

Opportunities in Waste: *From Cape Town to Ruiru*

- *Working Draft* -



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The Columbia University Team
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Executive Summary

The implementation of a sustainable integrated solid waste management system is one of the key parts to addressing sustainable development in the 21st century. Current global trends of population growth, urbanization, and consumerism have dramatically increased the generation of waste in urban areas. Inadequate waste services has led to informal burning and dumping in streets and open areas, which is degrading the environment and creating profound public health concerns. Without a strategy in place to properly deal with waste management, today's global trends will continue to exacerbate these problems.

Ruiru, Kenya is a microcosm of these global trends. As mandated by Kenyan's Local Government Act, the Municipal Council of Ruiru is responsible for providing solid waste management services to its local citizens.¹ However, the city currently lacks the adequate SWM policy support, capacity and process to support its 200,000 inhabitants.²

This report is the third iteration of a project conducted in partnership with the Municipal Council of Ruiru, the University of Nairobi in Kenya, and the Center for Sustainable Urban Development and the School of International and Public Affairs (SIPA) at Columbia University in New York. The first two teams published reports in 2006 and 2007, which revealed contamination of Ruiru's ground water as a result of seepage from uncontrolled waste dumping. Under pressure from its constituents and from the Ministry of Health, the Municipal Council of Ruiru is aware that it must grapple with this solid waste problem. In response, the Council is in the middle of acquiring land to move the informal dumpsite. However, this is at best an incomplete solution to the problem. Instead, the Council should devise a sustainable strategy for SWM that includes, but is not limited to, the creation of a formal landfill and waste diversion techniques, like recycling and composting.

To help Ruiru integrate these current innovative approaches to SWM, the 2008 SIPA team conducted research in the City of Cape Town, South Africa, focusing on waste minimization options. The team employed several methodological tools to prepare this report, including a literature review, informational interviews with multiple stakeholders. The team also conducted a stakeholder analysis and a SWOC analysis that led to the final recommendations. The team's research was guided by, Peter Ngau, an urban planning specialist from the University of Nairobi, throughout the project. The involvement of Peter Ngau helped to create a South-South dialogue between Nairobi and Cape Town; this relationship will be instrumental in the continuation of this relationship.³

Results from our data analysis underscore the necessity of an integrated and sustainable approach to addressing SWM. Acknowledging that major regulatory, economic and infrastructure differences between the Cape Town and Ruiru exist, our analysis reveals lessons from Cape Town that could be starting points for Ruiru's SWM plan.

Chapter One: Introduction

1.1 Background to the Global Problem

The United Nations estimates that the world will be 51.3 percent urban by 2010⁴. This means that for the first time in history, the majority of people will live in cities. Yet, we are not prepared. Rapid rates of urbanization are placing a growing strain on urban governments all over the world. Many city governments lack capacity, infrastructure and resources to cope with existing populations let alone the growing numbers of new migrants. One key result is that uncollected waste, which is often mixed with human and animal excreta, and hazardous and medical waste is burned or left dumped in streets and open fields, contributing to serious environmental contamination that gravely affects the health of communities.

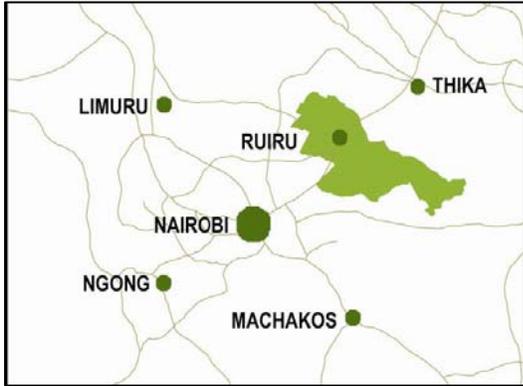
“Every day around the world...illnesses related to water supply, waste disposal, and garbage kill 30,000 people and constitute 75 percent of the illnesses that afflict humanity.”⁵ In addition, the poorest in urban areas suffer the most from these life-threatening consequences derived from neglected solid waste disposal. When pressed, local governments tend to limit their financial resources to richer areas that hold more political clout. Thus, direct exposure to environmental contamination and its affects are often left to the urban and peri-urban populations living in low-income neighborhoods.⁶

Consequently, without clear global and local strategies for solid waste management, rapid urbanization will continue to exacerbate environmental, health and socio-economic problems. However, all is not lost. Cities can become solutions to these global dilemmas. Since urban areas allow for the efficient use of land, energy, and resources, today’s societies can strive to achieve “sustainable urbanism.” To do so, “cities need an alliance with Nature in order to recycle their waste products into usable inputs for farming, gardening, and energy production.”⁷ By recognizing and implementing these opportunities in waste, governments can help society implement sustainable urban development.

1.2 Study Background and Rationale

Beginning in 2005, students and faculty from the Urban Planning Department of the University of Nairobi, the Centre for Sustainable Urban Development (CSUD) of the Earth Institute and the School of International and Public Affairs (SIPA) developed a partnership with the Municipal Council of Ruiru, Kenya. This North-South partnership aimed to build a network of research and policy support to directly assist the Municipality craft strategies and concrete solutions to its daunting sustainable development problems.

Ruiru is a microcosm of the larger global problem of urbanization and expanding populations; Ruiru lacks adequate water supply and sanitation services to support its 180,000 inhabitants. The first North-South collaboration in 2005 found that water-related diseases stem primarily from



contaminated water and inadequate sanitation. Contamination occurs for a variety of reasons; however, one key reason involves poor Solid Waste Management (SWM), including the dumping of waste next to the Ruiru River in Murera ward. With a population growth rate of 8.2 percent, the Municipal Council of Ruiru confronts the challenge of ensuring the proper disposal of solid waste.⁸ Already operating with limited technical and financial resources, the Municipality's solid waste collection rate is about 35 percent, which will become increasingly difficult to maintain since the solid waste generated in Ruiru is expected to rise.⁹ In addition to the growth in its waste stream, the Municipality's disposal site has a limited capacity level and lacks adequate infrastructure and effective management.

In 2006, the second SIPA team conducted a water analysis in conjunction with Kenya's Ministry of Water. The study revealed that Ruiru's ground water sources were becoming contaminated as a result of seepage from uncontrolled waste dumping throughout the city. In particular, the Municipality's uncontrolled dump in Murera Ward is also most likely leading to contamination of the ground water and is currently polluting the Ruiru River. In a July 2005 letter, sent from the area residents of Mugutha to Professor Michieka at National Environment Management Authority (NEMA), area residents called for state intervention to secure the re-location of the unauthorized dump in Murera because "the plot is an environmental and health hazard to the community due to the incidents of sickness from the smell emanating from the garbage of used hospital needles, slings, and fetuses while being burnt. Two families lost their houses, and even a street boy lost all his fingernails while scavenging at the site."¹⁰

Residents raised their concern again in a participatory planning exercise that the Municipality conducted with the University of Nairobi and CSUD. This culminated in the first physical development plan for Ruiru. This plan identifies the need for improvements of its solid waste practices, particularly in managing its dumpsite as a key objective from 2005 to 2020. It is clear that Ruiru needs to start actualizing some of the most urgent water and public health recommendations.

This report is the third chapter of SIPA's involvement in this North-South partnership. However, the third team tasked to research in Ruiru was unable to travel to Ruiru and assist the council because of the recent violence in Kenya. Since the project goal is to help Ruiru explore its options in managing its solid waste, the team along with their advisors decided to conduct their fieldwork in Cape Town, South Africa. Cape Town is known to have innovative SWM practices and is a leader in the region. In addition, the Urban and Regional Planning Department of the University of Nairobi has an existing partnership with the University of Cape Town. Conducting the research in Cape Town was an excellent opportunity to further build this South-to-South partnership and facilitate a dialogue between Kenya and South Africa.

1.3 Objectives of the Study

The objective of this study is to provide a set of innovative ideas for Ruiru in approaching the dump in Murera ward. While the Municipality is focused on relocating the dump, a stronger and more sustainable strategy would involve developing strategies for the improved management of a landfill, as well as including a more holistic approach by focusing the research on waste minimization. This option as one part of a more integrated strategy that can help Ruiru reduce the amount of waste deposited in the current dumpsite and move towards a more sustainable practice. In this way, the study aims to:

- Examine innovative waste minimization practices in Cape Town
- Offer the Ruiru council recommendations
- Facilitate South-to-South dialogue.

Study Justification



Under pressure from its constituents and from the Ministry of Health since 2007, the Municipal Council of Ruiru is aware that it must grapple with the problem of the open air dump in Murera ward. In response, the council is in the middle of acquiring land to move the dump. However, this is at best an incomplete solution to the problem. The council will need to create a properly managed landfill to avoid environmental contamination and public health hazards in any location it chooses. Further, it needs to devise a sustainable strategy for SWM that includes, but is not limited to, the creation of a landfill. Landfills do not last forever. They have a limited life-span and do not effectively reduce waste; they only contain it. With massive urbanization and population growth it is

imperative to find alternative practices to land-filling that are able to “close life cycles” or return waste to a more useful form. Therefore, a study of alternative approaches to SWM is an important contribution towards improving municipal solid waste collection and disposal.

Waste Minimization

Waste minimization should be the key alternative to simple landfill management (See Figure 1). In this waste minimization approach, the goal is to reduce waste that ends up in the landfill, not simply to contain it. As seen in the diagram, by avoiding and recycling waste, the amount of waste that ends up in the landfill is reduced. Essentially, waste minimization is “any activity that has the target to minimize waste generation and pollution at source and to promote a hierarchy of waste management practices, namely reduction of waste at source, re-use, recycling and safe disposal.”¹¹ However, in most developing countries, the typical approach to SWM has been the inverted triangle where the majority of waste ends up in landfills.

