

**AN ASSESSMENT OF SANITATION SITUATION AND POTENTIAL FOR APPLYING
PUBLIC PRIVATE PARTNERSHIP IN ITS MANAGEMENT IN LOWER MIGOSI
ESTATE, KISUMU CITY, KENYA**

By

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ABSTRACT

Achieving sustainable Environmental Sanitation Management (ESM) in urban centres especially in developing countries is difficult unless urban authorities involve all stakeholders in adopting an urban wide strategy. Kisumu City faces sanitation challenges which stem from inadequate provision of basic sanitation services by the legally mandated institutions. This study was undertaken in Kisumu City in order to generate data necessary to develop a model for partnership engagement among all stakeholders in environmental sanitation management. The specific objectives of the study were to: assess the status of environmental sanitation management in Migosi Estate; examine the existing policies, legislations and institutional/organizational roles in ESM; and investigate the potential of public-private partnership (PPP) approaches in environmental sanitation management. The sample frame included City Council of Kisumu, Lake Victoria South Water Services Board, government institutions, Community Based Organizations, private sector institutions and households. The households were sourced from a planned settlement within middle income households (Lower Migosi Estate). The target population for Lower Migosi Estate was 200 households from which 120 households were sampled using stratified and systematic random sampling techniques. Primary data were collected through questionnaires, key informant interviews, observations and photography. Secondary data were collected from available literature and existing information. Quantitative data were analyzed using descriptive statistics such as percentages while qualitative data were analyzed by coding and organization of data into themes and categories, then evaluating the usefulness of information for answering research questions. The study found out that: the status of ESM in Migosi Estate was deplorable despite the fact that it is a planned middle income estate; there were weak institutional and legal frameworks that led to overlaps and disconnect among the institutions undertaking their duties towards addressing ESM challenges; and PPP as an approach to ESM was not existent. It was concluded that: the status of ESM is poor; there is weak institutional/legal frameworks and lack of a structured PPP model within Migosi Estate. The study recommended the need for an inclusive engagement for all players in ESM; harmonization of the conflicting legislations on ESM and piloting of PPP in ESM.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

During the past decades, the traditional state monopoly in urban environmental sanitation management (ESM) has been debated heavily, resulting in different forms and degrees of private sector involvement across the globe. In the wake of the United Kingdom's water privatization in the 1980s, the 1990s witnessed increase in privatization and a variety of public-private partnership (PPP) constructions in developing countries, especially following the promotion and push by international development agencies such as the World Bank, the International Monetary Fund (IMF), the Asian Development Bank (ADB) and others (Nickson 1996, 1998; Kikeri and Kolo, 2006). It was believed that private sector participation in the ESM sector would bring in much needed investment and improve service coverage, quality, and efficiency by replacing conventional public-sector systems suffering from under-investment and inefficiencies due to excessive political interference and rent-seeking behavior by vested state and bureaucratic interests (Hall et al, 2005).

Around the second half of the 1980s, ideas of further private participation and involvement in the provisioning of environmental services (water, waste, energy, etc.) started to develop, especially in the United States and the United Kingdom. Here the fundamental idea is involving the private sector in tasks traditionally fulfilled by the public sector, the orientation and literature is slightly different. The majority of the literature comes from the management and organization sciences and the orientation was less focused on state failures and governance, but rather on efficiency, the bringing in of new capital and the introduction of market logics. The dominant form of organizing urban infrastructure (water, energy, waste, transport) by state agencies has been replaced in many places by various PPP constructions, with different reasons put forward to legitimate such new constructions (Linder,1999). At the same time, these partnerships led to considerable debate, most significantly on issues of equity and equality: who is involved in these partnerships, for who are these constructions bringing more effective and efficient services, are local governments able to balance the power of private capital coming in (especially in situations of Transnational Companies (TNCs) in developing countries) (Oppenheim and MacGregor,

2004), and what does private sector involvement mean for affordability of environmental services for the poor? Thirdly, in the 1990s, following the United Nations Conference on Environment and Development in Rio de Janeiro(1992), and even stronger after the Rio+10 conference in Johannesburg (2002), ideas and practices of public private partnerships started to emerge forcefully on the national and global agenda (Mol, 2007). In this literature, the emphasis is strongly on transnational partnering of public and private entities, with a strong focus on the role of civil society organizations. The main reason behind the recent attention to private sector participation in environmental protection and service delivery is related to tendencies of globalization and governance complexities. As Davies (2002) correctly summarizes, in this interpretation the notion of partnership has a positive rhetoric referring to inclusiveness, transparency, participation and dialogue, redistribution of power, and equity not so much to ideas of efficiencies, capital investment, market logics, and increased service coverage.

A major problem of water supply and sanitation provision in cities in Africa is the inability of governments and public utilities to deliver and maintain basic infrastructure services for their growing populations (UNDP, 2006). As an outcome, many urban households have access to potable water only two hours in two to three days, and water consumption in some areas barely reaches the internationally recognized minimum of 20-25 L per capita per day, and almost half of Africa's urban population does not have access to adequate sanitation (UNDP, 2006). The involvement of the private sector in urban water and sanitation provision can take many different forms (World Bank 1997). However, management contracts have been the main form adopted by all municipal and metropolitan authorities in Ghana. According to Ogunbiyi (2004), Public-Private Partnership schemes involving management contracts, where the combination of public finance and private management of technical and commercial operations has been applied, could be the best type of contractual arrangement for ESM in Africa.

Rapid urban growth is also putting a serious strain on existing urban infrastructure and services, and many urban areas are faced with many environmental problems. With respect to institutional arrangements, the local governments, entrusted with the provision of urban basic infra-structure, have been unable to perform as a result of administrative problems and lack of capability. The government will have to become more proactive in developing policies that promote the required

changes and in supporting local initiatives. Attempts by the government to solve various environmental problems and provide services in urban areas have been inadequate. The situation is likely to remain unchanged in the future despite the efforts of government of Kenya to improve the infrastructure and service delivery, as projected capabilities will not meet the projected need for services (Mwangi, 2000). Since the mid-1980s and the introduction of economic structural adjustments, the government has been reducing its public spending, and this has had an adverse effect on urban dwellers. The provision of urban services, especially in poor neighborhoods, will have to rely on a different approach. The possibility of tackling the most serious environmental and health problems with limited resources will require cooperation between groups of actors. The local and central governments should thus devise new ways in which, within particular social, economic and political contexts, individuals, households, community organizations, NGOs, many different government agencies, private sector organizations and international donors can combine resources.

