empowerment. This is reflected in a rational approach based on concepts, processes, and method analysis that can be applied to traditional concerns. Conversely, it is apparent from the preceding discussions of local knowledge’s role from, decision making around day-to-day activities of city planners and managers of waste, to their understanding and acknowledgement of it in their solid waste management activities in an unofficial way currently, that, local knowledge belongs amongst what a planner should know, and for that matter Sandercock’s (1998) “multicultural literacy” offers the closest possible opportunity for integrating local knowledge in planning. In contrast to Friedmann’s (1996) substantive domain, Sandercock (1998) suggests a redefinition of skills, methods, and competencies into a set of professional qualities or key literacies that include “multicultural literacy” i.e. sensitivity to diversity, collaborative approaches to knowledge, and listening, and cultural understanding. Sandercock (1998) asserts that with an increasingly multicultural world, there is the need for planners to understand, and focus on the intersection of both concrete and experiential knowledge, and processes that together produce the human habitat, cultural differentiation, and change.

In this regard, there are many contributions to the planning education literature that have attempted to summarize the key competencies required of planners in Africa and in multicultural spaces and contexts (see: Nwaka, 1996; Aryeetey, 1992; Diaw et al., 2002; and Sandercock 1995), and in general, one finds a high degree of consensus on the importance of the acknowledgement of the cultural context of places, within which planning occurs.

Faludi (2002) argues that planners require knowledge, skills, and attitudes in regard to planning theories and methods, spatial issues and institutional arrangements to manage spatial development; as well as the ability to manage uncertainty, build and sustain networks, and manage pressure and reach out to various groups within a community. Sandercock (1998) also provides some useful pointers in her focus on five key areas of "knowledge" or "literacy", technical, analytical, ecological, multicultural, and design that she argues planners should possess. Along similar lines, Kunzman (1997) lists seven key competencies, analytical, methodological, visionary, creative, social, communicative, and intercultural; while, Zehner (2002) provides a more complex breakdown of thirty-three skill areas used by practicing private and public sector planners. A common theme raised by all these studies' observations is the relevance of knowledge of the culture that exists within the area for which the planner is planning. Thus, as made clear by the study's findings that local knowledge plays an essential part of the day-to-day decision-making process of not only the government officials, but also residents, and other actors (private waste companies) within the society, a more explicit use and involvement of local knowledge in the decision making and planning process is essential and called for.

Regarding the possible ways for making this involvement appropriately that is a question for further research and study beyond the scope of this study.

7.7 Methodological challenges for research on Local Knowledge

In most case studies found in the literature, local knowledge is not a freestanding entity, but socially constructed through interactions among the users themselves and between them and outsiders, such as researchers. The experience through this study was that exploring and understanding local knowledge from the perspective of the holders of that knowledge is a challenging task and a learning process, especially as the researcher had to gain trust of the holder. A notable finding, from the fieldwork is the diffuse nature of knowledge and the diversity of the individual accounts of respondents with regard to their traditional knowledge around waste handling practices. The 'problem' of inconsistency of survey respondents' descriptions of their knowledge categories is related to the physical, cultural, and perceptual dimensions of their surroundings in Accra and Kumasi. Further, the site-specificity of local knowledge is illustrated by the fact that in general, respondents' descriptions tended to be confined to their own compounds or immediate locale for residents, or the sub districts or metropolitan localities (-administrative and service delivery-) of responsibility for government officials, and private waste companies. The spatial variability across these areas within Accra and Kumasi, explain the small differences in the descriptive content of the data gathered. To limit this effect on the study, different research tools: interview questionnaires, focus group discussions, and personal observations, were used in combination, and close integration through out all three phases of this study. This allowed for a comparison of benefits and limitations,

and an understanding of the extent to which ‘local knowledge’ is site and context specific. This approach to designing and pursuing the research as an integrated sequence, has allowed for cumulative learning, and continuous crosschecking of information. Further, the perceptual dimension of respondent categories engaged in the study: chiefs, residents, government officials, and private waste companies, relates to a notion of multiple realities. In other words, there are differences in perceiving, and knowing associated with the differences in social position arising from age, ethnicity and, or occupation, and the particular city site, Accra or Kumasi. However, a finding of this study was that the expression of these perceptions also depended on the context in which knowledge is generated and shared. Thus, through the use of various field research tools discussed in chapter 2, the research gained an understanding of how peoples’ expression of their knowledge, and the categories used related to the particular location and social setting of the interview, discussion or observation, and its sequence in the research process. The interviews, and focus group discussion sessions held in the course of this study, involved different cognitive reference points. For instance, in some sessions, respondents described their understanding of local knowledge relationships to waste handling practices with little or no prompting; while, others were more dependent on the promptings of the facilitation process. However, in both types of sessions respondents recalled orally from memory, the wide range of norms, beliefs, and practices in relation to waste handling.

By discussing methodological issues and challenges related to exploring local knowledge, this study highlights the need for a more informed and critical approach to

local knowledge. The examples given through the preceding discussions illustrate the complexity, and dynamic nature of local knowledge, and demonstrate that the way in which local knowledge is expressed and shared is influenced by the methods used, and the context in which it is generated. It is suggested that a carefully designed and integrated mixed methods approach to research, allowing for continuous crosschecking of information gathered, encourages a cumulative learning process, and will enhance an insider perspective and understanding of local knowledge. Rather than dismissing complexity and contradiction in local knowledge, it is crucial to question where the differences and ‘inconsistencies’ come from, as this will generate explanations and insights which can greatly improve the understanding of local people’s perceptions and behaviour.

CHAPTER 8

SUMMARY AND CONCLUSION

8.0 Introduction

This research into local knowledge's role in solid waste management provides an illustration of the nuanced impacts of local knowledge in decision making that influence solid waste activities within an area. Also, the study shows a number of important elements such as, a gap between formal rules, and actual practices, inadequate financial strength to match growing need, a poor state of the natural environment, environment and health issues as a result of waste service delivery activities, roles local knowledge plays in daily decision-making, perceptions around the involvement of chiefs and the relationships between local knowledge and solid waste management, as well as the application of, and implications of local knowledge use in solid waste activities. The aim of this final chapter is threefold: the first is to return to the research questions as spelt out in Chapter 1 and to show how these questions have been answered. The second is to outline policy directions from the research's findings in Accra and Kumasi that have been surmised in chapters 5, 6, and 7 focusing on overcoming identified constraints. The final objective is to make suggestions with respect to areas for additional or further study, drawing upon emergent themes that need further inquiry

8.1 Answers to the research questions:

As spelt out in Chapter 1 of this thesis, this study is based on the following research question: What is the role of local knowledge in solid waste management in the African city? With the following sub questions:

1. What is the relationship between local knowledge and solid waste management in the African city?
2. How does local knowledge complement solid waste management approaches in use in African cities?
3. What positive and negative implications do the relationship in (1) above, have for planning solid waste management at the institutional level in an African city?