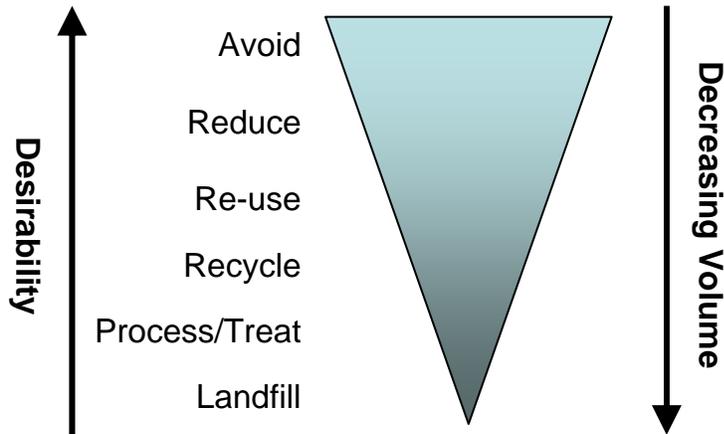


Figure 1: Waste Management Hierarchy

There are many options for waste minimization that can help conserve landfill capacity. These options include Waste Avoidance, Reduction, Reuse and Recycling/Composting.

- **Avoidance** refers to actions taken before waste is generated. For example, at a local level, individuals can use plastic bags or their own reusable cloth bags. Some countries, such as Ireland, have banned the use of plastic bags.
- **Reduction** refers to actions to decrease the amount of waste generated. Imposing a tax on plastic bags, for example, provides incentives to reduce the production and consumption of plastic bags. Appropriate product packaging is also favorable as a means of waste reduction.
- **Re-use** is the act of using a material again either for its original purpose or for a similar purpose without significantly altering its physical form. Reuse consumes less energy and resources than recycling.
- **Recycling/Composting** are the separation, collection and use of waste materials that are fed back into the market. Recycling is the processing of waste materials that can be broken down and manufactured into new products. Composting refers to the biological decomposition of organic waste that allows it to be returned back to its original state.¹²

All of these waste minimization options can significantly contribute to landfill reduction, leading to a more effective SWM.

Why Choose Recycling and Composting?

Although other waste minimization options exist, recycling and composting are an accessible way to empower communities, generate income and provide an excellent opportunity for initiating waste minimization programs. Thus, our study focuses on composting and recycling. These two are also the simplest and most plausible options for a small Municipality like Ruiru. Previous studies have found that the waste composition in Ruiru and Nairobi has over 60 percent organic, green, or food waste, which is compostable. Like other parts in Kenya, Ruiru has a

thriving flower industry that faces growing international pressure to grow organic flowers. By looking more into innovative composting practices, the findings from this project if implemented, would promote the development of Ruiru's local flower farmers and build business partnerships across borders.

In their request for assistance, Ruiru Municipal officials identified recycling as a means of improving SWM practices. Although recycling contributes a small fraction to the reduction of waste, it is seen as means of generating income for low-income households. Since recycling promotes environmental awareness and "cleaner" living, locals also take more pride in their neighborhoods. Like composting, the implementation of recycling initiatives is flexible and can be used either at a micro or macro level.¹³

Transferability

Our study recognizes that there are major differences between Ruiru, Kenya and Cape Town, South Africa, which affects the transferability of the innovative practices found in Cape Town to Ruiru. As a peri-urban city, Ruiru is part of the larger metropolitan area of Nairobi. Cape Town is larger than Nairobi, both in terms of population and land area.¹⁴ In addition, Cape Town has a more sophisticated technical capacity and infrastructure system to deal with its solid waste problems. With more vehicles, refuse and compacting facilities than the Municipality of Ruiru and an established tender and contract practice in place, the Municipality of Cape Town is relatively more effective in managing the collection and disposal of solid waste. In addition, the City of Cape Town has more financial resources spent per capita on SWM than the City of Ruiru. For the fiscal year 2005-2006, the operating budget of the Solid Waste Department in Cape Town was about \$138 million or about \$42 per person, while the Municipal Council of Ruiru spent \$47,000 or \$0.26 cents per person for the same year; Ruiru's budget was actually for Public Health and Environment, which dealt with issues besides SWM.¹⁵

Nairobi and Cape Town each have their own political history that shapes their institutions and communities. Unlike Ruiru or Nairobi, Cape Town continues to face racially discriminatory provision of public services, including waste management. Today, the legacy of apartheid has left socio-economic status stratified according to race. In Ruiru, communities are not segregated according to race, but along socio-economic status, which has also resulted in inequities of the SWM services provided between richer and poorer wards. Whether due to race or income, both cities face inequalities in SWM services.

Furthermore, with an average per capita Gross Domestic Product that is almost ten times greater than Kenya, South Africa, including Cape Town faces the challenge of an increasing amount of waste generated from various packaging materials of glass, plastics, and paper.¹⁶ The majority of waste composition in Ruiru, on the other hand, is comprised of organic waste, which requires fewer resources to return it to its re-usable form. Since waste composition in Kenya's per-urban areas like Ruiru consists of up to 60 percent organic waste, composting is a process that would be of immense benefits, particularly turned into a soil conditioner for the surrounding farms and small urban plots.

Despite their differences, both Ruiru and Cape Town are committed to improving SWM.

Although Ruiru at the moment is focused on turning an illegal dump into a formal landfill, the city's fifteen-year local development plan acknowledges the need to further develop other aspects of its SWM program as well.¹⁷ Cape Town also started with poor SWM in the 1980s and early 1990s and later became a leader in SWM in the region with an established Integrated Waste Management Policy.

1.4 Study Methodology

In order to provide Ruiru with up-to-date insights into SWM and waste minimization in particular, our SIPA team completed a literature review and conducted key informational interviews. We made two fieldtrips to South Africa, one in February and one in March 2008. The initial field trip sought to establish contacts with key stakeholders in SWM, including the Municipality of Cape Town and community-based and non-government organizations focusing on recycling. During the second field trip in March, the team traveled with Dr. Peter Ngau from the University of Nairobi to further research the recycling initiatives and focused on the efforts of private composting firms in Cape Town. The team organized meetings with Dr. Peter Ngau and key stakeholders from the Municipality and private sector that enabled a South-to-South dialogue in SWM. After the two field trips, the team completed about 20 interviews and 5 group interviews.

Based on the fieldwork and literature review, the team analyzed the interactions and roles of the key stakeholders in SMW, particularly in recycling and composting. We then used this data to examine strengths, weaknesses, opportunities and challenges (SWOC). In April, the team invited Saliem Haider, former head of the Solid Waste Disposal Department for the City of Cape, to come to Columbia University and assist in this project. From this SWOC analysis and insights from Saliem Haider, the team prepared a list of recommendations for Ruiru that will help to facilitate its SWM strategy and manage the problems linked to the dump.

Chapter Two: The Case Study of Cape Town

2.1 History

As our case study for SWM, Cape Town is an inspirational story. Prior to 1997, the City of Cape Town as we know it today consisted of 39 municipalities that serviced this Cape metro region. Various informal SWM practices existed in these municipalities that included uncontrolled burning of waste and untreated landfill site open to animals and children. None of the landfill sites had protective plastic liners that mitigated for potential groundwater pollution. With a decentralized local government, there was no real effort to consider the greater metro environmental problems from the existing SWM practices as well as little public interaction regarding the policy decision of these municipalities. In 1997, the 39 municipalities were disbanded and restructured into seven municipal service structures, where six performed local

functions of solid waste collection and cleaning. For three years, there was concerted effort among the six municipalities to upgrade the landfill sites and compost plants and operate them in accordance with environmental regulations. By December 2000, the Unicity came into existence where the seven municipalities were merged into one – The City of Cape Town. Waste collection, cleaning and disposal are now all in one Solid Waste Disposal department, and all composting facilities were now deemed Disposal functions.¹⁸

Since 2000, the City of Cape Town has implemented several initiatives that improved its waste management. All three landfill sites are strictly controlled, only allowing private companies and individuals with permits from the City to enter the facilities.¹⁹ Newer parts of the landfill sites also now have been designed with linings and leachate detection systems to reduce the potential for groundwater pollution. The material recovery facility at the Athlone Refuse Transfer Station also composts waste, helping divert general waste from landfill disposal²⁰. The Municipality also established 19 drop-off points or free community waste facilities where citizens can drop off all types of waste, such as garden waste, motor oil, metal, paper, cardboard, glass plastic, and electronic waste.²¹

The City's current Integrated SWM policy also incorporates the National Waste Management Strategy for minimizing the impacts of waste that is disposed at landfills. The aim of this national strategy is to “reduce the generation and environmental impact of all forms of waste [and], to ensure that the health of the people and that quality of the environmental resources are no longer affected by uncontrolled and uncoordinated waste management.”²² By re-orienting its SWM into a more integrated and holistic solution aimed at pollution prevention and minimization at source, the City has the policy support to address its current SWM problems.