It is worth noting that urban environmental problems in low-income countries differ from those in high-income countries because of the rate of urbanization, the interaction between environment and socio-political dynamics, and the weakness of governance systems at the municipal level. City level data for 43 African cities, for example, show that 83 percent of the population does not have toilets connected to sewers. In Mahira, a section of Huruma slums in Nairobi, for example, there was only one toilet with 10 units and two bathrooms for a settlement of 332 households or 1,500 inhabitants (UN HABITAT 2003).

Problems of environmental sanitation have been experienced in most of the Kenyan urban areas where there is inadequate water supply and sanitation services the results being poor public health especially in high density estates. According to World Bank report (2004), the population of Kenya is projected to increase dramatically over the next two and a half decades, doubling by 2025. Thus there is a pressing need for achieving sustainable and effective environmental sanitation coverage in Kenya. Government efforts directed at solving serious urban environmental problems in Kenya have not mobilized the private sector, non-governmental organizations and community initiatives at the planning and management levels. A wide gap remains between the needs that are highlighted in policy and the actual implementation and

performance of programmes and projects that address environmental issues in urban areas (Mwangi, 2000).

Kisumu is the third largest town in Kenya, located on the Eastern shores of Lake Victoria, with a population of over 350, 000 people. The city has in the recent past experienced rapid growth and development, a factor that has had a direct bearing on the mushrooming of unplanned settlements. Over half of this population live in unplanned (informal) settlements. Both the Lake Victoria South Water Services Board and the Municipal Council of Kisumu are faced with the challenge of ensuring proper and efficient Environmental Sanitation Management (ESM) to its residents. Waste collection efficiency is estimated at 20% and the existing water infrastructure only serves 40% of the town population while sanitation coverage is much less at 23% of the town (Ombogo, 2003). Most of the town is either using septic tanks or pit latrines. There is unreliable quality of water due to the occasional breakage of water supply and sewerage system (Ombogo, 2003). However, in the face of expansion and rapid population increase, problems arise. The emerging issues include; lack of sanitation services and public utilities, poor housing, poor road conditions and poor disposal of wastes. The trend poses a greater challenge to government sanitation services providers and other stakeholders in the municipality on what would be the way forward in dealing with these problems. The local government agencies have not given due attention towards PPP as an approach that can address these ESM challenges.

1.2 Statement of the Problem

Implementing adequate sanitation is a global problem, but is significantly more urgent in developing countries. This highlights the need for alternative approaches to planning and management that frame solutions to the environmental sanitation problem within the context of sustainability. The research challenge is how to effectively improve current environmental sanitation practices through partnership engagement in Migosi Estate of Kisumu City. Poor environmental sanitation is a common feature in both unplanned and planned settlements such as Nyalenda and Migosi estates respectively due to inadequate or non-existing strategies for stakeholder engagement in ESM. Despite the fact that Migosi is a planned estate, it suffers from poor ESM since the government institutions that are endowed with this responsibility have not

been able to effectively deliver for various reasons. Further, most services under study were designed more than four decades ago with less population but have not seen much expansion so as to cater for the increasing population.

The incapability of the institutions to provide adequate water, waste and sewerage services on their own among other limitations has immense negative impacts and calls for incorporation of other actors in the sector. This approach entails the integration of private sector, Non-Governmental and Community Based Organizations in identifying their roles in the end allowing and opening up opportunities for responsibility sharing in ESM. Due to the lack of capacity of government authorities to provide services on their own, ways should be sought to incorporate the participation of other actors. Improvements should not only be geared towards enhancing the capacity of these authorities in ESM, but also incorporating all actors. Migosi is a middle class estate within Kisumu City and when looking at the trends of population density in comparison to other estates within Kisumu town, it is rapidly expanding. It is notable that majority of the residents within Kisumu City can afford living within Migosi. Thus this increase in population with the already compromised status of ESM if not checked would only worsen the situation. The purpose of this study was to assess the situation of ESM, the legal mandates of the institutions and the potential of PPP as an approach in ESM within Lower Migosi Estate.

1.3 Objective of the Study

The overall objective of the study was to assess the sanitation situation and the potential for applying Public-Private Partnership (PPP) approach to environmental sanitation management in Migosi Estate within Kisumu City. The specific objectives of the study were;

1. To assess the status of environmental sanitation management in Migosi Estate,.
2. To examine the existing policies, legislations and institutional/organizational roles in environmental sanitation management Kisumu City
3. To investigate the potential of involving Public-Private Partnership approaches in environmental sanitation management in Migosi estate.

1.4 Research Questions

The research questions that guided the study were;

1. What is the status of Environmental Sanitation Management in the Migosi Estate?
2. What are the institutional or organizational roles in ESM and which policies and legislations guide ESM in Kisumu City and how effective are they?
3. What are the potentials and roles of public-private institutions in ESM in the study area?

1.5 Significance of the Study

The results from the study would be used in improving environmental sanitation management in Kisumu City and as such successes can be replicated to other municipalities in Kenya since none of them has been able to adequately solve the sanitation challenge affecting them. The proposed study is expected to benefit mainly the local authorities and more specifically the CCK, LVSWB and development partners to better undertake sanitation projects meant to improve the quality of the environment and public health that have never been successful. In addition, the general population of Kisumu City would be an added beneficiary if the recommendations are put to good practice.

In order to improve the performance of the urban water and sanitation sectors, it is important to understand the situation of ESM and provide a methodology that can help address such challenges. In this study, the potential of PPPs would be explored and worthy recommendations made to enhance its application in the provision and management of environmental sanitation services. These partnerships are mainly geared towards streamlining the role, functions, and decision-making processes of actors within the sectors. As such, based on the outcome of this study, PPP may enhance further actions on the part of the stakeholders to bring about a specific and desired change within Lower Migosi Estate of Kisumu City.

In a nutshell this study is worth undertaking as it will provide researched information on the potential of PPP within Lower Migosi that will substantially reduce sanitation planning and management problems and reduce other negative impacts associated with poor management in environmental sanitation. Through this study, development partners may obtain best practices to

support ESM projects in estates within Kisumu as well as opening up other areas on ESM within and outside Kisumu.