In the discussions to follow, the answers to these questions are summarized, and in that regard it must be noted that what is lacking in the environmental management, local knowledge, and solid waste management discourses in the literature are assessments of the role local knowledge plays or can play in planning urban solid waste management in Africa. There are three main reasons for this: first, there is the problem of what Knaap (1992) calls the counterfactual, that is to evaluate effectiveness, one must know something of what would happen in the absence of the noted phenomenon; in this case the role local knowledge plays in solid waste planning and management. Second, there is the problem of timing. Solid waste collection and disposal activities affect land use decision-making over long periods of time; and thirdly, there is the issue of scale, i.e. at the level of the household, neighbourhood or community, or the entire city.

Regarding local knowledge's role in solid waste management, it was found that local knowledge strongly played a role in the day-to-day decision making process of people, so much so that, it influenced their code of behaviour, afforded them entry and acceptance into the community, strengthened their belief, and gained them community involvement

and influence. All of these were then affirmed to have an influence on their solid waste management activities. As such composting, leadership, education, attitude change, enforcement and regulation, and recovering cost were all noted as ways in which daily local knowledge use is being applied to solid waste activities in the cities. Consequently, the stopping of littering and encouragement of proper waste practices, education, adherence to norms and beliefs around waste handling, the creating of awareness around local waste practices, and the employment of appropriate technology to meet the waste handling needs emerged as roles that local knowledge plays in solid waste management in Accra and Kumasi.

On the relationship between local knowledge and solid waste management, three key linkages were found to be in existence at differing levels amongst the stakeholders. These are that: local knowledge brings a sense of social responsibility and moral suation to bear with regards to waste handling practices. It helps with establishing recycling and reuse activity and composting, and finally, it improves waste handling practices.

With regards to the complementarity of local knowledge with the solid waste management approaches in place, it was found that local knowledge was still strongly considered to play a role in solid waste management in spite of the noted barriers of politics, modernization, apathy and poor public perception experienced in its use by residents, government officials and private waste companies. An also strong positive indication of present use of local knowledge was found in relation to the institutional

arrangements of the Waste Management Departments of both the Accra and Kumasi Metropolitan Assemblies.

Concerning positive and negative implications of the relationship between local knowledge and solid waste management for planning solid waste management at the institutional level, it was found that, similar themes emerged in both cities for the roles identified for local knowledge with respect to decision-making and the potential implications for local knowledge use in solid waste management approaches. In this regard more positive implications were outlined than negative. On the positive side, improvement in understanding of waste handling, the opening up of the system to involvement, the incorporation of informal systems and having no implications emerged. On the negatives, only complicates system was identified, but just barely. Additions to expense were not considered to be a factor at all as it was not acknowledged as a financial drawback. Also, even though it is not openly outlined, it is clear that by improving access to refuse containers, and or by making them more convenient to use, littering can be minimized throughout both cities thereby improving waste collection service delivery. In both Accra and Kumasi, improvement of understanding was the most outstanding outcome anticipated by all three stakeholder groups. The other notable trend was the acknowledgement of the fact that the waste management system in place in the city could gain more involvement from residents and the general public at large through local knowledge use. It is interesting to note that all the three groups overwhelmingly saw local knowledge incorporation in solid waste management as positives. Furthermore, it is evident from the findings that none of the groups of respondents in both Accra and

Kumasi noted that the use of local knowledge in solid waste management in these cities would add an expense to the solid waste management activities, neither were they noticeably worried about an inclusion of local knowledge complicating it.

8.2 Contributions to planning theory and planning practice

This study into the role of local knowledge in planning and managing solid waste touches on several issues within planning, and brings some insight to two main areas in planning theory and practice, (1.) on how the planner within his/her local milieu uses their local knowledge of it, and (2.) a lack of local knowledge inclusive training for the planner. The study contributes the following to planning:

- Awareness and relevance of local knowledge use in daily decision-making by government officials, residents, and private companies.
- An understanding that local value sets can be used to understand, interpret, and evaluate the significance of the impacts of plans and management activities.
- Providing a firm knowledge and understanding of land tenure with respect to the planning and management of activities within two West African cities.
- Using key local leaders (chiefs, elders, etc.) to facilitate involvement and dialogue with as well as within the community.
- Understanding social power structures (e.g. chieftaincy and local government) within local communities and culture.

These points encourage developments in planning practice in African cities in general, and Accra and Kumasi, Ghana in particular in three key ways. These are, firstly, the enhancement of participation of the local or traditional sections of the community in

urban planning. In that, pragmatic and efficient planning cannot be achieved if planning and plans do not accommodate the local knowledge on, and of residents, and other actors (e.g. private companies) within the area being planned for. This will foster more commitment to plans, and make them more responsive to the needs and aspirations of people. These are in line with theoretical observations made by Healey (1999: 116) in noting two dimensions to the idea of a planner's communicative processes. The first is the valuing of 'local knowledge', which is different from 'expert' (or sometimes western knowledge), and consists of common sense, practical reason, proverbs, and metaphors. This suggests different ways of knowing that calls for a different relationship between planner and participants. The second dimension, related to the first, is that consensus-seeking processes can have an added benefit through the shared understanding, mutual trust, and 'identity creation' which are built up, and linger on as new 'cultural resources' or 'cultural capital' (Healey, 1999: 114). The involvement of local people may also help planners to understand local resource use and use local value sets to interpret, evaluate, and monitor the impacts of planning decisions. Further, such enhanced participation in planning may lead to a reduction in over dependence in most developing countries, and Africa, on foreign concepts, goals, technologies, and expense on foreign expertise that have continued to fail in attempts to address problems.

Secondly, the active involvement of traditional leaders (chiefs) in the planning process, especially in land matters. For instance a structural dialogue between planners in African cities and the chiefs who hold stewardship over lands might have to be established. Doing so, will help prevent land being allocated for purposes that go against a plan after its

acceptance, as their participation would be in this case beyond mere consultation and involve a legal commitment to implementation that can be sanctioned in cases of non-compliance. This is not out of line with mainstream development planning thinking with its focus on local political empowerment (Mohan and Stokke, 2000), and with cultural-turn scholarship's interest in how culture and context shape knowledge and behaviour (Storper, 2001). The third key component is localized training programs and curriculum for planning officials. Officials must be familiarized with local knowledge ideas, and the culturally grounded issues within the space for which they plan.

Consequently, a new addition to the role of the planner will be to link local knowledge to action. Certainly, modernist planning theory does not conceive of this role of the planner, the discourse does not speak specifically to local knowledge that is grounded within the cultural milieu of a place, even though Faludi (2002), Ozawa and Seltzer (1999), and Alexander (2001) have variously argued within the planning theory literature that planners require knowledge, skills, and attitudes, and have attempted to link skills and competencies to specific forms of knowledge, even using Aristotelian distinctions between practice and knowledge. Beauregard (1998) puts it well in stating that, no practical planning theory comes alive without practitioners, and that implicit to the rational comprehensive approach (which still dominates planning practice) is a planner infinitely competent, psychologically unbounded, and an ideologically neutral actor. However, postmodernists argue that the world and our experience of it is far more complex and subtle than has typically been realized in the modern age (Taylor, 1999:339), and even though theoretically, planning both in the western world and Africa

still remain in a modernist mode, this does not mean that planning theory remains unaffected by the rather complex postmodern cultural critique (Beauregard, 2000). To this end, there have been many contributions to the planning literature that have attempted to summarize the key competencies required of planners in Africa and planners in multicultural spaces and contexts (see: Nwaka, 1996; Aryeetey, 1992; Diaw et al., 2002; and Sandercock, 1995), and in general, one finds a high degree of consensus on the importance of the acknowledgement of the cultural context of places, within which planning occurs. Thus, a postmodern place based planning approach, which is sensitive to local knowledge and the cultural milieu within which it is grounded is essential, and to this end, planning in such a local knowledge and culture context requires a new kind of cultural literacy for the planner.