2.2 Current SWM

Although the Municipality of Cape Town operates under different institutional, technical, and financial capacity than the Municipal Council of Ruiru, Cape Town confronts similar SWM challenges. With 3.5 million people and as the second most populous city in South Africa, Cape Town is generating an increasing amount of waste. In the last few years, its waste generation has increased by as much as 7 percent even though there has been a flattening of population growth. The growth in its waste stream can be attributed to the improvement in economic conditions.²³ In addition, Cape Town's landfill sites are rapidly reaching capacity.²⁴ Like Ruiru, illegal dumping is an ongoing problem for the Municipality, and there continues to be low public awareness in handling waste.²⁵

As it centralized its SWM operations in the 1990s, City of Cape Town decentralized in another way. In order to adequately serve all the seven areas, the Municipality began to build numerous partnerships with private companies, NGOs and CBOs. For example, under the Solid Waste Disposal department's three functional divisions of disposal, collection, and area cleaning, the City contracts with private companies to collect and transport waste from residential sites to the refuse stations and landfill sites. About 80 percent of “formal houses” in Cape Town have wheelie bins or mobile garbage bins that allow for weekly collection of waste, and about 50

percent of informal settlements receive a refuse collection and area cleaning service from the Municipality.²⁶ Although the Municipality continues to face challenges of having one department service all seven areas, it has implemented city-wide initiatives, particularly in the areas of recycling. These initiatives aim at reducing waste at a higher level in the waste management hierarchy. CBOs, NGOs, and private companies are also implementing innovative SWM practices, specifically in recycling and composting, which in turn have increased Cape Town's capacity to minimize waste prior to its disposal at the landfill.

Consequently, this decentralization led to the emergence of multiple stakeholders in Cape Town's SWM process. The process was no longer limited to the public sphere; private companies and community-based actors have entered into the process. The interaction of these stakeholders reveals that a more integrated and coordinated approach is required for an effective SWM system.

Chapter 3: Stakeholder Analysis

3.1 Stakeholder Interaction Analysis

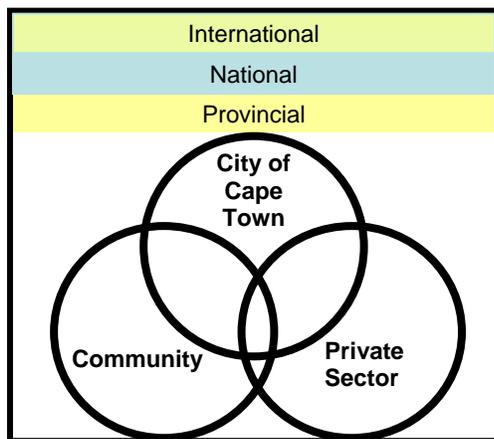


Figure 2

In addition, international, national and provincial governments play a critical role in shaping solid waste services. Each level of governance greatly impacts solid waste norms and policies, which in turn, affects performances on a local level. In this regard, the City of Cape Town finds itself in a uniquely positive position. Unlike other developing African countries, the regulatory framework in South Africa provides strong policy support as reflected in Cape Town's solid waste policies. Overall, the multiple levels of stakeholders each play critical roles; successful SWM strategy seems to develop from recognizing this and fostering constructive interactions.

Solid waste management is a highly interactive process between multiple stakeholders. As the central actor, the City of Cape Town is obligated by national law within the Municipal Systems Act to *ensure* the provision of solid waste services to its jurisdiction. However, the City is not obligated to provide these services itself and has incorporated the private sector and community organizations into the process. The City has developed formal partnerships with the private sector to provide a range of services. However, while the City has acknowledged the community's role in education, advocacy, small-level business development and collection services, it has been slower to incorporate community organizations in formal partnerships.

3.2 Stakeholder Participation Analysis

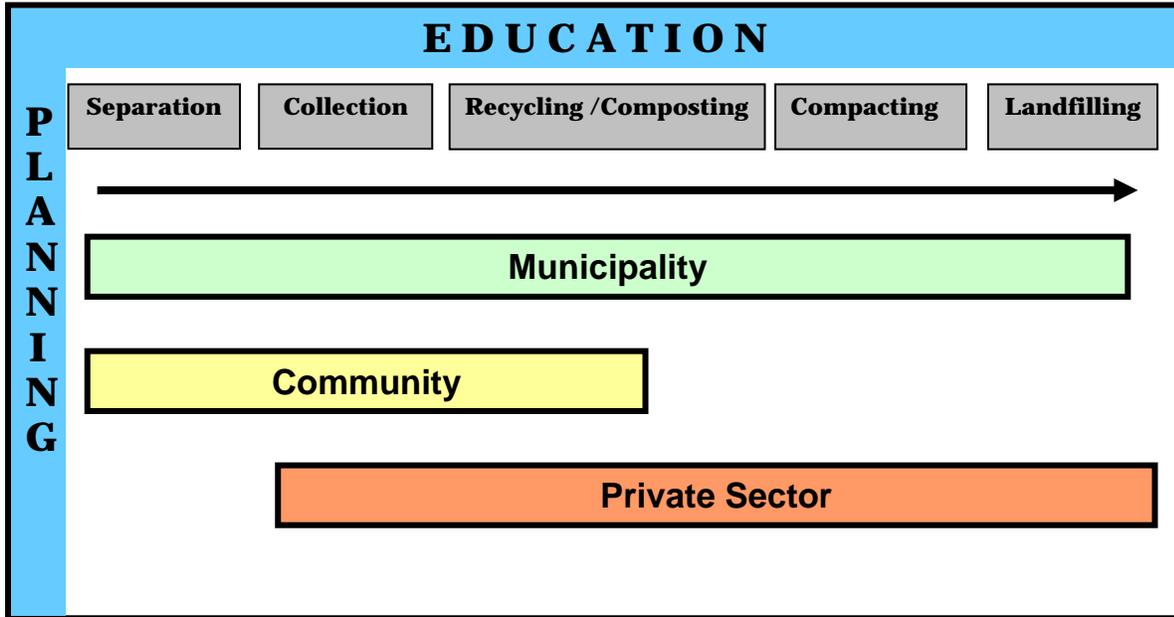


Figure 3: Stakeholder Interaction

Designing and implementing a SWM system involves many processes and participation from multiple stakeholders. The diagram above highlights the process that Cape Town is working towards in the disposal of waste products. After consumption, waste products enter the waste stream through some form of separation. Second, collection services will collect the products and bring them to different facilities depending on the form of waste. Third, some of the waste is taken to a recycling/composting facility where it is manipulated into a new form and sold back into the market (for example recycled bottles or composted soil). On the other hand, if a waste product is not recyclable or compostable it goes straight from collection to compaction and on to disposal in a formal landfill. In addition, planning and education play a critical role throughout the entire process.

As mentioned before, the principle actors in implementation of solid waste services are the municipality, the community and the private sector. The following section will detail each sector, the specific actors within each sector and their role in the process.

The Municipality

Over the past decade, the City of Cape Town has increasingly decentralized its control of the solid waste system and now, supports an integrative waste management plan. The City has sub-contracted out thirty percent of its waste management services via Public Private Partnerships (PPPs). These PPPs have allowed the City to increase its capacity of service provisions at a minimal cost. The City currently has six partnerships with private companies, these companies include: Wasteman, Enviroserv and Millennium Waste, Interwaste and Marthinus Waste Removals. These private companies are responsible for a range of activities, including waste collection, transport and processing. Oftentimes, they are also contracted to manage landfills and

cling buy-back centers. Furthermore, because of the City's responsibility to ensure waste management services; it is bound by law to monitor and evaluate each program and partnership, whether the program is under their direct control or not.

Community Level

Community level initiatives play a critical role throughout the waste management process. The community based initiatives take the form of:

1. Non-Governmental Organizations (NGOs);
2. Community Based Organizations (CBOs); and
3. Individual or Household Initiatives

NGOs

In Cape Town, the main roles of NGOs include: education; advocacy and liaising between small-scale collectors (CBOs and individuals) and large-scale private companies.

In terms of education, some NGOs seek to facilitate community exchanges. For example, the Community Organization Resource Center (CORC) brings people from one community together with people from another community to promote learning exchanges and innovation at a grassroots level. Other NGOs, such as Footprints and Organic Solutions charge schools to provide environmental and waste education. These schools bring primary age school children to the recycling facility, where a facilitator from the NGO conducts educational programs. The programs consist of a lecture and also hands-on learning, where the children build worm composts and observe recycling.

In addition, NGOs, such as CORC, act as liaisons between the community the City, as well as between the community and the private sector. These NGOs are in contact with leaders of various CBOs and relay the information back to the City. However, the process in Cape Town is not formalized and functions at a low level, meaning it is often difficult to organize dialogue with the City. NGOs such as CORC, Footprints and Oasis also manage recycling buy-back centers/depots. These centers, either: one, directly employ people to work sorting materials at the center; or two, subcontract the sorting process to CBOs. The NGOs' main roles within this process are to either act as a sorting and holding facility or act as a holding and transportation facility. Within either model the NGOs act as a liaison between the community and the private sector, where the private sector buys the sorted recyclable materials and pays the NGO directly.

A Case Study on an NGO Interaction with Multiple Stakeholders

The Community Organization Resource Center

The Community Organization Resource Center (CORC), a local NGO, seeks to empower poor communities to build low-income housing through community savings schemes. They work in all nine provinces of South Africa and are internationally affiliated with Slum Dwellers International and Pamoja Trust in Nairobi, Kenya. As a grassroots-based organization, CORC encourages about 50 community savings groups in the Cape Town network to find ways to solve their own problems and learn from each other through community-based exchange.

Of the 50 savings group, 19 participate in recycling. Most of the groups are in the informal low-income settlements of Cape Town and have taken on recycling as a means of supplemental income-generation. Each group is responsible for setting up their own guidelines for dividing up the recycling tasks of collecting and sorting, and sharing the profit from the sale of recyclables. With a capacity to collect and transport three tons of recyclables, a collection team makes a weekly collection from each savings group. Using funding from the network and CORC, the collection teams also provide the women goggles, overalls, gloves, and containers to collect and store recyclables.