1.6 Scope and Limitations of the Study

The study area was limited to Migosi estate in Kisumu City. The aspects of environmental sanitation covered in the study were limited to solid waste, water, sewerage and drainage in the study area. The key groups of actors included: CCK, water and sewerage service providers (LVSWSB, KIWASCO), regulatory agencies, media organizations (Radio Lake Victoria), and residents of Migosi Estate, private sector (garbage collecting and desludging enterprises) and relevant CBOs were involved in the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The literature relevant to the research was reviewed, analyzed and organized/thematized into five sub-sections namely: status of environmental sanitation management; institutions, policies and legislations on environmental sanitation; strategies for management of environmental sanitation; gaps to be addressed by the study and a conceptual framework for environmental sanitation management

2.2 Status of Urban Environmental Sanitation Management

The World Health Organization (2000) reports that the economic costs of avoidable diseases are staggeringly high and societies with a heavy disease burden tend to experience severe impediments to economic progress. The urban poverty cycle leaves sanitation to local officials or individual households. Improved sanitation coverage is one of the biggest laggards in the United Nations Millennium Development Goals. Approximately 2.6 billion people, about one third of the current world population, do not have access to public water or sewer systems (Luethi, 2008). This lack of proper sanitation is responsible for most infectious diseases and child mortality, greatly affecting the already impoverished populations in developing countries with African countries being the most vulnerable (Luethi, 2008).

Many NGO projects have invested significant amounts in failed environmental sanitation projects throughout the developing world (Luethi, 2008). For instance, the projects in the Philippines and Sri Lanka have resulted in some adverse environmental impacts because of poor planning, inadequate facility design, inadequate community health training and awareness, or lack of proper environmental monitoring and follow-up actions. In the Philippines, poor drainage is a problem in many small gravity pipe systems and around hand pump sites. People are concerned about getting water, but not about how to dispose it once they have used it. Technical

guidelines do not address proper drainage in subproject planning and community awareness building (ADB, 2002).

According to Water Supply and Sanitation Collaborative Council (WSSCC), 2002 rapid urban growth in Kenya and other developing countries has outpaced the capacity of urban authorities to provide basic services. The impacts of these limitations had been a lowering in the quality of life, reduced urban productivity, increased burden of healthcare and unmitigated environmental pollution. With reference to various UN charters, access to safe drinking water and adequate sanitation are basic human rights in which an individual has the right to be protected from diseases and other health hazards posed by insufficient water and poor sanitation.

The heavily and densely populated informal urban settlements require adequate coverage for instance Nyalenda in Kisumu City. This need is complicated by problems of non legal tenure, and the *ad hoc* expansion of such settlements (IEA, 2007). The Kenyan government has made progress by establishing the Local Authority Service Delivery Action Plan (LASDAP) and the Local Authority Transfer Fund (LATF) to respond to planning and infrastructure demands for the urban poor. Although the model is ideal, measures to strengthen functioning, transparency and accountability are necessary.

Sanitation and hygiene are indicators of a country's poverty status. About 60% of Kenya's hospital attendance is due to preventable diseases and over 50% of these illnesses are related to poor sanitation, hygiene and water (IEA, 2007). The high figures clearly highlight existence of problems associated with environmental sanitation in Kenya. In Kisumu, the access to safe drinking water is a key development challenge. According to CORDAID (2008), only 57% of the total population has access to piped water supply with a direct consequence of water and sanitary related diseases which are common as the town faces recurring outbreaks of cholera. A report on News from Africa Online by Ochieng' (2002) on water and sanitation in Kenya indicates that urban residents had limited access to refuse removal services which raise important health and environmental concerns. It is reported that only 1% of the urban residents had the local authority remove their refuse while 35% got rid of their own refuse buy dumping it in the open (Ochieng', 2002).

In launching the Lake Victoria Water and Sanitation Initiative, UN HABITAT (2008) summarized the specific objectives as: a) to promote pro-poor water and sanitation investments; b) to support institutional development and human resource capacities at local and regional levels for improved delivery of improved water and sanitation services; c) to facilitate realization of upstream water sector reforms at the local level in the participating urban centres; and d) to reduce the environmental impact of urbanization in the Lake Victoria Basin. The UN HABITAT's initiative is a clear indicator of some gaps in environmental sanitation development and this study is also focusing on ways of addressing those challenges.

According to Asabia (2009), lack of resources is a major contributing factor to the continued existence of poor environmental sanitation and hygiene. He also states that government resources are targeted more towards the water sector and thus sanitation labeled as the 'poor cousin' who is often neglected during resource allocation. With such a dismal scenario, he states that a solution should be sought by identifying initiatives especially on the use of a partnership model between the public and private sectors as a vehicle to provide more capacity in the sanitation sector.

2.3 Institutions, Policies and Legislations on Environmental Sanitation

Kenya is one of the countries that signed the Bonn Ministerial Declaration (2002) assigning priority to water and sanitation as keys to sustainable development. Kenya is also a signatory of the Rio de Janeiro Declaration (1992) making water, sanitation and hygiene a top priority for action since the country is seriously affected by lack of basic water and sanitation services. This however remains an elusive goal WSSCC (2002). Urban water supply and sanitation service providers in many developing countries are already strained under current demands and face formidable obstacles from policy constraints in meeting this growing demand (Luethi, 2008).

In Kenya, the government (GoK, 2007) has made significant progress in developing an Environmental Sanitation and Hygiene Policy that mandates the Ministry of Public Health (MoPH) to spearhead such activities. The MoPH is thus expected to provide leadership to all concerned agencies such as the Ministry of Local Government (MoLG), Water and Irrigation and

Environment as well as NGOs among others in the sector. The policy recognizes the need for a people centred and national participatory approach to environmental sanitation. The policy has outlined the following instruments in promoting hygiene: the use of participatory approaches or methodologies, communication approaches, that incorporate tested household health education messages, development of training tools and promotional materials, conducting campaigns and exhibitions, partnership with media, a national sanitation week as an action oriented program to raise the political profile of sanitation, and information on a range of safe sanitation options, with clear implications for aiding household choices (IEA, 2007). This policy is yet to see the light of the day as it has not been enacted. Furthermore, there are inadequate national sanitation promotion and development programs to make the policy operational.

The government of Kenya has a draft National Environment Policy (2012) that notes that despite efforts to encourage reuse, recycling and recovery, the amount of solid waste generated remains high and appears to be on the increase. In addition to solid wastes, wastewater effluents represent one of the largest threats to the quality of Kenya's waters. Wastewater often results in increased nutrient levels leading to algal blooms and depleted dissolved oxygen resulting in destruction of aquatic habitats.