The opportunity that these contributions present are, a rethink and reconstruction of planning procedures for solid waste management in urban Ghana in particular, and African cities in general, in order to explicitly and effectively incorporate local knowledge. This can be done by encouraging planners to document their use of local knowledge in the form of videos, journal logs, technical dictionaries, and training and education manuals that are useful in review, implementation and evaluation of plans. Backing such an approach through policy may also be helpful for validating and verifying the knowledge in relation to their effect on development (Adunga, 1996). In particular, community consultations may offer the opportunities for incorporation of the local knowledge of residents, chiefs, and other actors. According to Everitt (1986),

indigenous people are helpful in identifying priorities for project planning, implementation, and the evaluation of impacts within their community.

However for government officials which included both professionally trained planners, and officials tasked with the responsibility of planning, the study found that through their knowledge and experiences of the use of local knowledge in planning solid waste management in Accra, and Kumasi, politics, public perception, and modernization constrained a successful integration of local knowledge. These issues can encourage rigidly institutionalized and probably western trained prejudices against local knowledge incorporation. Further to this, linguistic barriers and the place specific nature of local knowledge can also pose barriers to the incorporation of local knowledge in planning practice (Neimeijer, 1995; Agrawal, 1995). These constraints can be resolved through extensive public education to raise the awareness around the use of local knowledge in daily decision-making. Also, training and education for the planner in Africa that incorporates the recognition of local knowledge within a place is important. In this respect, the planning educational and training curriculum and practices, which are derived from colonial experiences, need to be changed to suit the local context. Kroma's (1995) work is a good example of an attempt to acknowledge instances in which local knowledge comes into conflict with western educational concepts and yet proves to be the most effective means to interact with the local environment. Also, for such a change to be effective, teachers and trainers in planning programs must also be trained to recognize, include, and effectively engage in the use of local knowledge. This may require a change in the attitudes, and perceptions of planners, residents, policy makers,

governments, and the private sector with the way forward being a curriculum that goes beyond the classroom and theory, as well as western based applications to the African terrain, but rather also encourages a development of the use of oral narratives, and local knowledge within a culture to inform their planning processes. The goal of such a curriculum will be to develop an African planner with a local identity that will for instance respond to the lack of identity for the urban African planner both within a western dominated planning theory, and practice. Recognition of local knowledge will go a long way in grounding the African planner's processes within the context of the cultural milieu within which s/he applies their practice.

In making these contributions, it is essential to note that there are a number of incentives that Ghanaian planners stand to garner from the incorporation of local knowledge into their practice. Firstly, it will help them to acknowledge the diversity of 'actors' involved in both the planning and implementation processes in order to work on plans with full coordination of all involved. This is a boost because it will generate a realization that even Ghanaian planners are not a hegemonic group, and that each of them perceives the planning process and the various communities of actors in different ways with different perceptions stemming from their own identities. In this regard, it is essential for them to gain exposure and learn about everyday practices of each of the actors involved in the planning process, because planners on the whole as suggested in the literature (see Olufemi and Reeves, 2004) must map the diversity of residents at the start of any planning activity.

Secondly, incorporation offers incentives through harnessing resources at the grassroots level, keeping in mind that local people often know not only the “what”, but the “where”, and “when” of resources such as plants, water, and animals with respect to land use. So by bringing local knowledge into the realm of Ghanaian planners, solutions that are realistic and attainable because they are inclusive of the local setting and traditional value can be espoused. For example, in emerged from the study that in Accra, traditionally, solid waste was dealt with through “*Tomo*”. A system where a place is designated in an area and organic waste produced locally is deposited for a period of time, after which, the “*Tomo*” is dug out as compost or manure. This could for instance be adapted as part of a municipal waste diversion plan or program by putting to use this traditional compost or manure method that can help make waste diversification an integral part of the day-to-day household waste management and handling practices, because of its existence within the culture, as well as the familiarity of the local people with the system.

Thirdly, local knowledge incorporation offers Ghanaian planners an opportunity to influence people’s behaviors from a very early stage. As stated in this study’s preceding discussions on chieftaincy, an indigenous institution of chiefs, clans, and elders, which under pin the social organization of the society is already available and is influential in land use and tenure, as well as the day-to-day lives of individuals. Consequently, an involvement of these local structures i.e. representatives of each clan, elders, and chiefs’ courts, from the start, and in accordance with local decision-making, and local labour relations and practices, in planning and projects on the community, and neighbourhood level will enhance the success of these initiatives. Further, this offers opportunities to

affect behavioral challenges that make plan implementation arduous early. In that, people in the Ghanaian culture are taught from childhood what is permitted and what is not, principally defining not only their code of ethics, and moral values, but their behavior too. Ghanaian planners by incorporating local knowledge in their practice will thus gain opportunities to influence, and affect changes in wrongful behavior and habits, for example littering, through the well established indigenous institutions (chiefs, clans, the use of town criers/ *"gong-gong beater(s)"*, and elders) that form an integral part of the social fabric of the society, and culture of the people. For example it emerged from the study, in Kumasi, that in instances where private waste companies were having difficulty recovering cost, and getting inhabitants to prescribe for waste collection services, they enlisted the help of the chiefs, and clan elders of various localities who were very successful in bringing their influence to bear on the community by instructing the people to pay the charges owed, and to prescribe to the system for collection. This was done by getting the local "town-crier" also called the chief's *"gong-gong beater"* to go from neighbourhood to neighbourhood and in certain instances, from door-to-door under the authority of the chief to instruct people to pay up.

Finally, using the chiefs and their *"gong-gong beaters"* to disseminate information at the locality, and neighborhood level offers an incredible opportunity to Ghanaian planners to disseminate information to people in a method and language that is appropriate to their conditions i.e. in instances where a majority of the people cannot read and write, or are not easily reached by various means of mass communication for instance, radio, email,

telephone, and postal services, which in Africa in general, and Ghana in particular have met with failure, due to the lack of supporting infrastructure.

In addition, it is worth noting that besides these incentives, the incorporation of local knowledge would bring a new emphasis to a practice of planning which is people centered, environmentally sound, and participatory.