CORC's interaction with the City's Solid Waste Department is limited. Instead, CORC has developed a relationship with the Ministry of the Environment. CORC's interaction with the Ministry is mainly through an advocacy role on behalf of the communities they serve. However, they do interact with programs of the Solid Waste Department by participating in the City's Yellow-Bag program. In partnership with Marina de Gama, a high-middle income residential area, the CORC collection team picks up the 1000 yellow bags of recyclables from the Coastal Park landfill site and distributes them to some of the 19 savings group for sorting. Also worth noting is that while all of the savings groups effectively generate a supplemental income from their participation in the CORC recycling program, groups that also partner with the City and private sector have generated more income. ²⁷

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Community Based Organizations

CBOs in Cape Town are involved in community organizing, education, collection and small business development. CBOs have formed in the informal settlements, where they have organized to create income generating activities in waste. Since CBOs are often organized by local community leaders, these leaders play an active role in waste management by organizing and educating their community about issues and opportunities in solid waste. These leaders have started many initiatives from community awareness campaigns to community gardens and compost centers that promote community soup kitchens.

In addition, these CBOs have formed groups across communities to promote learning exchanges to discuss strategies and lessons learned. For example, certain recycling CBOs have developed a system that creates economies of scale by amalgamating their materials into one batch, which allows them to directly sell to the private sector or to an intermediary NGO. This partnership among CBOs has generated income and increased supplemental incomes for the community.

Individual and/or Informal Sector Actors

“The term ‘informal private sector’ refers to unregistered, unregulated, or casual activities carried out by individuals and/or family or community enterprises that engage in value-adding activities on a small-scale with minimal capital input, using local materials and labor-intensive techniques”.²⁸ Informal sector participants are typically very poor individuals from the informal townships around Cape Town that engage in recycling and composting as a way of generating income or cutting costs.

Micro-scale collectors typically collect residential waste from household waste bins, illegal dump sites and landfills. Micro-scale collectors sell their recyclables to local buy-back centers. Also, some private sector businesses will conduct informal and illegal business dealings with these ‘waste pickers.’ The private businesses charge the ‘pickers’ a fee in turn for dumping their waste, typically builder’s rubble, near the settlements. In addition, the waste pickers are awarded permits from the City to enter government-owned landfills. They do this in order to pick through the refuse heaps in search of recyclable materials. However, the City has decided to discourage these pickers from entering the landfill as of June 2008 because of grave health concerns and deaths experienced by the pickers in the previous years.

Individual composting and on-site composting are commonly practiced in Cape Town. The introduction of worming to the process of composting can convert the process into a profitable business. Individuals in Cape Town are using worm farms to speed up the process of composting to make it more efficient, reduce foul odors and have a final product for sale that is of higher quality. Secondly, on-site compostors are individual businesses that use composting at the site of their business. Typically, this is carried out by farmers. Most farms already use similar techniques or at least re-use food and green waste as fertilizer. However, when actual composting facilities are built, farmers greatly reduced their costs by paying less for waste collection and paying less for inorganic fertilizer.



A Case Study on Individual On-Site Composting **JP Broodryk Farm**

The JP Broodryk farm is a small-scale farm that grows a variety of crops. The farmer grows enough food to feed himself, his family and his employees and families. He then sells the rest of his food products to a nearby tourist game park hotel. The farm is located very far from any urban area and has extremely arid soil. The farm uses the compost to condition the soil, especially to help hydrate and soften the soil. The compost is not used for income generation directly; however, it helps to reduce costs. The farm mainly uses the compost as a soil conditioner, instead of chemical fertilizers. Therefore, the farm saves money by composting and not buying chemical fertilizers.

Private Sector

The formal private sector refers to privately-owned corporations, organizations, firms and/or institutions. These entities must be formally registered with the City and have official business licenses. They also must have some level of capital investment and necessary equipment related to waste management. These private entities are now involved throughout the entire waste process, from collection to landfilling. They can enter into the waste process in a variety of ways; one, when the City awards them a contract to provide a specific service, two, when they purchase the rights to perform a service, or three, when a business, community or individual pays for their services. The sector easily breaks down into two categories: small-scale private business and large-scale private business.

Small-Scale Private Businesses

Small-scale private businesses are independent individuals who are functionally apart from the City. Within recycling, these businesses act as an intermediary between the community and larger private sector firms. These businesses own a vehicle that enables them to collect recyclables and transport them to larger private recycling companies. This type of collection has grown in the past few years because small-scale collectors are able to quickly respond to fluctuations in the market. In relation to composting, small businesses, like Organic Solutions have generated a healthy profit as well, especially in worm farming. Businesses sell products like worm farms, composted soil conditioner and worm 'tea' to landscapers, nurseries and small-scale farmers.

A Case Study on Small Scale Businesses in Recycling and Composting

Abundance Recycling and Organic Solutions

Abundance Recycling was formed out of a sense of social responsibility. It was created when two owners of a yoga studio, Cynthia and Gary asked their clients about their interests in receiving door-to-door recycling collection. Originally, they offered two collections per week and serviced 800 homes and small business within the areas of Cape Town's southern suburbs. The collection service is performed by one vehicle and a trailer.

Initially their fees were too low to cover costs, at 20 Rand per month or about \$3, which included four separate collections within that duration. Currently, the price of collection has increased to 40 Rand per month or about \$5, which includes pick-up of one large recycle bag per household per week for 10 Rand. Abundance now employs one driver and one collector and is looking to expand and possible be considered for a municipal tender.

Organic Solutions, founded by Stephan Kloppert, currently functions as a small-scale profitable composting business, but Stephan seeks to break the organization in two parts: one that sells products for a profit and two that works with the community to promote composting. Stephan has decided to begin his new initiative with the Ministry of Education. The Ministry of Education has taken an interest in his project and wants to institute pilot composting and organic gardening program in 10 schools within the district of the Municipality.

For now, Stephan is developing the for-profit side of his organization. He makes money selling entire worm farms or simply the products of his worm farms, which consist of the worm castings, a type of soil conditioner and worm "tea." Along with the Ministry of Education, the local church took an interest in his organization and decided to donate 20 hectares of land to helping him create a garden and composting area for the children of the church. The space will seek to teach children about planting and growing food, along with waste minimization techniques, like composting. Stephan has already sold worm farms to many schools. He worked with these schools and given talks to the children about the worm farms and gardens. He says that the children had so much fun working with the farms and learning all about composting, worms and gardening.



Large-Scale Private Businesses

The combination of urbanization and over-population, mixed with fixed government budgets, has put a strain on Cape Town's solid waste resources and capacity. Large-scale private businesses have been filling in that gap. These large-scale private businesses are large firms with a fleet of vehicles and large capital infrastructure. From collection and transportation to compacting and material transformation, large scale private businesses currently execute the majority of large-scale recycling initiatives in Cape Town. Similarly, in composting, the private sector produces better quality compost at a reduced price than the City of Cape Town.

A Case Study on Large-Scale Private Sector Initiatives and Interactions with Municipality

Reliance Composting

Reliance Composting located in Paarl, South Africa outside of Cape Town and was created initially to financially support a local wine farm. Pieter Zotze, the General Manager, who owns the vineyard and manages Reliance Composting saw the potential to use his organic green waste from the vineyard and turn it into profits by developing a marketable composted product. Mr. Zozte, not only recognized the economic component of composting, but also understood the environmental benefits. In order to qualify under UK organic soil standards the vineyard underwent a 3-year conversion process.

The company currently provides compost to a variety of buyers and is looking to expand its operations. However, Reliance has not been able to expand to its potential. A misjudgment about the readily available volumes of compostable materials has proven to be a constant issue. Reliance wants the Municipality to provide large quantities of compost that are needed for Reliance to grow. However, this proves to be difficult because the Municipality is also providing garden waste to other contracted composting businesses. Overall, the process of growth for large-scale composters seems to be a complex and difficult process. If Reliance is to continue growing it will need innovative ideas and dialogue with the Municipality.



Chapter 4: SWOC Analysis

4.1 Strengths, Weaknesses, Opportunities, and Challenges

In this section we use a SWOC approach to analyze the opportunities and challenges associated with the key solid waste stakeholders in Cape Town. The analysis assesses the internal strengths and weaknesses of each actor and the external opportunities and threats that they face. We have grouped each stakeholder into three sectors, the public sector, private sector and the community sector.

| Stakeholders | Internal to Organization | | External to Organization | |
|--------------------------|--|--|---|---|
| | Key Strengths | Key Weaknesses | Key Opportunities | Key Challenges |
| City of Cape Town | <ul style="list-style-type: none"> Strong Policy Support Strategy and planning Infrastructure: Two Refuse Transfer stations, Material Recovery Facilities | <ul style="list-style-type: none"> Underbidding of contracts Length of contracts Lack of strong dialogue & partnership with NGOs and CBOs | <ul style="list-style-type: none"> Growing 'green consciousness' of middle-high income residents Expansion of private sector interest in waste management | <ul style="list-style-type: none"> Limited landfill capacity Sustainability of the recycling industry due to volatile pricing. Only cans and metal are self-sustaining recycling businesses |
| Private Sector | <ul style="list-style-type: none"> Improved efficiency and quality Technical and capital capacity | <ul style="list-style-type: none"> Conflict of interest Limited control of supply | <ul style="list-style-type: none"> Discussion Forum Separation-at-source initiative | <ul style="list-style-type: none"> No strong markets for recyclable products Uncooperative relationship with other private companies and City" |
| Community | <ul style="list-style-type: none"> Environmental campaign initiatives with schools Income generated is invested back into the community | <ul style="list-style-type: none"> Lack of dialogue with the City Lack of financial sustainability | <ul style="list-style-type: none"> Government availability of public grants Private interest in partnerships | <ul style="list-style-type: none"> Low presence of environmental education campaigns Larger institutions, like private sector or municipality overtaking the work and supply in future |

Figure 4: SWOC Analysis of Stakeholders

City of Cape Town

The key strengths of the City's role are careful strategy and planning and the creation of SWM infrastructure and policy, including regulatory frameworks. The national, provincial and municipal regulatory and co-regulatory support for waste minimization within Cape Town is particularly strong and helps to support formal and informal recycling and composting

initiatives. The City's waste infrastructure is also relatively sophisticated. Properly-maintained landfills, material resource facilities, drop-off centers, buy-back centers, and a fleet of collection vehicles are all important facilities that must work in unison to ensure the smooth functioning of waste services.