Legal challenges especially in terms of adequacy of provisions, poor enforcement and harmonization of existing laws and regulations threatens planning and/or management of environmental sanitation in Kenya. In 2006, NEMA, established waste and effluent discharge standards into the environment. The effluent discharge standards are specified and the fees are different to those of WRMA which is focusing on effluent discharge into water bodies only.. Additionally, there is non-point source pollution from poor land husbandry, sanitation, and liquid and solid waste disposal practices. According to IEA (2007) for example, studies carried out on pollution in Nairobi River found out that sewage, nutrients, toxic chemicals human waste, solid waste dumping, industrial and agricultural chemicals are the main pollutants and that due to poor enforcement, the river may not support aquatic life. This further complicates success of achieving environmental sanitation in this country. These examples clearly indicate that regulatory framework over the use and management of water resources (necessary in sanitation)

is seriously wanting and involvement and coordination of key stakeholders is crucial for management of the resources and services.

Although the Water Act 2002 states that Water Service Boards (WSBs) and Water Service Providers (WSPs) mandates' cover water, sewerage and sanitation, many of them ignore the sewerage and sanitation aspects. Subsequently, the need to meet sanitation and sewerage needs has been left mainly to communities or individual households. It therefore implies that not many of these households of communities would be able to initiate the acquisition of sanitation facilities due to financial implications and ignorance. Further, the Local Government Act Cap 265 provides that the local authorities will ensure sanitation development (sewerage and drainage systems) in their areas of jurisdiction and no amendment had been done even with the enactment of Water Act 2002 which has no linking provisions on solid waste management drainage systems.

Solid waste disposal and management is currently not a responsibility of a WSP and is currently through Environmental Management and Co-ordination Act (EMCA) of 1999 and Department of Environment within the respective local authorities. Solid waste management (SWM) problems are not unique to Kenya (CEA, 2005) and therefore inadequate SWM practices may be severely affecting the quality of environment and public health of residents in many urban centres in Kenya. There have been challenges realized in SWM as stakeholder participation in key decision making has been lacking although the situation is gradually changing. Currently, the CCK has gazetted Municipal Council of Kisumu (Solid Waste Management) by-Laws, 2008 which do not adequately address disposal and management of solid waste yet these are the biggest problems to local authorities in SWM. The by-Laws also lack provisions on partnership engagement in SWM, which the world is giving a priority as the best approach to sanitation planning and management.

2.4 Strategies for Management of Environmental Sanitation

In its toolkit report for municipal service delivery, UNDP (2008) stated that it had become increasingly clear that governments could not meet the continually growing demand for services by acting alone, and that there was a need to look for support from other sectors of society.

UNDP defined Public Private Partnerships (PPP) as a partnership based on the recognition that both the public and the private sectors could benefit by pooling their financial resources, know-how and expertise to improve the delivery of basic services to all citizens. In addition, the report stated that PPP could offer an alternative to full privatization by combining the advantages of both sectors: that is, they combined social responsibility, environmental awareness, public sector accountability with; the finance, technology, managerial efficiency and entrepreneurial spirit of the private sector.

In Macau, Asia, application of PPP was not simply about the financing of capital investments, but exploring the full potential of private sector management, commercial and creative skills (ADB, 2000). The private sector facilitated the use of creative and innovative technology and approaches to show their good performance which helped improve the efficiency of operations and management capability in local governments. The government changed its role from service provider to regulator and manager, while the private sector provided financial resources, technical capability, and entrepreneurship to provide environmental services. The government was able to concentrate its attention on how to set up the most suitable public works system, with its task including planning, financial arrangement, monitoring and management in order to achieve small but effective governance (ADB, 2000).

In the research paper, Asabia (2009) noted that although the area of PPP is a recent trend in service delivery, private investors can sink investments in urban environmental infrastructure with long payback periods. The private sector in itself may not ensure success, but partnerships with the public sector enhance capital, local knowledge, appropriate technology and the regulatory framework. Asabia also stated that people's participation is an integral part of delivering water and sanitation services. This would ensure a feedback on customer opinion of service delivery and educate customers on water and other basic issues that lead to improved services. Citizens' participation should therefore be promoted while defending the interests and supply to vulnerable and special needs groups such as hospitals, schools, prisons and markets through community management systems. Community Based Organizations (CBOs) or Community Development Associations (CDAs) in the local communities can manage the water facilities on behalf of the communities. Such communities should be involved in the planning

and implementation stages of environmental sanitation facilities to ensure ownership of the projects.

An agreement was made in the World Summit on Sustainable Development in 2002 targeted at halving the proportion of people without access to adequate sanitation by the year 2015. Prior to the summit, environmental sanitation had never been an issue of its own in the development agenda and further pressure had been mounted by the United Nations (UN) in declaring the year 2008 as the International Year of Sanitation (UN, 2008). Sanitation hereby encompasses a wide range of issues including human excreta disposal, personal hygiene, solid waste disposal, wastewater disposal, environmental cleanliness and drainage. The Agenda 21 of the Rio de Janeiro agreement stated that planning and implementation of sanitation programmes should be carried out in the context of holistic water resources development and management, including health dimension (UN HABITAT, 2003).

Asabia (2009) reiterated that sanitary challenges in Africa were daunting but not insurmountable. If the right approach was adopted, Africa as a whole would be able to provide adequate sanitation for the growing needs in public health and environmental protection. In a strong opinion, Asabia stated that the solution lies in PPP where governments and local authorities will be required to work in partnership with the private sector, donor agencies and CSOs to ensure health and dignity to citizens and the environment.

2.5 Gaps to be addressed by the Study

Inadequate data on the status of environmental sanitation in urban areas and more specifically in Kisumu City triggered the need for this study. The study determined the level and effectiveness of environmental sanitation facilities in Kisumu City. In addition, previous studies (Ochieng', 2002; CORDAID, 2008; UN HABITAT, 2008; JICA, 1997; and CEA, 2005) had given a different focus in the sense that the studies had either focused on sewerage/ sanitation development or solid waste management. This underpinned the fact that the researchers did not appreciate the linkage between poor solid waste management and poor performance of the sewerage and drainage systems. Thus the study highlighted both the two factors as very crucial in urban ESM.

Furthermore, most studies have dealt with technological improvement without appreciating the non-technical issues in environmental sanitation. In their study, Montangero, et al (2006) appreciated the need for improving environmental sanitation through Material Flow Analysis strategy to minimize resource consumption and environmental pollution while they failed to acknowledge the role of other sectors in ensuring that the technology was adapted. The uniqueness of the study was therefore that it appreciated such kind of technologies and explored the potential of PPP where the concerned institutions and stakeholders are involved in the management of such technologies.