8.3 Policy suggestions derived from the study: implications for people planning urban solid waste management at the institutional level in Ghana, and Africa

There are quite a number of issues that deserve quick action to ensure an improvement in, and more sustainable solid waste management in Accra and Kumasi. Though the constraints outlined in the study are many, the major crosscutting ones are dealt with here. Policy intervention in this regard should be targeted at the elimination of these constraints, and action should be focused on the following:

1. The need to empower the Metropolitan Assemblies, and address the shortcomings by: - (a) - consolidating and updating the legislation for regulation and enforcement; and -(b)- getting more public involvement in the decision-making around their efforts to improve revenue generation.
2. The integration of policy design and involvement, moving to a new style of engagement that fosters widespread involvement of private and community actors and their local knowledge in the preparation, planning, decision-making, design, implementation, and monitoring and enforcement of regulations in solid waste management activities. This will in turn increase civic responsibility towards waste collection, and improve trust between the local government officials, and other actors.

3. Fostering a positive change in attitude of residents and policy makers towards a more open use of local knowledge in solid waste management and planning, through a mapping of the diversity of actors, and the involvement of neighbourhood level resources, and indigenous institutions in the planning process. For example, the use of a chief's "town crier", to disseminate information on notices for plan consultations and projects, that affect people in particular neghbourhoods, will help bring a humanizing touch to projects or plans, as well as a personal touch to inhabitants' doorsteps within the community.
4. Making the solid waste system more viable by various financial and technical interventions developed, and informed through all stakeholders' local knowledge. For example, with regards to cost recovery and the subscription for solid waste collection services, including local chiefs, elders and clan leaders in the decision making around rates to be charged, the service type best suited to be delivered and the processes for generating revenue to make the service delivery more sustainable can only make the financial situation improve. For instance, allowing the local people to decide which method of service delivery should be introduced in their community, as well as what form of cost recovery should be pursued for what level of service provision, has proved very successful in Kromoase, a locality in Kumasi, Ghana, where the chief after consulting with the community asked for a central container collection service type and solicited cooperation from his residents to collect the user fees for the private waste company concerned. A marked departure from other instances with other communities where the chief and local clan elder's involvements was absent, and the service type was decided independently by the company and government officials resulting in low levels of cost recovery. In the Kromoase locality case, the chief approached the private waste company and government officials from the get go when the service was privatized, and

the community's inhabitants undertook a registration process which included embossing houses with the Waste Group Limited, company logo. After that the company asked the chief for places to site containers, and also to broker with the inhabitants, the frequency of collection that the community desired as well as the fee payment schedules. With this in place, at the end of the month when fee collection time arrives, the chief sends a "*gong-gong beater*" to announce the date and inform people to get ready to pay for the waste services, an approach which has been most effective and supportive.

5. Concern for the environment's degradation, and public health, which draw upon the local knowledge elements of social responsibility and moral suation, recycling and reuse activity, composting, improvements in waste handling practices, education and attitude change, and enforcement and regulation, to encourage waste minimization and diversion efforts.

In all these respects, policy design and implementation must be pragmatic, and should link with the current perspective of stakeholders jointly working towards the achievement of collective goals. As such government and metropolitan assembly officials have to work in concert with, and listen to and consult with residents, chiefs, private waste companies and other stakeholders, in the design of policies and arrangements. These policies should manifest in enterprising actions on the ground informed by local knowledge that are proven to be successful and could perhaps be scaled up officially. The local government authorities should also implement local knowledge elements such as: employment of appropriate technology, the adherence to norms and beliefs that work for enforcement and regulation, creating awareness around local waste practices, and the incorporation of informal waste systems into waste service delivery arrangements. As

well, the enforcement of by-laws should be based on the closer involvement of the community, and stakeholders using local leaders and chiefs, rather than officials who are underpaid and badly motivated. Further, a positive change in attitude towards local knowledge use in solid waste management amongst all stakeholders will go a long way to ensure a solid waste collection and disposal system that is sustainable. The issue of affordability with regards to paying for the solid waste services illustrates a social dilemma which city authorities face when confronted with the real life scenarios of what to do to ensure sustainable solid waste service delivery. In this regard, the local government authorities should investigate the affordability of the rates they come up with in correlation to the levels of service provision, with the community deciding on the most appropriate combination.

In making policy suggestions, this research calls for a more holistic place-based approach to planning and managing urban waste in Africa; so as to bring a broader view to the management of solid waste than is often the case in assessing the problems and prospects of cities. This will differ from the current community based frameworks, which concentrate mostly on the perspectives of the lack of physical infrastructure, and issues of political power devolution to African municipalities in addressing the complex issues of their solid waste management arrangements (Onibokun and Kumuyi, 1999; Obirih-Opareh, 2002, and Post, 1999). A holistic place-based approach to policy and planning will recognize the importance of these perspectives, but will also seek their integration through a mix of public policies that respond to the needs of cities of all sizes, location, and cultures.

In this regard, it is essential to tap local knowledge for planning solid waste service delivery through the place based approach since the attention now being given to solid waste management in African cities reflects the fact that many of today's policy challenges are resistant to sectoral interventions designed and delivered from central government departments, international agencies and donors. Thus, effective problem solving requires that governments tap local knowledge, bridging outdated divides between experts, citizens, and international donors and aid contributors for effective solid waste management service delivery. This is because the more robust, urban, and community policies are those that have been seen in the environmental management and assessment literature to engage different forms of localized expertise including the "lived experiences" of residents, the "action research" of community organizations, and the technical data of statistical agencies. However in pursuing this, it is important to note that, finding the right policy mix, which acknowledges the significance of a locality, and its local knowledge for policy making, also means recognizing the potential risks inherent in the place based focus if conceived too narrowly, or in isolation from broader policies.

A mix of policies is crucial, for balancing both spatially targeted measures for distressed areas with poor waste service delivery in cities, and particular aspatial policies for public health, and environment issues with respect to handling solid waste in African cities. Thus, a robust place based policy framework must have two interrelated components, (1.) general policies guided by an urban Africa contextualization, and (2.) targeted plans,

strategies and programs informed by the experiences, local or traditional knowledge, and ideas of residents.

Providing access to refuse containers is also an inexpensive option that will play an integral role to lessen the environment and health impacts of the current solid waste situation. This is evidenced by the situation in Kumasi for instance, where the decision makers are now thinking of moving to solely providing house-to-house collection service. Plans are in the pipeline to improve access to various house holds for the collection of waste through the creation of depot collection points, and the provision of 240 litre, wheeled waste collection bins for every household for carting the refuse to the central depot site.

8.4 Areas for Further Research

The study suggests a few areas that are relevant both theoretically and practically for future research. These are grouped into: - (a) general, and - (b) for Accra and Kumasi, Ghana.

(a) General:

1. How can the inclusion of local knowledge in urban environmental management policies in general, and those regarding public service delivery such as solid waste, in particular be fostered in accordance with an interpretation of urban environmental management that recognizes wider responsibilities than simply those of the city and residents?

2. How can ideas concerning solid waste management with an integrated local knowledge component be promoted, and how can government officials, planners, and policy makers be made to engage such an approach that seeks to integrate socio-cultural, public and environmental health concerns? How can such collaboration be opened up to include informal actors such as waste pickers, and community actors with an aim to adopt, encourage and improve waste minimization and diversion efforts?