The key weaknesses are the structure of the bidding process and a lack of dialogue with the community sector. The bidding process has caused problems because under-bidding and short-length of contracts have prevented companies from long-term investment and security of tenure. The lack of communication between the City and the community-level organizations causes inefficiencies, such as duplications in service.

City of Cape Town Five-Area Pilot Program

The City of Cape Town launched a recycling initiative in September 2007 called the Five Area Pilot Program. The pilot program has targeted five areas in Cape Town's southern suburbs. The program is a "separation-at-source" initiative, meaning that residents are asked to separate their recyclable from non-recyclable waste at home, *prior* to City collection services. Households are provided one clear plastic bag per week free of charge to be used for the collection of recyclable materials.

During the program, the City remained in control of general refuse collection, but contracted out the collection of recyclables to private contractors. Currently, the city has six contracts with private sector recycling companies; each of whom controls either collection, transportation or the processing of materials. However, one year after implementation, only three of the five programs still function, and only one is considered successful. The failure of the four programs is attributed to under-bidding by the city, where the city gave the contract to the lowest bidder instead of the most competent bidder; Another problem was poor business planning by the private sector, where the private companies did not estimate the full costs of the program. On the other hand, the successful program worked within a high income community that generated more recyclable waste, and was better educated about the separation policies and procedures. These factors helped the company to generate a higher profit.

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The opportunities of the City are the growing green consciousness of the residents of Cape Town and the expansion of private sector interest in waste minimization initiatives. Cooperation between consumers and the private sector has greatly facilitated the implementation of City policy. Many residents in Cape Town are much more environmentally aware than previous generations and are interested in environmentally conscious activities, such as recycling and composting. The expansion of private sector interest in waste minimization has also allowed the city to competitively assign contracts to private companies.

The challenges of the City are the liability of the city's landfills and the questionable sustainability of the recycling industry. The city's landfills are considered to be a liability because of the high burden the landfills have placed on the yearly city budget as well as on the environment. If the city does not take the necessary steps to decrease the amount of waste landfilled, the cost of landfill maintenance and land acquisition for additional landfill space will skyrocket. The second threat is the sustainability of the recycling industry, which suffers from volatile pricing and unpredictable supply.

Private Sector

The key strengths of the private sector are improved efficiency and quality, and high capacity. Rudimentary results seem to show that the private sector can help alleviate the system of inefficiencies and improve quality. For example, the City contracted out composting businesses to private companies after the City's Radnor composting plant was closed down. The Radnor plant experienced inefficiencies and low product quality and the new PPP system is helping the composting industry turn a profit and produce a higher grade product. The private sector also benefits from high capacity because they have comparatively large amounts of funding and resources. Therefore, they are less adverse to price fluctuations and can adapt more quickly to changes in the market.

The key weaknesses are that private businesses are formed with the primary interest of making a profit, rather than providing a service for the public good. The City is accountable to its citizens whereas private companies are only accountable to their shareholders. Their main interest is in maximizing profits. Those members of the private sector that use waste as an input may be less likely to support waste avoidance or minimization goals. The private sector also has limited control over its supply of raw materials. A large portion of the sector's raw materials comes from City owned drop-off and buy-back centers, which are dependent upon the individual behavior and contracts with the City. At times, the supply cannot keep up with demand.

The main opportunities for the private sector are the existence of a discussion forum and the City's separation-at-source initiative. The recycling forum opens dialogue with other private companies involved in recycling and allows the City to engage in dialogue and share best practices in the SWM process. The Municipality's separation-at-source initiative is also an opportunity for the private sector in recycling and composting industries to increase their supply of waste materials.

Private recycling and composting companies face different challenges. The lack of a strong market for recyclable products is a main challenge to the private sector. With volatile prices for recyclables, both the private waste collection and management companies, as well as recycling and composting industries, have found it difficult to expand their current businesses since their profits fluctuate. As for private companies involved in composting, they have found it challenging to build viable partnerships with the City and other private companies.

Community Initiatives

The two key strengths of community based organizations are the education initiatives within the school system and the income generated that goes directly back into the local community. The education programs have greatly improved the awareness of the environment and solid waste. This hands-on learning style is also an effective teaching tool for children. Further, by working with the school system, these groups are able to charge a fee for their service, which helps increase their chance of sustainability. Secondly, the income that is generated from local small

businesses goes directly back into the community, which provides a direct sense of satisfaction and encourages community engagement.

The two key weaknesses are the lack of quality work and the lack of financial sustainability. Although the quality of work greatly differs between community initiatives, many private sector and City initiatives complain that the quality of work is not consistent. For example, community recycling enterprises do not always sort the recyclables in a consistent manner, which in turn, forces the private sector to spend time and money re-sorting. Also, their lack of financial sustainability is a weakness because the community businesses are typically dependant on outside actors and City grant money. Furthermore, they do not always have access to formal credit markets and are thus, fragile and unable to survive financial fluctuations.

The two key opportunities are the availability of government grants and the private sector interest in partnerships. In the past, the government has given grants to NGOs and is looking to continue this process. This is a great opportunity for community level initiatives to grow their already existing projects or to start-up new projects. Second, the private sector is now looking to NGOs and CBOs to provide services and supply raw materials.

Community initiatives also face two key external challenges, which include few environmental education campaigns and the fact that larger institutions are overtaking community work and/or supply as the businesses grow. Environmental education campaigns are less common in the informal settlements. Although these communities already have highly developed waste minimization practices, they could still benefit from exposure to formal educational campaigns. Secondly, as community initiatives grow to a sustainable and profit making size, larger institutions will use their already developed information and services and take them over. This threat would hurt the community initiatives in the long-run as they grow.

4.2 Lessons Learned and Suggestions for Municipality

The SWM innovative principles in Cape Town can be categorized according to six areas: cooperation and partnerships, economic incentives, regulatory framework, separation-at-source initiatives, equity and education.

1. Cooperation and Partnerships

The development of an *integrated* waste management plan creates synergies among different SWM actors and creates a framework for the implementation of a sustainable SWM system. The plan creates incentives for each stakeholder to not only become involved in waste minimization techniques, but also exchange information and create partnerships with a variety of stakeholders

PPPs have allowed the City to transfer the risk of new recycling and composting business ventures onto the private sector. It has also introduced a level of competition within the industry to rid the system of inefficiencies and improve the quality of services. However, the City's

private contractors have been sub-contracting services out to other smaller private companies. This can cause complications because the sub-contracted companies are not bound by the same regulations that the tendered company is held to. It is also difficult for the City to monitor and regulate operations when services are not centralized.

2. Economic Instruments and Fiscal Incentives

The key to a successful waste minimization policy is the prioritization of the program within the budget. The prioritization of waste minimization in City of Cape Town is reflected in the 2003/2004 public budget, where a greater amount of funds were allocated towards waste minimization efforts.³³

The creation of the recycling and composting industries is an expensive venture, particularly with the huge capital cost required up-front and subsequent operational costs. Capital costs include land acquisition, infrastructure development, equipment acquisition, new buildings and facilities, remediation and closure and operational costs include wages, vehicle maintenance and technical and feasibility investigations/studies/consultation fees,³⁴ However, recycling and composting can save the Municipality a large amount of money through landfill savings and creation of jobs. The establishment of a viable recycling and composting industry is a vehicle for economic growth through macroeconomic expansion and small-scale income generation. Macroeconomic expansion is realized through the creation of new industry and small-scale income generation, specifically within the informal settlements.

These waste minimization initiatives must be self-sustaining businesses. Many NGO and CBO groups are only able to make ends meet through government grants. The cost and revenue structure of the system needs to be evaluated and modified such that these businesses are not reliant upon public funding.

3. Regulatory and Co-Regulatory Policy Instruments

The national, provincial and municipal regulatory policy instruments in Cape Town have all substantially helped the City move towards waste minimization goals. These instruments, including the National Waste Minimization Strategy, the White Paper on Integrated Pollution of Waste Management in South Africa, and the Cape Town's IWM policy, helped the Solid Waste Department deal with a "history of extreme institutional fragmentation, social inequality and varying tariff structures."³⁵ With its strong strategic planning capacity of the City, waste minimization has indeed become a public priority as reflected in the City budget and City-wise campaigns.

4. Separation-at-source

Separation-at-source initiative is critical to the success of the recycling and composting program. It is important that the City have mandatory separation-at-source programs that require individual households to separate their recyclables from their non-recyclables *prior* to pick-up. Doing so would increase the amount of waste that can actually be composted or recycled. According to the City's IWM policy says: "waste separation at source shall be

mandatory in all domestic households and institutions and businesses, including high density and multi story buildings, from a date to be announced. Initially only organic (vegetable and plant matter) and inorganic (usually cardboard, glass, plastic, paper, builder's rubble) waste shall be separated." Teaching residents to separate at home is cheaper than sorting materials at Material Recovery Facilities and also helps to increase individual awareness about the ecological impact of waste.