2.6 A conceptual Framework for Environmental Sanitation Management in Kisumu City

The prime goal of environmental sanitation is to protect public health and also promote environmental quality and sustainability, support economic productivity and employment creation. Achievement of environmental sanitation goals require sustainable water, sanitation and SWM systems which are adapted to and carried by the municipality and its local communities (Schubeler, 1996). The framework upon which an ESM system is based should recognize the interconnectedness of the different sectors/players. This includes the regulatory and supervisory role that local authorities have in service provision (JICA, 1998), the economic and environmental value derived from utilization of waste as a resource by CBOs, NGOs, private sector and other interested actors in the urban setting (ILO, 2001). Figure 1 shows a conceptual framework on key partners and roles in ESM.

The strategy for improvement of ESM in the town should therefore be an all inclusive approach with concerted effort from all sectors of the society. The strategy hereby named PPP in ESM has been identified as a viable strategy for involving various partners and roles to be undertaken. The following factors were considered in designing the framework: first, the appropriateness of infrastructure to the users; second, competition among the contractors in service delivery; third, appropriateness of technology in enhancing quality of environment and public health; and fourth, harmonization of legislations and adequate enforcement of the legislations.

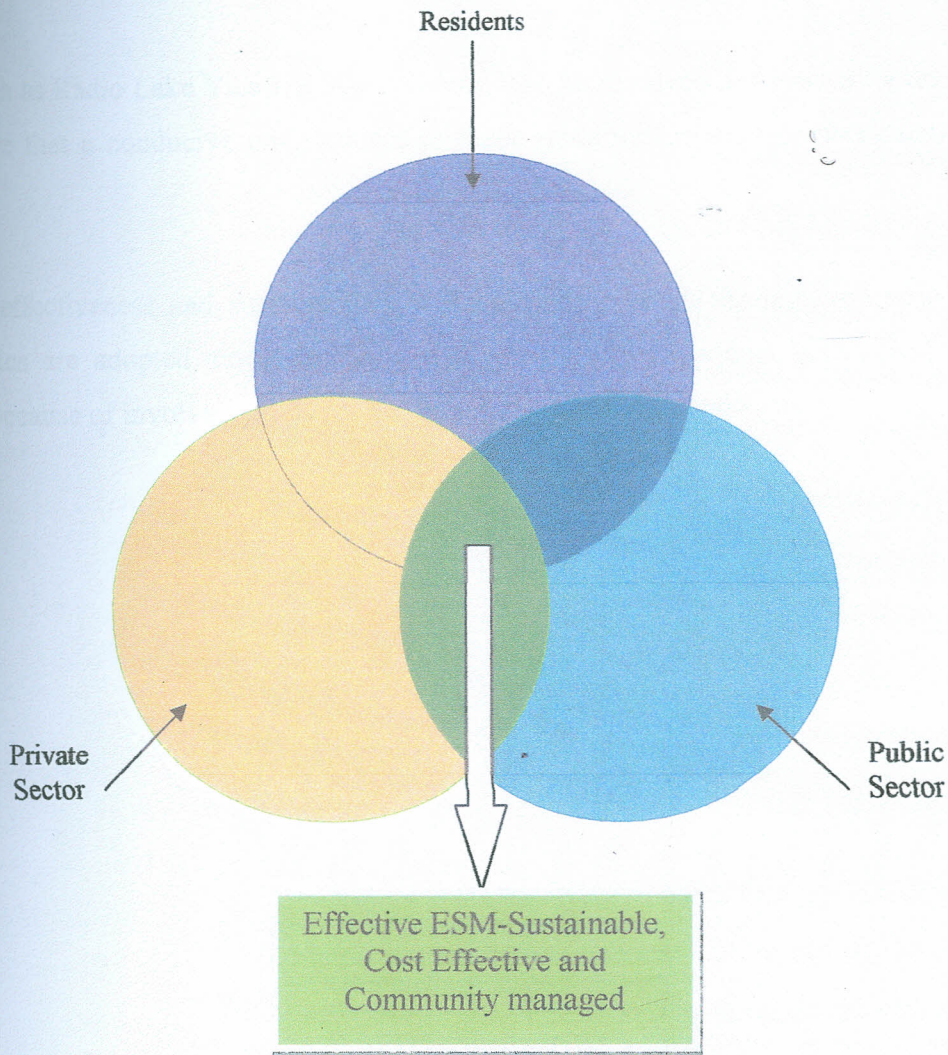


Figure 1: Conceptual Framework: A PPP Model Appropriate for ESM in Lower Migosi Estate

Source: Researcher's Design, 2013

The public sector will be government institutions whose role will include regulation, supervision and management such as NEMA, LVSWB and CCK. Finally, support in terms of acquiring resources such as land. The Private Sector will include the water and sewerage as well as SWM services providers and will provide technology, entrepreneurship, funds such as development partners (JICA), KIWASCO, CBOs and private garbage handlers (PGHs). Publicity for awareness creation and ownership will be done by Media institutions which is part of private

sector such as Radio Lake Victoria. The residents will be involved in Monitoring and Evaluation and ensure that a conducive environment is made possible for such environmental sanitation projects.

The cost effectiveness and sustainability will be made possible through ensuring appropriate technologies are adopted since decisions will not be by any individual institutions checks and balances because of involvement of project beneficiary (the residents)

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides information about the area that was under study and highlights the methodology on which the research was carried out. It consists of methods of sampling, the form of data required, the data collection instruments used, data analysis and interpretation. The chapter ends by providing a brief on the reliability and validity of the methodology used as well as constraints of the methodology that was used during this study.

3.2 Study Area

3.2.1 Location and Climate of Study Area

Kisumu City is located in Kisumu District, Nyanza province, western Kenya along Lake Victoria's eastern shore surrounding the Nyanza Gulf. It has an area of 417 sq. km of which approximately 120 sq. km. is under water and 297 sq. km. is dry land (NEMA, 2003). The City area lies between longitudes 34°35'E; 34° 55'E and latitudes 00°02'N; 00° 11'S, which originates from the main north south oriented Great East African Rift. Figure 2 shows Kisumu within the Kenyan context and Figure 3 shows the map of Kisumu indicating location of Migosi Estate.