(b) For Accra and Kumasi:

1. Why is organic waste not used more as a resource? How can linkages between various actors in the solid waste management system be integrated to promote recycling, reuse, and composting of solid waste in both cities?
2. How should community involvement, and cost recovery in solid waste activity be best organized in Accra and Kumasi? Is there sufficient potential for using waste as a resource in both cities? If so, what roles can local knowledge play in facilitating waste diversion, and minimization programs?
3. A baseline study on per capita generation of waste.
4. An examination of actual spatial health data of the cases, or incidences, and prevalence of malaria, cholera, and diarrhea in relation to solid waste service provision by type, and socio economic character of localities within Accra, and Kumasi.

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APPENDIX A
QUESTIONNAIRE FOR FIELD SURVEY INTERVIEWS

Preamble:

I am a researcher from the University of Waterloo, Waterloo, Ontario, Canada working on my doctoral dissertation on the role local (traditional) knowledge has to play in managing solid waste in African cities. This is aimed at helping to invoke action to improve the existing solid waste management situation, as well as to explore the possible ways of integrating local (traditional) knowledge and practices into the management of solid waste. I am especially interested in the ways in which solid waste disposal practices are understood by you within the context of your environmental, social and cultural milieu.

> Today's interview should take about 35 minutes. If you have any questions at any point do not hesitate to ask. With your agreement, I would like to tape record the interview to accurately document your views. Your name or address will not appear on any tapes or manuscripts as stated in the consent form. This is neither a government survey nor a profit-oriented project. The information from this interview will be aggregated with others from similar interviews and will be used for the academic purposes in Mr. Benoit Demanya's doctoral dissertation at the University of Waterloo. The information collected here is **confidential and no direct reference will be made to individual names**. A brief summary of the results of the study will be provided to each respondent in appreciation of their involvement in the study.

Thank you for your participation.

Interview number: _____

Name of interviewer: _____

Date of interview: _____

Place of interview: _____

Interview format: Face-to-face Interviewee filled in Other:_____

Research explained and introductory (preamble) provided: yes/no (reason:_____)

Consent form signed: yes/no (reason: _____)

SECTION A: SOLID WASTE MANAGEMENT –GENERAL:

I would like to start the interview with a few questions about solid waste management in Accra/ Kumasi.....

A1. Can you please tell me what constitutes solid waste management to you?

_____

_____

_____

_____

A1. How is solid waste activity managed in the city? By whom?

_____

_____

_____

_____

A2. What would you say are the major problems with solid waste management in this city (Accra/Kumasi)?

_____

_____

_____

A3. What is the state of the natural environment with respect to solid waste handling practices in the city?

_____

_____

_____

A4. What are the most common environment and health issues that you face in the city with respect to solid waste management?

_____

_____

_____

A5. What agencies are involved in/ responsible for solid waste management in the city?

_____

_____

_____

i.) What is the level of their involvement/ responsibility?

_____

_____

_____

A6. What agencies are involved in/ responsible for addressing environmental problems in the city?

_____

_____

_____

i) What is the level of their involvement/ responsibility?

_____

_____

_____

A7. Which of the following environmental problems have been experienced by the city/ community/area in relation to solid waste?

[] water pollution [] flooding
[] air pollution [] smoke
[] Fire hazards [] pests, vermin, and flies
[] littering [] other:_____

SECTION B: KNOWLEDGE AND INFORMATION SOURCES:

B1. What are the focal areas of information, data gathering and intervention by you/your agency/ group in managing solid waste in the city/ area? Why?

_____

_____

_____

B2. Do you know about local (traditional) ecological knowledge? How?

_____

_____

_____

i.)What do you think of it?

_____

_____

_____

B3. Do you think it has a role/(s) to play in the management of solid waste in this city? Why?

_____

_____

_____

B4. What role do you think local (traditional) ecological knowledge will be best suited to play in managing solid waste in this city? Why?

_____

_____

_____

B5. How effective do you think informal and community attempts at facilitating information/ knowledge for managing solid waste has been?

[] Most Effective [] Very Effective

[] Effective [] Partially Effective

[] Not Effective

i.) Why?

_____

_____

_____

B6. In what ways have these attempts been effective?

_____

_____

_____

B7. What do you consider to be the most appropriate way for managing solid waste?

_____

_____

_____

B8. Based on your knowledge or experiences, what will be the anticipated barriers to the implementation or use of local (traditional) ecological knowledge in the management of solid waste? Why?

_____

_____

_____

B9. Based on your knowledge and experience, what kinds of approaches have been employed in the management of solid waste in this city?

_____

_____

_____

i) Were they successful? Why/ why not?

_____

_____

_____

B10. Tell me what you know about the ecological well being of your area/community/city?

_____

_____

_____

_____

B11. What kind of information would be helpful in effectively managing solid waste in the city?

_____

_____

_____

_____

B12. Do you think there are particular groups of people in the area /community/city who are knowledgeable on traditional ways of managing solid waste?

_____

_____

_____

_____

B13. Do you trust your sources of knowledge/ information?

_____

_____

_____

_____

SECTION C: LOCAL (TRADITIONAL) KNOWLEDGE, PRACTICES, PROCESSES AND BELIEFS:

C1. Can you please tell me what local knowledge and traditional ecological knowledge mean to you?

_____

_____

_____

_____

C1. Do you perceive your self as possessing local (traditional ecological) knowledge? How so?

_____

_____

_____

C2. How do you apply your traditional knowledge with regards to solid waste management practices within the community/ area/city?

_____

_____

_____

C3. Are there any government departments/ agencies involved in the application and use of your local knowledge? If so, what role(s) do they play.

_____

_____

_____

C4 Does local (traditional) knowledge play a role in the decision-making process of your day-to-day activities? If so, what role(s) does it play?

_____

_____

_____

C5. Are there any non-governmental organizations (NGOs) or community-based organizations (CBOs) involved in the use/ gathering of traditional knowledge? [Can you tell me the names of these organizations and the role(s) they play?]

_____

_____

_____

C6. How involved are the indigenous and local chiefs and leaders in the decision-making process on managing solid waste? [Can you identity some of those actively involved and the role(s) they play?]

_____

_____

_____

C7. What traditional or local **norms** practiced by people on a regular basis influence their attitudes and perceptions regarding waste handling? [Can you tell me the ways in which these norms play a role/(s)?]

_____

_____

_____

C8.What traditional or local **beliefs** held by people influence their perspectives, attitudes and perceptions regarding solid waste handling? [Can you tell me the ways in which these beliefs play a role/(s)?]

_____

_____

_____

C9. Does the Waste Management Department involve local (traditional) knowledge as part of the decision-making process in managing waste collection? YES/ NO/ DK

I. How frequently is this done?_____

II. What is the source of this knowledge/ informantion?_____

III. How is this knowledge used/ incorporated into decisions and management activities?_____

IV. Why has the WMD been engaging local (traditional) Knowledge in its management initiatives?_____

V. Has this approach been successful? YES/ NO/ DK In what way has it been a success?
_____

C10. Are there any informal approaches to handling solid waste that you can think of which are important in management approach and decision-making process about waste services? Yes/no/ DK

i. Who/What is involved in these informal approaches?_____

Ii How often have these approaches been employed and in what capacity or role?
_____

C11. Are there any alternatives to the current arrangements of solid waste management being employed? yes / no/ DK

I If so, what were they:

_____

_____

_____

Ii Who put forward these alternatives? / How did these come about?