5. Equity

Recycling and composting initiatives can be used to promote equity of SWM services among communities with different income levels. The City's existing waste collection tariff structure has helped equalize the cost of SWM services between poorer and richer communities. Furthermore, its policy of requiring private contractors to employ local members from the communities they service, the City is not only providing jobs for the unemployed, but also help foster a sense of community responsibility among these residents. The City created a policy which requires private business to employ local personnel from areas that they are servicing. This policy was actually an outgrowth of lessons learned from an experience in Khayelitsha, where a private company servicing the area was not employing people from Khayelitsha. As a consequence, the residents "made it impossible for the company to service these areas," the company's tender was not renewed and the City changed its policy.³⁶

6. Education

The most successful waste minimization plans have strong educational awareness programs that are designed to alter the SWM system from the bottom-up through modifications in the behavior of the creators of waste. The City-funded awareness campaign called "Waste Wise" has been successful at improving awareness by incorporating environmental awareness lessons in high school curricula through working with the Ministry of Education. NGOs should also increasingly take on the role of education, because it is best suited to their business model and resource structure.

Chapter 5: Recommendations for the Municipality of Ruiru, Kenya

In developing its strategy to manage solid waste, we recommend that the Municipality of Ruiru incorporate the following two themes:

- Environmental Sustainability
- Integrated Approach

The key to environmental sustainability is to work towards the idea of a "closed life cycle," where waste materials are diverted from the landfill and transformed back into re-usable goods. The Municipality must consider that merely moving its current dumpsite to another location would not necessarily solve the environmental problems and subsequent public hazards that arise from the disposal of solid waste. Following a more integrated approach, Municipal Council of

Ruiru should acknowledge that it is not the only main actor in SWM process and that it can partner with key stakeholders, whether it is the private sector, CBOs, or NGOs, throughout the SWM process. A more coordinated approach, in turn, would promote greater dialogue among the different actors and help SWM function more smoothly.

5.1 Short-term Recommendations

Within the next year, we recommend that the Municipality of Ruiru:

- Conduct an assessment of its current SWM practices, including characterization of its waste
- Develop an Integrated Management Plan that incorporates environmental sustainability and follows an integrated approach

By analyzing its current SWM practices, the Municipality can evaluate the City's strengths and weaknesses in managing its solid waste. This assessment will also provide the Ruiru a list of opportunities it can undertake with other key stakeholders in minimizing waste prior to the landfill disposal. By doing a waste characterization, Ruiru will be better able to customize its SWM process according to its waste content and hence create business model that is appropriate to the local conditions. Second, the Municipality should develop an integrated SWM strategy with its key stakeholders. This strategy should emphasize its waste minimization options and identify composting as the most applicable option for Ruiru.

5.2 Long-term Recommendations

We would like to reiterate the recommendations suggested by the 2006 and 2007 team on solid waste management:

- Set up more communal collection points
- Re-allocate refuse collection capacity
- Regard waste as a resource
- Enforce regulations
- Explore opportunities for leveraging partners
- Build awareness in schools
- Leverage youth groups for garbage collection
- Encourage community clean up campaigns

In addition to these recommendations, the 2008 SIPA team recommends that the Municipality of Ruiru develop a SWM strategy by:

- **Building public –private partnerships with the private sector**

For example, as it moves its dumpsite from Murera ward to another location, the Municipality can partner with the private sector to manage and control the dumpsite. It should also work on

expanding existing partnerships with the private companies and provide more garbage collection and recycling services in the more densely populated ward of Gitothua and Githurai. Such a partnership can help meet some of the infrastructure and resource constraints of the Municipality.

To initiate this partnership, the council can establish a recycling or composting forum where key partners in the private sector and community can discuss key SWM issues and opportunities. This forum would also help avoid gaps and duplication in SWM initiatives and allow information to flow more freely among the sectors. Simultaneously, the municipality can also be constructing partnerships with the non-profit sector in order to facilitate awareness campaigns and education on recycling and diversion of waste from landfills.

- **Promoting grass roots development and dialogue to expand the recycling and composting sector**

The Municipality can leverage youth groups, such as FORCAS and Practical Action to assist with garbage collection and promote recycling as a means of generating income. By regarding waste as an income resource, locals will have more incentives to expand its recycling effort. Also the municipality can assist in fostering relationships with larger NGO's as well. For example in the recent past the UN Habitat as well as the Intermediate Technology Development Group (ITDG) have facilitated trainings for Nairobi CBOs in composting projects. The municipality can ensure funding of such projects to bolster CBO participation with larger NGOs.

- **Establishing an educational awareness program on environmental problems.**

For example, the municipality can work with the Ministry of Health and local CBOs on a public health awareness campaign to educate the community on the dangers of picking waste from the dumpsite, illegally dumping trash throughout the city, and garbage burning. It can partner with the local schools to start educating its youth on these environmental and health issues. The municipality can also encourage community clean-up campaigns that utilize the schools already participating in awareness programs to turn education into action. Incentives can also be used among school programs to induce and motivate youth to participate in environmental awareness campaigns and clean ups.

- **Building equity into recycling and composting initiatives**

As all of the above recommendations come into place and the municipality expands its solid waste management services, the Municipality should ensure that SWM services take into account the socio-economic differences between wards. Equity in services and funding needs to be established between lower income and higher income areas. It should be understood that waste management issues in peri-urban areas affect many surrounding communities and not just the immediate area where the problem exists. In order to establish equity in services, subsidization needs to be incorporated into the municipal workplan for SWM

Conclusion

Waste minimization, as part of a global waste strategy to combat the affects of rapid urbanization, can help transform major environmental and public health challenges into opportunities. From our field trip and research conducted in Cape Town, it is clear that negative SWM practices can be overcome in a relatively short timeframe, as Cape Town has proven. The practices may not be perfect as yet, but the political, social and community will is there to attain excellent environmental standards which could benefit Cape Town on the economic, socio-political and public health fronts. The same is possible for Ruiru.

Ruiru's strong commitments to its citizens, continuing dedication to equitable policy solutions and support from experts at local universities, place it in a strong position to act as an agent of change in what is an alarming environmental situation and looming public health crisis. The Municipality should also be encouraged by the strong finding that it need not act alone; by carefully bringing in a variety of stakeholders, some of the capacity and resource constraints in face of a daunting problem can be overcome. Although the study recognizes some limitations in the direct transferability of practices, we hope that the insights from Cape Town serve as a starting point for further dialogue and also aid Ruiru in its thinking about first steps toward a desperately needed integrated sustainable solid waste management plan.

Finally, this study also suggests how fruitful it is to encourage a deepening of South-South dialogues such as the one between Nairobi-Ruiru and Cape Town. Such dialogues can help disseminate innovative practices, as well as build knowledge and policy support for municipal officials who face enormously difficult tasks. South-to-South exchange is another opportunity in waste with far reaching potential that has not yet been adequately tapped. We need to exploit and create such opportunities to transform solid waste practices as a global community. Only then will we move towards healthy sustainable urbanism, rather than what is increasingly referred to as a disease-ridden "planet of the slums."

Appendix

1. Literature Review

| Article | Summary |
|---|---|
| <p>Solid Waste Collection Systems in Developing Urban Areas of South Africa: an Overview and Case Study Katrina Smith Korfmacher Waste Management & Research, 10 1997; vol. 15: pp. 477 - 494.</p> | <p>Experience with appropriate collection systems for urban and peri-urban areas of developing countries is accumulating. Nonetheless, the primary lesson learned from studying such systems is that collection systems must be designed to accommodate the particular conditions of the community. This paper reflects on international experience with such collection systems and examines their relevance to South Africa.</p> <p>A case study is presented of designing a solid waste collection system for the Winterveld, Bophuthatswana, including a community survey, a waste composition study, and exploration of resource recovery options. Detailed data from the case study show that, even within one country, solid waste collection systems are not automatically transferable from one community to another. Particular recommendations for the South African situation are given.</p> |
| <p>Graded landfill requirements in South Africa - the climatic water balance classification G. E. Blight Waste Management & Research, 10 2006; vol. 24: pp. 482 - 490.</p> | <p>Landfilling in South Africa is controlled by a set of statutory Minimum Requirements, based on a landfill classification system. Landfills are classified according to the type of waste, the projected final size of the landfill and the climate. Climate is important as climatic conditions in South Africa vary from humid sub-tropical in the east, to semi-arid on the central plateau, to semi-desert in the west. Anti-pollution measures are closely related to climate and size, with the pollution potential of small, general (i.e. domestic) waste landfills in dry climates being regarded as negligible. At the other end of the scale, large landfills where hazardous wastes are disposed have a serious pollution potential and must be designed as containment systems. The paper describes the method currently in use for deciding on the climatic classification of a site, followed by the new method that will be adopted when the latest revision of the Minimum Requirements appears shortly.</p> |
| <p>The effect of waste composition on leachate and gas quality: a study in South Africa G.E. Blight, A.B. Fourie, J. Shamrock, C. Mbande, and J.W.F. Morris Waste Management & Research, 4 1999; vol. 17: pp. 124 - 140.</p> | <p>South Africa has a system of graded landfilling standards that takes account of climatic conditions, waste type and the rate of deposition of waste. At present, waste is classified into general, i.e., municipal solid waste and low and high hazard wastes. Many of the hazardous wastes are liquids, and these are codisposed with general wastes at restricted, fully</p> |