3.2.2 Housing and Human Settlements in Kisumu City

The Central Business District of Kisumu is rather small and relatively well planned with government buildings, industries, commercial centre and some residential areas. Most of the peri urban areas are unplanned, densely populated with low income whereas some smaller peri urban planned residential areas have lower population density with high income (CCK, 2004). Migosi Estate is a planned estate with middle income which is currently experiencing a relatively high population density.

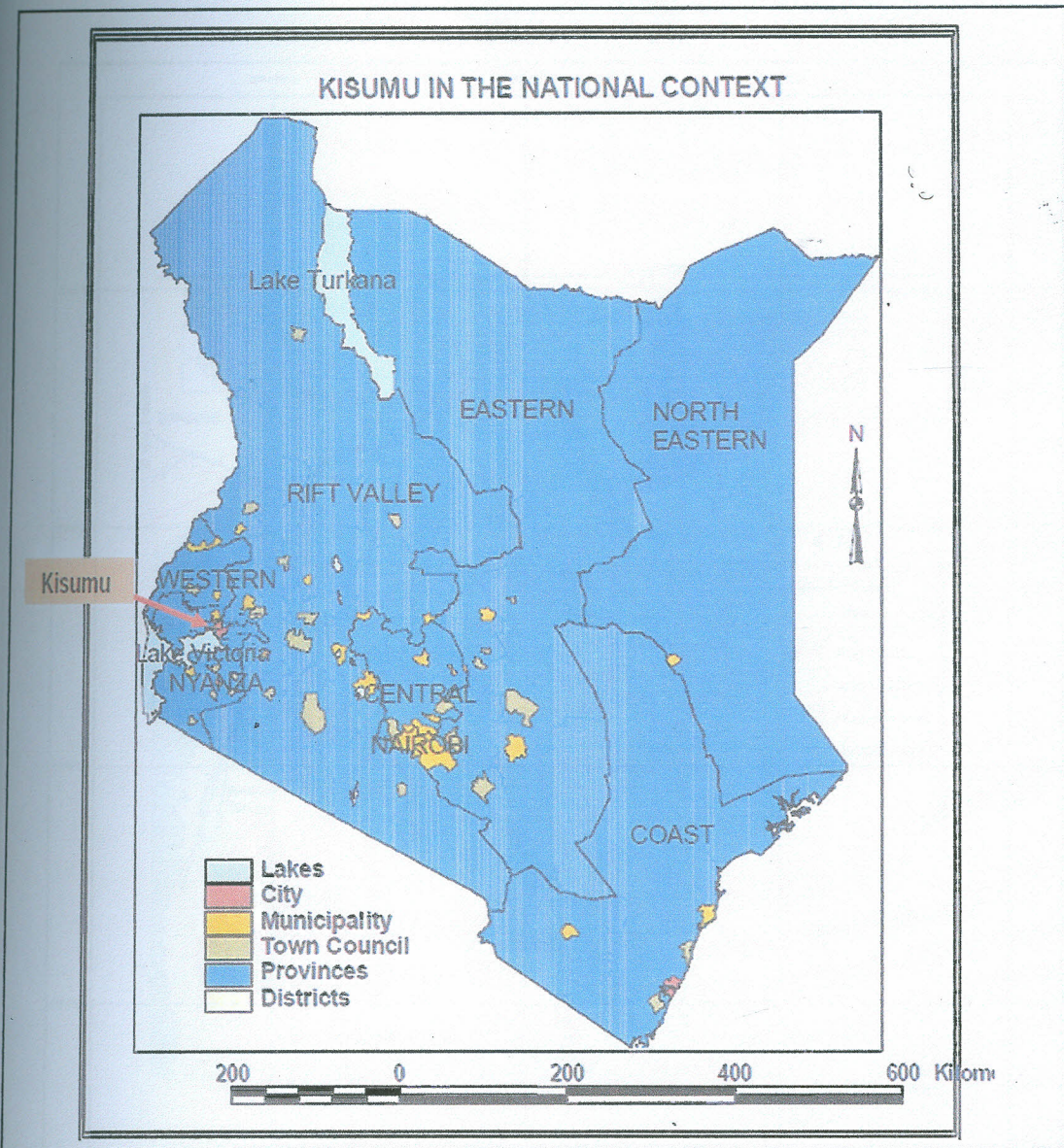


Figure 1: Map of Kenya showing Kisumu City
 Source: Kisumu City Development Strategies (2004-2009)



Figure 2: Map of Kisumu showing location of Migosi Estate
 Source: Department of Remote Sensing and Resource Surveys, 2012

Kisumu, the third largest city in Kenya and is the headquarters of Kisumu County. It has developed progressively from a railway terminus and internal port in 1901, to become the leading commercial/trading, industrial, communication and administrative centre in the Lake Victoria basin, an area that traverses three provinces of Nyanza, Western and western Rift Valley. In addition, Kisumu serves as the communication and trading confluence for the Great Lakes region - Tanzania, Uganda, Rwanda and Burundi. The city covers an area of approximately 417 Km², of which 297 Km² is dry land and approximately 120 Km² under water.

In the State of Environment Report of NEMA (2003), it reports that at over 1,000 metres above sea level, the city falls within the humid climate. The annual mean minimum and maximum temperatures are 17.3 centigrade and 28.9 centigrade, respectively. The city has a humidity of 70%. For rainfall, the average annual rainfall is 1245mm falling in bimodal form of distribution, i.e. the long rains between March and June, and the short rains between October and November.

3.2.3 Population of Kisumu City

The population of Kisumu City is 473,649 with a population density of 559.2 sq. Km and the number of households is 115,502 (Kenya National Bureau of Statistics, 2009). On the other hand, Migosi Estate with an area of 1.9 sq. Km has a population of 19,826 and 4,975 households (KNBS, 2009).

3.2.4 Water Supply

In Kisumu city, the water distribution system since 2003 is under the management of Kisumu Water and Sewerage Company (KIWASCO). This is a private utility company formed under the review and enactment of the revised Water Act, 2002 (NEMA, 2003). Though situated at the shores of the second largest freshwater in the world, residents of Kisumu have continuously experienced acute shortage of clean water, and suffer from lack of environmental conscious sewerage facilities as well as solid waste disposal sites.

The water supply currently covers, in theory a large part of the town, but in reality the water supply is inadequate and un-reliable, and many people are depending on vendors for their daily

water supply. The sanitation service is not satisfactory either with less than 10% of the population served by the sewerage network, which empties most of its sewage directly into Lake Victoria (SIDA, 2003).