_____

_____

_____

Iii How seriously were these alternatives considered by government agencies/ stakeholders?

_____

_____

_____

C12. What implications do you think the involvement of local knowledge in waste management has for the planning of solid waste management at the institutional level?

_____

_____

_____

C11. Are there social norms and beliefs regarding waste handling and management that you know about? Yes/ No/ DK
If yes, answer the following: in the Chart below please identify these norms and beliefs, outlining when they are invoked, their significance or role (s) that they play in local life and how they are enforced

SOCIAL NORM/ BELIEF	Capacity to Engage/ when is it invoked	Reasons /Significance	Social Support (How is it enforced?)
Taboo: _____			
Ritual: _____			
Festival: _____			
Traditional belief: _____			
Other: _____			

i) Are your waste handling activities affected by these social norms and beliefs? Yes/ No/ DK. If Yes, in what way?
_____
_____
_____

ii) Do you observe these social norms and beliefs on a regular basis? Yes/ No/ DK. Why?
_____
_____
_____

SECTION D: SOCIO ECONOMIC AND DEMOGRAPHIC CHARACTERISTIC OF RESPONDENT:

D1. Sex: [ ] male [ ] female

D2. Educational Status:
[ ] no formal education
[ ] primary level
[ ] secondary level (Junior/Senior)
[ ] elementary level
[ ] tertiary/ post secondary

D3. Could you tell me your job title and provide a brief description of the work that you do [if necessary]:

_____

_____

_____

D4.Which category does the interviewee fall into [interviewer to fill in]:

[] Community organization [] Non-governmental organization
[] National government [] Environmental Regulatory Agencies
[] Local government [] Private sector
[] International agency [] Other:_____

D5.How long have you been involved with waste management issues in Accra/Kumasi – not necessarily formally employed, but at least as an active stakeholder? _____(Years)

D6. Is there anything else you will like to add or something that I haven't brought up that you think is important?

_____

_____

_____

D7. Can we contact you again? Yes/ No/ DK

Thank you very much for your participation in this exercise. Have a nice Day!!!

Interviewer to fill in:

General comments about the interview:

_____

_____

_____

Were there any questions in particular where the respondent was notably uncomfortable, annoyed, animated, etc?

_____

_____

_____

APPENDIX B
INTERVIEW FORM GUIDE FOR FOCUS GROUP DISCUSSIONS

Preamble:

I am a researcher from the University of Waterloo, Waterloo, Ontario, Canada working on my doctoral dissertation on the role local (traditional) knowledge has to play in managing solid waste in African cities. This is aimed at helping to invoke action to improve the existing solid waste management situation, as well as to explore the possible ways of integrating local (traditional) knowledge and practices into the management of solid waste. I am especially interested in the ways in which solid waste disposal practices are understood by you within the context of your environmental, social and cultural milieu. Today's Group Discussion should take about 45 minutes. If you have any questions at any point do not hesitate to ask. With your agreement, I would like to tape record the interview to accurately document your views. Your name or address will not appear on any tapes or manuscripts as stated in the consent form. This is neither a government survey nor a profit-oriented project. The information from this interview will be aggregated with others from similar interviews and will be used for the academic purposes in Mr. Benoit Demanya's doctoral dissertation at the University of Waterloo. The information collected here is **confidential and no direct reference will be made to individual names**. A brief summary of the results of the study will be provided to group participants in appreciation of their involvement in the study.

Thank you for your participation.

Workshop number: _____

Name of Group/(s) Present: _____

Date of FGD: _____

Place of FGD: _____

Interview format: [ ] Face-to-face [ ] Interviewee filled in [ ]Other:_____

Research explained and introductory (preamble) provided: yes/no (reason: _____)

Consent form signed: yes/no (reason: _____)

LOCAL/TRADITIONAL KNOWLEDGE :

(1.) I am interested in learning about local (traditional) knowledge in relation to solid waste management. Can you tell me what local (traditional ecological) knowledge means to you?

(2.) Who in your view possesses this form of knowledge?

(3.) How do you apply your traditional (ecological) knowledge with respect to solid waste management practices within the community/area/city?

(4.) What constraints or barriers make it difficult for traditional knowledge to be used in the management of solid waste activities?

(5.) What are the various sources of ecological knowledge/ information on your environment?

(6.) What strategies do you embark upon to cope with problems and issues arising from solid waste activities in your community/area/city?

(7.) Do you think that traditional knowledge can complement the western-based solid waste management approaches currently in use in the city? If so how?

APPENDIX C
PARTICIPATION CONSENT FORM

Name: _____

Date of Interview: _____

I, the undersigned, agree to participate in the research conducted by Mr. Benoit Demanya of the University of Waterloo, Waterloo. Ont., Canada in conjunction with the Friends of the Earth, Ghana as part of the examination of the role of local (traditional ecological) knowledge in solid waste management in Accra and Kumasi, Ghana.

I acknowledge that my participation in this research is voluntary and that the researcher ensures **complete confidentiality** and **will protect the identity of individual participants**. The original information collected in this survey will not be shared with any other person unless I provide an agreement in writing. Publication of results from this survey will be in a form that prevents specific individuals from being identified. Furthermore, I can withdraw my participation at any time during the duration of this research assignment and have any information associated with my participation removed from the assignment.

Individual responses will only be seen by Mr. Demanya, his 2 (two) Research Assistants and by his research supervisor, Dr. Murray Haight at the University of Waterloo in Waterloo, Canada. All tape recordings will be destroyed when the research is concluded.

If I have any concerns with the project or my participation I may contact Dr. M. Haight at the University of Waterloo in Canada at (519) 888-4567 Ext. 3026 or E-mail: mhaight@fes.uwaterloo.ca

•I agree to permit a tape recorder to be used in this interview YES____ NO___

•I agree that quotations from this interview may be used in written work arising from this study and that they may be attributed directly to me YES___ NO ___

•I agree that quotations from this interview may be used in written work arising from this study but may **NOT** be attributed to me or to a title that could be attributed to me. YES___ NO ___

Participant s Signature: _____ Date: _____

Researcher s Signature: _____ Date: _____

APPENDIX D
SAMPLE OF SOME OF THE CODING USED IN NVIVO 1.2 ANALYSES

List of codes used in NVivo to identify the various themes utilized for analysis.

CODE	DESCRIPTION
Accra Metropolitan Assembly (AMA)	Responsibility of Government at any level. Includes the (AMA), District and Sub-District Assemblies, and any branch of the government not otherwise specified.
Environmental Protection Agency (EPA)	Responsibility of the Environmental Protection Agency.
Ministry of Health (MoH)	Responsibility of the Ministry of Health.
Non Governmental Organizations (NGOs)	NGO's involved with solid waste management.
Private Waste companies:	Solid waste management responsibility of private companies.
Vicma Waste Limited	
Yama Waste	
Mesk World Waste Company	
Ama Serwaa Waste Company Limited	
Sakam Limited	
Gee Waste	
Almanuel Waste Company Limited	
ABC Waste	
Golden Falcon Company	
Lack of knowledge	Identified cause of solid waste management problems.
Over Population	Identified cause of solid waste management problems.
Resources	The lack of resources available to deal with solid waste management problems.
Capital	The unavailability of trucks, qualified personnel to deal with solid waste management.
Refuse Containers	Insufficient numbers of refuse containers in communities.
Funding	Lack of financial resources to invest in an adequate solid waste management system. Examples include providing protective equipment for the workers.
Enforcement	Inability to enforce waste management bye laws. For example: littering, dumping of waste anywhere other than designated areas.
State of Environment	The condition of the natural environment as related to solid waste.