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|---|---|
| | <p>lined and drained sites. The characteristics of the municipal or general wastes differ, depending on the income level of the originating community and the source of the energy they use. The major source of variation lies in the relative proportions of putrescible matter. There is presently no differentiation between general wastes, based on composition. However, it may be possible to relax standards when low putrescible content general waste is landfilled, and this is the issue addressed in this paper. Experiments, using waste from low and middle income communities, are being conducted using small and large field test cells or lysimeters and laboratory lysimeters. Preliminary results indicate significant differences in the quality of leachate from the two waste types. The characteristics for gas generation also differ significantly. It will be necessary to continue long-term monitoring of the test cells and lysimeters to determine differences in the long term analyses of leachate and gas and the long-term total contaminant load of the wastes. The results may influence future landfilling standards, but on present evidence, this will be unlikely.</p> |
| <p>Private Sector Participation in Municipal Solid Waste Service: Experiences in Latin America Carl R. Bartone, Luiz Leite, Thelma Triche, and Roland Schertenle Waste Management & Research, 1 1991; vol. 9: pp. 495 - 509.</p> | <p>Preliminary case studies have been carried out on private sector provision of municipal solid waste services in four large Latin American cities (Buenos Aires, Caracas, Santiago, and Sao Paulo). A parallel study of a metropolitan solid waste company in Rio de Janeiro provided a comparison . These experiences substantiate that private service provision can be successful in terms of cost containment and quality of service as long as the conditions for contestable markets are met . In the four cases studied, private collection firms have exclusive right to service specific areas of the city and contracts are awarded by competitive bidding . These and other studies in the region suggest that local authorities should establish operational and environmental regulations and standards to guide private contractors, and have the capacity to oversee these activities . Supervision and payment should be based on specific performance measures . More attention needs to be given to cost recovery, financial stability and improved disposal practices . There appears to be substantial scope for expanded private sector involvement in the region .</p> |
| <p>The Commercialization of Waste Management in South Africa By Mskoli Qotole, Mthetho Xali and Franco Barchiesi Research Series #3</p> | <p>This paper provides an analysis of the The Billy Hattingh “Community Based Refuse Removal Scheme” in Khayelitsha, South Africa (similar to Ruiru). The Billy Hattingh scheme a micro-enterprise initiative where private companies have acted as financial and technical intermediaries for local entrepreneurs on a wide range of services.</p> |

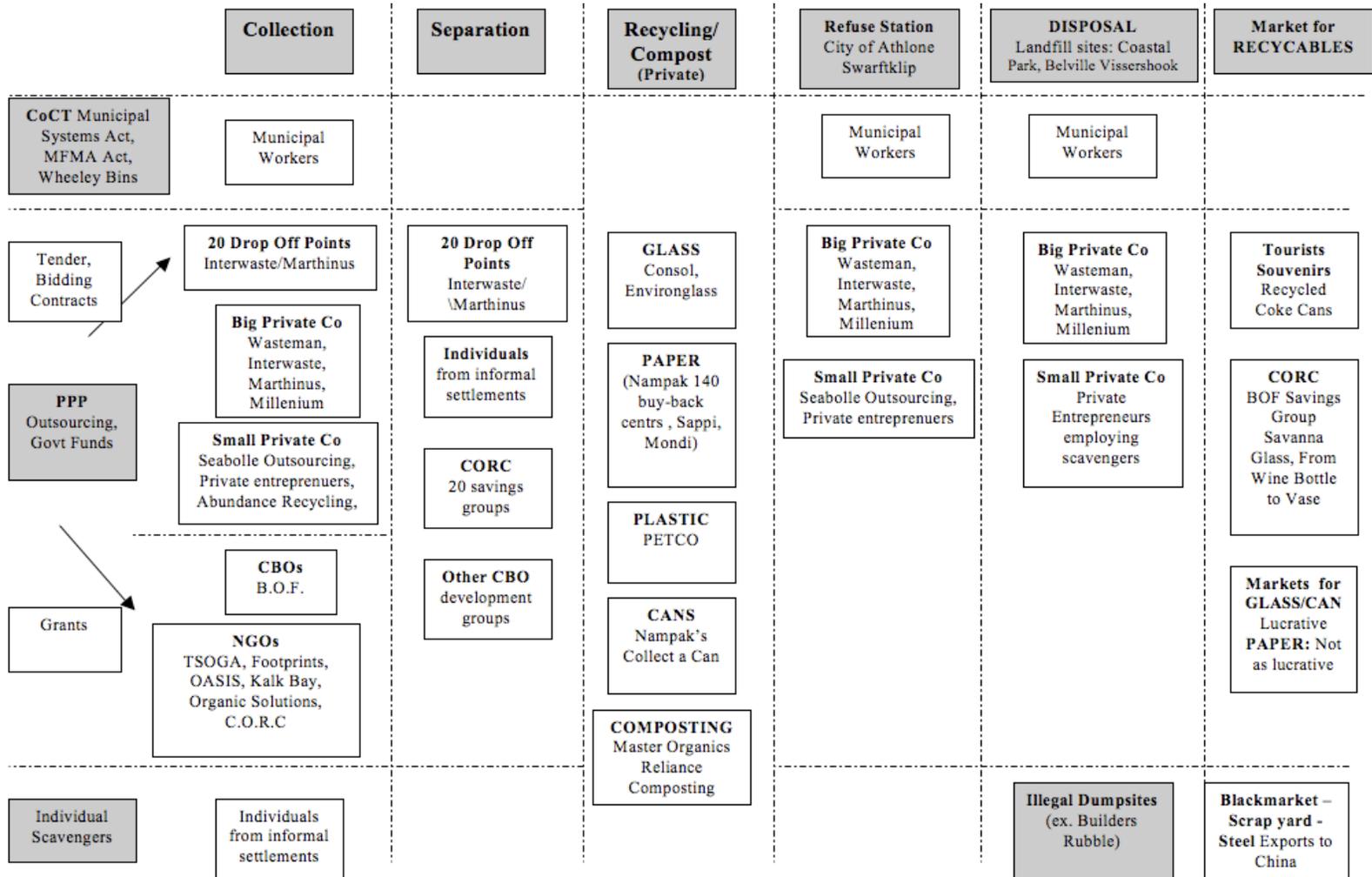
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| | <p>Khayelista is 30 km from Cape Town.</p> <p><i>One-man contract</i></p> <p>The scheme operates this way: Billy Hattingh & Associates signs a tri-partite contract with a local authority and a local resident acting as an entrepreneur. The entrepreneur is paid a monthly contract fee by the local authority in exchange for the service rendered, the local authority retaining overall responsibility for the service and the collection of service payments from residents. The process of selecting the entrepreneurs is carried out by a steering committee composed of Billy Hattingh & Associates, the local authority and community leaders. The entrepreneurs must be unemployed and must come from the same community that they are to serve. To the extent that entrepreneurs employ others, local labour must be used. Future Bank, First National Bank, and associated institutions have undertaken to provide financial support for all approved projects.</p> |
| <p>Building Accountability</p> <p>Strengthening accountability for urban services <i>S Cavill and M Sohail</i> Environment and Urbanization http://eau.sagepub.com</p> | <p>This article explores participatory governance in the context of participatory mechanisms of accountability for urban services....The people and organizations promoting accountability view it as critical to solving problems with urban services in an increasingly fragmented context of service provision. This article seeks to explore the growing interest in accountability and to assess the potential of participatory governance in improving the provision of urban services.</p> |
| <p>Gender and Specific Demographics</p> <p>THE IMPORTANCE OF GENDER IN WASTE MANAGEMENT PLANNING: A CHALLENGE FOR SOLID WASTE MANAGERS T.T. Poswa Durban Institute of Technology (DIT) (former Technikon Natal), Department of Environmental Health, P.O. Box 953, Durban, 4000, South Africa. Tel: (031) 2042949. Fax: (031) 2042038. E-mail: thobilep@dit.ac.za</p> | <p>This paper discusses the outcome of a holistic investigation into how gender affects solid waste planning and the importance of this in addressing service delivery. It concludes that the solid waste planners should always consider the effect of demographics of the households as an integral part of planning when designing a domestic waste management system. Particular attention should be given to the effect of gender on the choice of a collection system and the designed of equipment.</p> |
| <p>Waste Management Campaign Strategies</p> <p>Educational Strategy To Produce Increased Awareness At The Community Level In Tshwane Regarding Solid Waste Management City Of Tshwane (S.A.) Metropolitan Municipality</p> | <p>This paper provides us (EPD team) a good way of developing a Waste Management Awareness Programme strategy for Ruiru. It gives specific activities and objectives that that we can potentially recommend to the municipality.</p> |