In their publication of the Lake Victoria City Development Strategy, SIDA (2003) reports that poor road network is the norm in almost all areas in the slum belt. This is attributed to the fact that the area has had little input in terms of planning and capital outlay by the council over the years; infrastructure has been supplied in a rather preferential manner, highly favouring the low-density areas of the planned old town. The municipal rental areas are also characterised by decay in infrastructure.

Most of the town is either using septic tanks or pit latrines. In his study, Ombogo (2003) states that water production has been 15,000m³/day against a water demand of 48,000m³/day to 60,000m³/day and high levels of unaccounted for water averaging to 70% due to old infrastructure prone to frequent breakdowns and unplanned management.

3.3 Research Design

The research design was cross-sectional descriptive research involving household heads which was adopted because the research involved looking at the current situation in environmental sanitation. The choice of Migosi Estate as the study area was through purposive sampling as it was one of the largest planned settlements within Kisumu City. It is also an estate of middle-level income households in Kisumu City which is rapidly expanding in terms of population and environmental sanitation challenges are notably increasing. The households were sourced from Migosi estate consisting of middle level income families. The household heads were the unit of analysis.

3.4 Study Population and Sampling

Migosi has 4,795 households (Kenya National Bureau of Statistics, 2010). However, after conducting feasibility study which revealed that the worst affected part of Migosi Estate with the problem of environmental sanitation is the lower side with approximately 200 households, the

study focused on lower Migosi Estate. Lower Migosi is characterized by overflowing man holes, storm drains filled with raw sewer and plastic wastes as well as heaps of garbage behind residential units. The choice of 200 households was due to the fact that Lower Migosi has a population that is sparsely distributed when compared to the upper side and in addition, the challenges of resources hindered study of all the areas within Lower Migosi. Fisher *et al* formula cited in Mugenda and Mugenda (2003) for determining the sample size when target population is greater than 10,000 at 95% confidence level is as shown below:

$$\text{Sample Size (n)} = \frac{z^2 pq}{d^2}$$

- Where: z= the standard normal deviate at the required confidence level 95% (1.96)
 p= proportion of the sample population estimated to have the characteristics being measured, in the case of this study 50% (0.5)
 q= 1-p
 d= maximum tolerable error of 5% (0.05)

$$n = \frac{(1.96)^2 \times (0.5)(0.5)}{0.05^2}$$

$$n = 384$$

When the target population is less than 10,000, the following Fisher *et al* formula cited in Mugenda and Mugenda (2003) was used to determine the sample size at 95% confidence level.

$$n_f = n / (1 + n/N)$$

- Where: n_f = the desired sample size (when the population is less than 10,000)
 n = the desired sample size (when the population is more than 10,000)
 N = the estimate of the population size

$$n_f = 384 / (1 + 384/200)$$

$$n_f = 131.5, \text{ when rounded off is } 132$$

However, the researcher was only able to access 120 households (a sample of the questionnaire used is attached in appendix 1) since most of the respondents who were aged 18 years and above

were not easy to find in their households during the time and period of data collection. Even though the sample size used was not exact (less by 12 households), the households used indicated a certain trend on the kind of information that was being sought. In his book, *Sampling Essentials*, Daniel (2012) notes that there are good reasons that determine one to pick a small sample which include nature of the population and availability of resources. In this case the homogeneity of the Migosi Estate population as well as limitation in time, inadequate funds and personnel greatly contributed to the choice of the 120 households. In a study on SWM in the Informal settlements of Accra City, Eshun (2002) used a sample size of 40 out of 54,000 from two combined informal settlements stating that they were spatially different, they represented an aspect in SWM in urban setting. He also stated that although the sample size used for primary data collection did not have statistical accuracy, it could still be used as an indication in the absence of accurate data.

3.4.1 Sampling Procedure

Stratified sampling was employed in dividing the whole study area with the stratification factor being access roads. The estate was first of all divided into almost two equal halves using the Car Wash (Kibos-Migosi Junction) to Migosi-Kakamega road junction (Figure 4). The other access roads running through the households within the estate all join the road at different points. The exit point and end point during the process was then that road. After stratified sampling, purposive sampling was employed with the key justification being the area suffering mostly from poor ESM and that is how Lower Migosi was finally picked. Systematic random sampling was then employed in the selection of households in which questionnaires were administered. In areas where there were high concentration of households i.e. from one household to the next being 20 metres, the questionnaires were administered after every 10 households while where households were sparsely distributed (a gap of 30 metres), the questionnaires were administered after every 15 households.