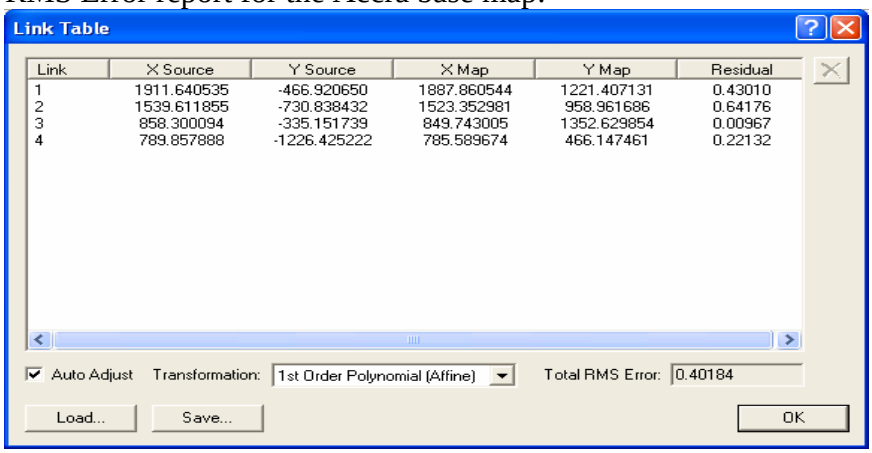
Very bad	Natural environment identified as in very bad condition.
Good	Natural environment identified as in good condition.
Disease	Human health consequences of current solid waste management practices.
Cholera	Water born disease causing diarrhea and in extreme cases can lead to death
Flies or Mosquitoes	Insects that commonly are hosts to pathogens, viruses and bacterial diseases
Typhoid	Water born disease caused by raw sewage, toxic metals, and other industrial wastes.
Dysentery	Water born disease caused by raw sewage, toxic metals, and other industrial wastes.
Malaria	Malaria is a pathogen transmitted to humans through mosquitoes that causes fever and in extreme forms death.
Diarrhea	Excessive and frequent evacuation of watery feces that can cause dehydration to the point of death.
Tuberculosis	An infectious disease of humans and animals that builds up in the lungs or other body tissues. When in the lungs it is characterized by coughing, fever, weight loss and chest pain
Fever	Any of various diseases characterized by an abnormally high body temperature.
None	Specified that no diseases were present as a result of solid waste management
Defecation	Voiding the bowel of feces in public places such as gutters and dump sites.
Environmental Conditions	How solid waste management is affecting the natural environment.
Littering	Indiscriminately disposing waste
Flooding	An excessive amount of water in areas usually dry
Air Pollution	The addition of harmful chemicals into the atmosphere causing severe odor and health problems
Pests, Vermin and Flies	Small animals or insects that are destructive, annoying or damaging to one's health
Water Pollution	Contamination of water resources by chemicals or harmful bacteria
Smoke	A cloud of fine particles caused by burning refuse
Fire Hazards	Where there is a danger of something burning, like throwing hot coals into a container full of dry material
Involvement	How effective efforts have been to mitigate issues surrounding solid waste management.
Not Effective	Efforts have not been effective to curb solid waste management issues.
Effective	Efforts have been effective in curbing solid waste management issues.
Trying	Responsible parties are making efforts to mitigate solid waste issues, but have yet to solve all problems.

Responsibility	What the identified parties are responsible for in regards to solid waste management.
Waste Collection	Responsible for collection of waste.
Infrequent Collection	Responsible for collection of waste but do so on an irregular basis.
Environment	Responsible for maintaining the environment.
Cleaning	Responsible for street sweeping and general cleaning of the city.
Education	Responsible to educate the public on proper solid waste management practices and consequences of poor management.
Revenue Collection	Responsible for collecting fees from the public for the solid waste management services as well as fines.
Impact Assessments	Responsible for conducting Impact Assessments in the city.
Enforcement	Responsible for enforcing solid waste management bye-laws.

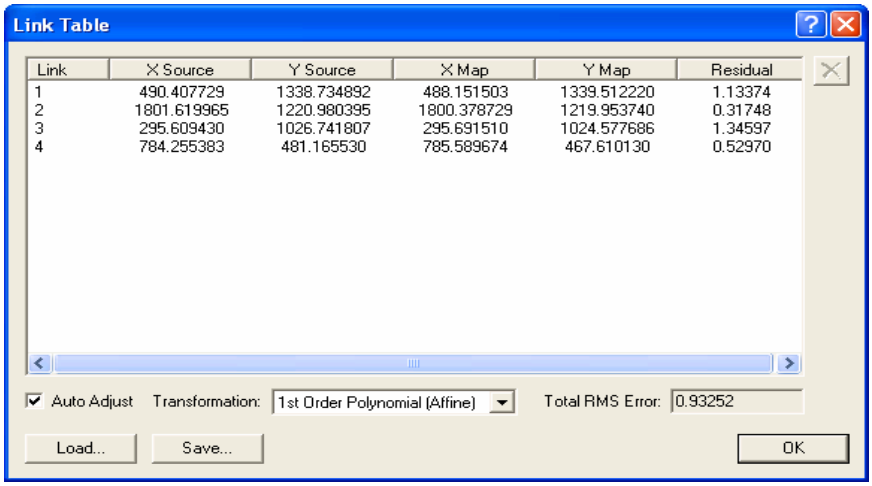
Adapted from: (UN, 2005) (Snarr, 2002: 233)

APPENDIX E

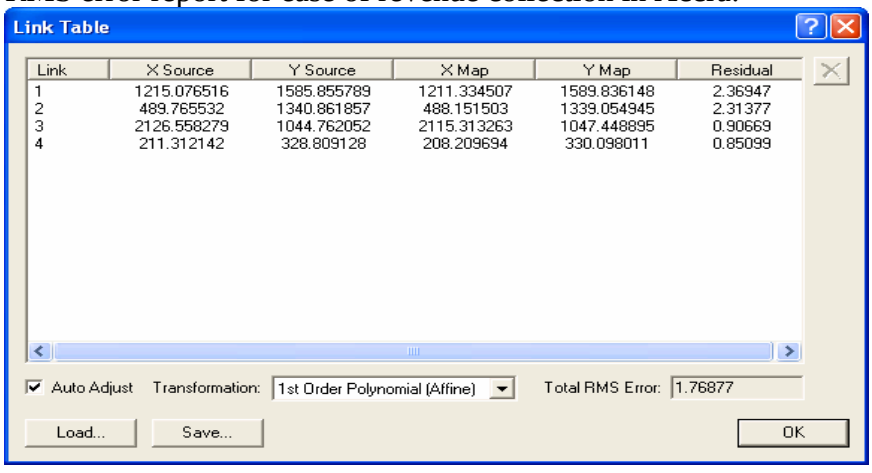
RMS Error report for the Accra base map:



RMS Error for Solid Waste Collection Services in Accra:

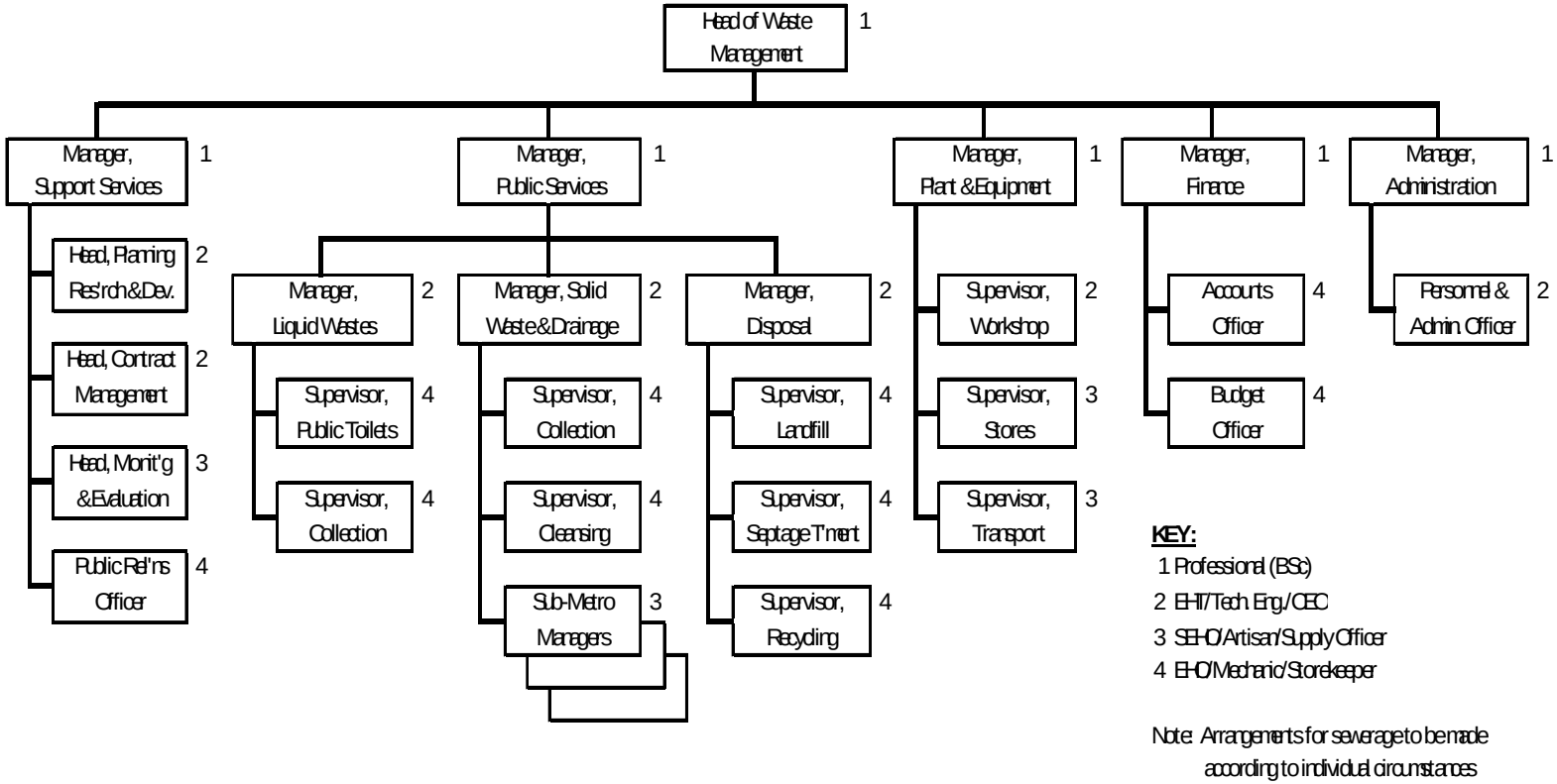


RMS error report for ease of revenue collection in Accra:



APPENDIX F

METROPOLITAN ASSEMBLY WASTE MANAGEMENT DEPARTMENT (WMD) STRUCTURE



Source: MLGRD (1999)

APPENDIX G
MODES OF WASTE COLLECTION AND TRANSPORTATION

Multi lift Trucks used for house-to house waste collection in Accra and Kumasi

Source: Field Survey (2004)

Power tiller for solid waste collection

Source: Field Survey (2004)

APPENDIX H

METAL CONTAINERS FOR SKIP STATIONS AND CENTRAL/COMMUNAL COLLECTION SITES

Source: Field Survey (2004)

APPENDIX I

SUMMARY TABLE OF DEMOGRAPHICS OF INTERVIEWEES (CHARACTERISTICS OF SAMPLE) IN ACCRA, AND KUMASI, GHANA

ACCRA									
	Gender			Educational Status					
	Male	**Female**	**Total**	**No Formal Education**	**Primary Level**	**Secondary Level (Junior or Senior)**	**Elementary Level**	**Tertiary/ Post Secondary**	**Total**
Residents	33 **(37%)**	57 **(63%)**	90 **(100%)**	5 **(6%)**	9 **(10%)**	38 **(42%)**	11 **(12%)**	27 **(30%)**	90 **(100%)**
Government Officials	16 **(80%)**	4 **(20%)**	20 **(100%)**	--	--	--	--	20 **(100%)**	20 **(100%)**
Private Waste Companies	10 **(67%)**	5 **(33%)**	15 **(100%)**	--	--	--	--	15 **(100%)**	15 **(100%)**
Proportion/ percentage of Total	59 **(47%)**	66 **(53%)**	125 **(100%)**	5 **(4%)**	9 **(7%)**	38 **(30%)**	11 **(9%)**	62 **(50%)**	125 **(100%)**
KUMASI									
	Gender			Educational Status					
	Male	Female	Total	No Formal Education	Primary Level	Secondary Level (Junior or Senior	Elementary Level	Tertiary/ Post Secondary	Total
Residents	19 **(32%)**	41 **(68%)**	60 **(100%)**	3 **(5%)**	7 **(12%)**	29 **(48%)**	6 **(10%)**	15 **(25%)**	60 **(100%)**
Government Officials	7 **(70%)**	3 **(30%)**	10 **(100%)**	--	--	--	--	10 **(100%)**	10 **(100%)**
Private Waste Companies	4 **(80%)**	1 **(20%)**	5 **(100%)**	--	--	--	--	5 **(100%)**	5 **(100%)**
Proportion/ percentage of Total	30 **(40%)**	45 **(60%)**	75 **(100%)**	3 **(4%)**	7 **(9%)**	29 **(39%)**	6 **(8%)**	30 **(40%)**	75 **(100%)**

Source: Field Survey (2004)