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| <p>Waste Management Section In Association With Usaid Draft Version V2.0 Oct 2003</p> | |
| <p>Macro-Recycling Options</p> <p>Murad, Wahid and Siwar, Chamhuri. <i>Waste Management and recycling practices of the urban poor: A case study in Kuala Lumpur city, Malaysia.</i> Waste Management and Research On-line Journal. 2007. International Solid Waste Management Association, Vol 25, p. 3-23.</p> | <p>This study provides evidence that the urban poor and low-income communities are the main recyclers, re-users, and source-reducers of their household solid waste. The study, however, suggests that policies should be formulated to focus on promoting knowledge, education, and the skills of the urban poor and, in addition, to empower them as a means of improving their quality of life.</p> |
| <p>Waste into Energy Options</p> <p>Eleftheriou, Polyvios. <i>Energy from waste: a possible alternative energy source for large size municipalities.</i> Waste Management and Research On-line Journal. 2007. International Solid Waste Management Association, Vol 25, p. 483-486.</p> | <p>The net calorific values and weight composition of solid waste from all the major municipalities of the island of Cyprus were measured. Representative waste samples were collected, processed and tested for energy generation over a complete year. The energy values appear to vary from city to city depending on the season. The total energy that could be recovered from the waste amounted to approximately 8.5% of the total electricity generation of the island of Cyprus.</p> |
| <p>Micro-Recycling/Micro-enterprise Option</p> <p>Rogerson, Christian. <i>The Waste Sector and Informal Market for Developing Countries</i></p> | <p>The objective in this paper is to investigate aspects of the comparative experience of partnership and conflict between the local state and the informal sector in the waste economy of the urban developing world. More especially, the focus is upon identifying entrepreneurial opportunities in the waste economy. Three sections of material are presented. First, an examination is undertaken of the broad workings of the informal economy of waste in developing countries as a whole. Second, the experience of changing urban waste management practices in Asian cities is examined highlighting important opportunities for small, medium and micro-enterprises (SMMEs) in waste recycling. Third, the importance of waste recycling as a livelihood strategy for poor urban households is discussed in the context of several African cities pointing out the more limited nature of best practices in waste recycling in the African context.</p> |
| <p>Micro-Recycling Option</p> <p>Vincentian Missionaries. <i>Development Program: micro-enterprise promotion and involvement in solid waste management in Quezon City.</i> Environment and Urbanization, Vol. 10, No. 2, October 1998.</p> | <p>This paper describes the development of a federation of scavengers who live close to a major solid waste dump in Quezon City, and the role of the Vincentian Missionaries Foundation and other NGOs that have supported it. A long-term environmental development programme has been initiated which builds on the existing activities of scavenger households and which is also integrated with housing, health and other social</p> |

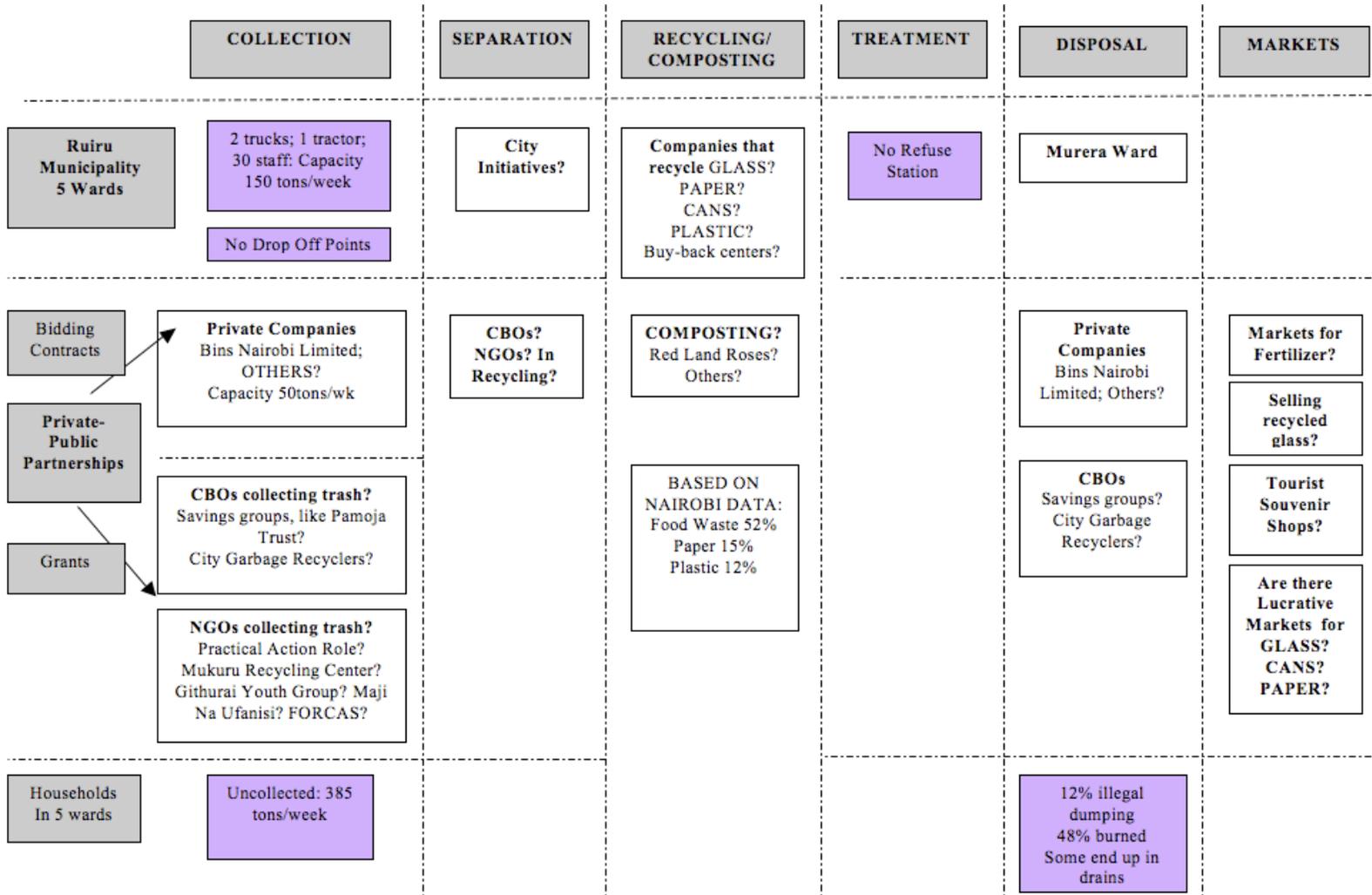
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| | <p>initiatives. A successful savings and credit programme has been started that funds micro-enterprises and social needs, including a housing programme. The Federation has also increased the scavengers' capacity to negotiate with local authorities and other government agencies. The paper ends by reflecting on the lessons learnt and their relevance for other communities.</p> |
| <p>Micro-Recycling Option</p> <p>Projects in South Africa http://www.usaid.gov/sa/success6.8.html</p> | <p>USAID has a project with the South African Department of Environmental Affairs and Tourism and University of Cape Town called the Eco-action Program. Also the Inkqubela Recycling Project, which is headed by Eunice Roro, which teaches people how to make money from recycling waste</p> |
| <p>Education and Alternative Costs Option</p> <p>Kgathi, DL, Dr., Bolaane, B. Instruments for Sustainable Solid Waste Management in Botswana. Waste Management and Research On-line Journal. 2001. International Solid Waste Management Association, Vol. 19, p. 342-352.</p> | <p>Sustainable solid waste management is a strategy for achieving environmental quality in both the developed and the developing world. Environmental quality is a necessary condition for an increase in per capita welfare over time. The paper suggests alternative instruments for solid waste reduction, re-use and recycling. But to be able to apply the suggested economic instruments, the quantities and composition of the waste must be known. Having identified the current instruments of Botswana's solid waste management (regulatory measures, environmental education, and economic instruments of property rates, service levy, and sanitation fees), the paper argues that these do not go far enough in enhancing environmental protection. Alternative instruments such as solid waste collection and disposal levies, deposit refund schemes, and product levies are suggested. It is also suggested that public environmental education and regulatory measures should be strengthened.</p> |
| <p>Problems with Alternatives for Developing Countries</p> <p>Brunner, Paul and Fellner, Johann. Setting Priorities for Waste Management Strategies in Developing Countries. Waste Management and Research Journal. 2007. International Solid Waste Management Association, Vol. 25, p. 234-240.</p> | <p>Based on case studies, it was found that for regions spending 1–10 €capita–1 year–1 for waste management, the 'waste hierarchy' of prevention, recycling and disposal is not an appropriate strategy. In such regions, the improvement of disposal systems (complete collection, upgrading to sanitary landfilling) is the most cost-effective method to reach the objectives of solid waste management. Concepts that are widely applied in developed countries such as incineration and mechanical waste treatment are not suitable methods to reach waste management goals in countries where people cannot spend more than 10 €per person for the collection, treatment and disposal of their waste. It is recommended that each region first determines its economic capacity for waste management and then designs its waste management system according to this capacity and the goals of waste management.</p> |

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| <p><u>COMMUNITY-BASED WASTE MANGEMENT FOR ENVIRONMENTAL MANAGEMENT AND INCOME GENERATION IN LOW-INCOME AREAS</u></p> <p>A Case Study of Nairobi, Kenya Peters, Kim, In association with Mazingira Institute. Case study prepared for HEC-HIC (Habitat and Environment Committee, Habitat International Coalition) for the The Urban and Popular Environmental Economy Program. Case study, 1998</p> | <p>This study focuses on the problems and opportunities of community-based waste management in Nairobi, Kenya. Within several of the city's informal settlements, women's groups have started composting organic wastes as means of improving community environmental conditions and generating income through the sale of the compost. The central purpose of the study is to assess the success of these composting projects in meeting their environmental and community development goals. A complementary purpose of the study is to add to the limited amount of research on waste in East Africa.</p> |
| <p>Samson, Melanie. A Case Study of the Municipal Waste Management Industry in South Africa. SEED Working Paper #66. International Labor Office Geneva. 2004.</p> | <p>The municipal waste management sector in South Africa has undergone significant transformations in recent years, largely as a result of externalization. To date research on, and analysis of, these changes and their implication for workers have been limited. The main objective of the paper is to expand the knowledge base on working conditions and work arrangements in the sector, with a view to helping unions organize and improve conditions of workers therein, regardless of where they work and the type of contract they have. This report also seeks to: identify the main organizations currently representing workers and employers in the sector; enhance understanding of the strategies adopted or currently experimented with by these organizations to organize and improve conditions of economic actors affected by externalization and informalization in the sector; identify potential reasons for the limited extent of these initiatives; and map out pertinent issues which will need to be addressed in the development and implementation of vibrant organizing strategies.</p> |

2. Mapping Diagram of Cape Town, South Africa SWM system



3. Mapping Diagram of Ruiru, Kenya SWM system



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