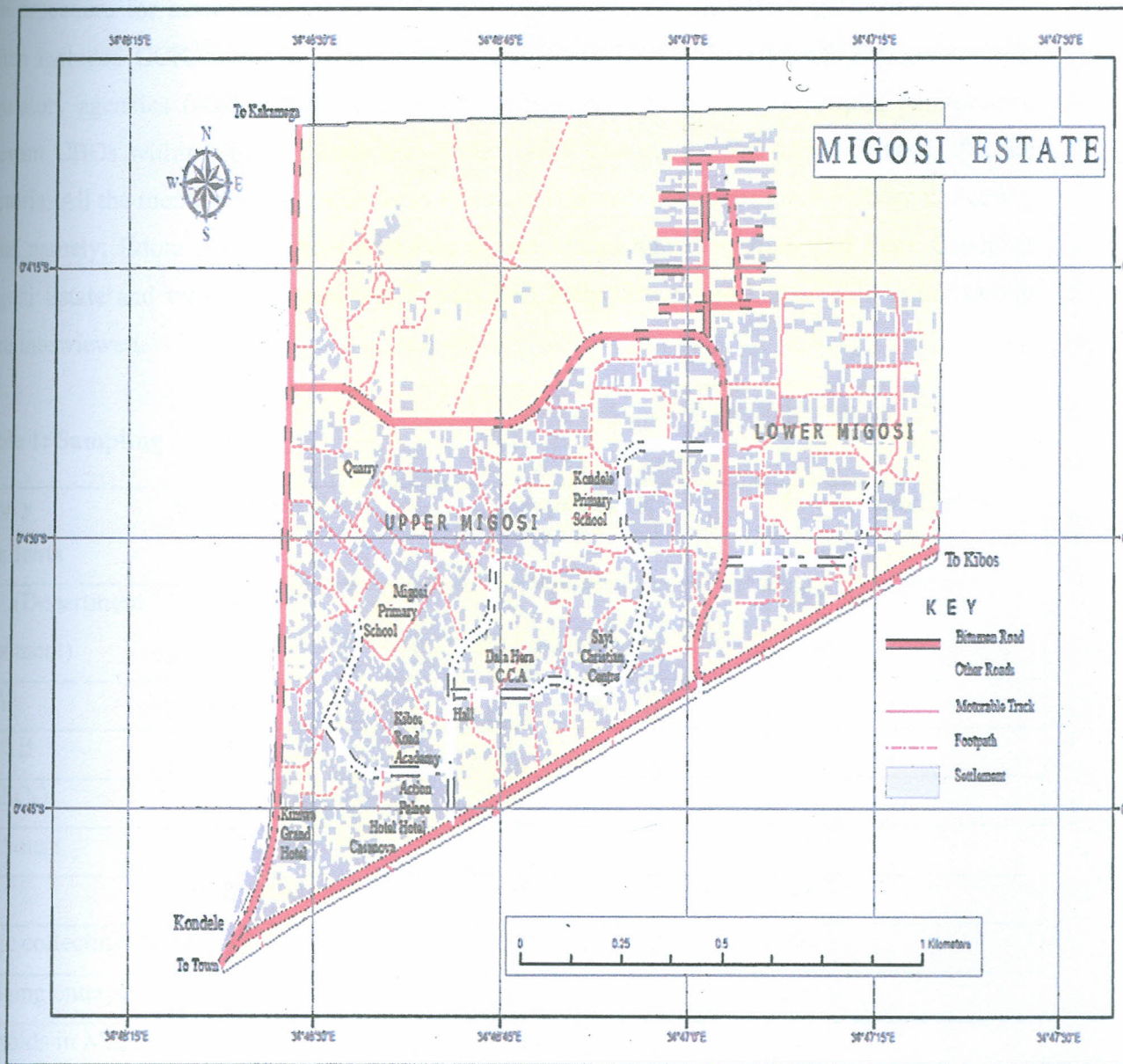


Figure 3: Map of Migosi Estate showing Lower Migosi and the Access Roads

Source: Department of Remote Sensing and Resource Surveys, 2012

The procedure for actors in ESM involved a sample frame adopted from purposive sampling which included CCK, water sewerage service providers (LVSWSB, KIWASCO), government regulatory agencies (NEMA,), private sector (garbage collecting and desludging enterprises), relevant CBOs within Migosi Estate and Radio Lake Victoria-formed under Friends of Lake Victoria. All the mentioned key informants were interviewed. A total of three garbage collecting firms namely; Edota Investment, Gasta Poa Waste Management Services and Peak Group in Migosi Estate and two CBOS namely; Shades Self Help Group and Upper Hill Youth Group were interviewed.

Table 1: Sampling Frame

Category of respondents	Group size	Respondents	% of respondents
CCK (Department of Environment)	1	1	100
NEMA	1	1	100
LVSWSB	1	1	100
KIWASCO	1	1	100
Media house	1	1	100
CBOs	2	2	100
Garbage collecting firms	3	3	100
Desludging enterprises	1	1	100
Households in Migosi	132	120	91

3.5 Data Collection Methods and Tools

3.5.1 Questionnaires

Questionnaires were developed addressing each specific objective of the research and the research questions and were administered to the households. This involved understating of how the information obtained would be analyzed after data collection. Two enumerators were hired after one day training for three consecutive weeks to visit the households where they identified

themselves to respondents and gave a brief about their research including the objectives for the study. For those households who were not quite conversant with the study topic, the enumerators explained to them in a simpler manner or language during the administration of the questionnaires. The enumerators also recorded the responses from the households to ensure eligibility.

3.5.2 Interview Schedules

Interviews were held with key persons within the municipality. The key informants included head of Environment Department of CCK, the environment officer for NEMA in Kisumu, the LVSWSB officer, KIWASCO Officer, directors of garbage collecting firms, chairpersons of CBOs and employee at desludging enterprise. All the key informants are working on ESM components within Kisumu City and specifically Migosi estate. Due to their differences in roles, responsibilities and objectives, a number of schedules were developed relevant to each institution and sought for information on status of ESM in the study area, their roles, legal framework in place and their perception on PPP to ESM. See appendices 2,3,4,5 and 6.

3.5.3 Photography and Participant Observation

Photos depicting on-the-ground scenarios about ESM within the study area were taken at different points and situations. Similarly, more data was gathered using participant observation skills on the level of sanitation, environmental management assessment and attitudes and perceptions of respondents during the interviews. This was captured using pre-prepared observation schedule (Appendix 7)

3.5.5 Data Collection

The data collected aimed at gaining an understanding of issues that necessitated the collection of the following forms of data:

1. The status of environmental sanitation management in Migosi estate
2. Policies and legislations that guide ESM in Kisumu City and how effective they are
3. The public-private institutions involved in ESM and their roles in the study area

The data collected included characteristics of households whether long term or short term resident, the sources, costs and reliability of water supply, sanitation facilities used by households, frequency of blockages or overflows of the septic tanks and/or sewer lines, reasons for blockages, costs of solid waste management, amount of solid waste collected from households, actors in provision of sanitation services, satisfaction with services and using PPP as an approach towards effective ESM within Migosi Estate. The sources of data were mainly primary and secondary as described below hereunder.

3.5.5.1 Primary Data

The primary data involved collection of information by use of questionnaires, interviews, and photography and participant observation. This information consisted of first, the status of ESM consisting water supply, access to and adequacy of sewerage and drainage facilities and SWM services provision; second, the roles of actors in ESM and policies and legislations on ESM; and third, the existence of PPP and its relevance in ESM in Migosi Estate. This data was collected by use of questionnaires and interview schedules that were administered to households and CCK's Environment Department, LVSWSB, KIWASCO, NEMA, Radio Lake Victoria, desludging enterprise, private garbage collectors and CBOs. The information sought here enabled the researcher understand the status of ESM, roles of actors, policies and legislations on ESM and the application of PPP as a model for ESM within the study area.

3.5.5.2 Secondary Data

This involved collection of basic data from already available sources. Relevant literature was reviewed from NEMA's Library, CCK departments of Planning, Public Health and Environment, Maseno University Library with most of the current information obtained from internet. Information reviewed included development plans, policies and legislations, published and unpublished (grey) reports and theses. A desktop review of relevant policies and legislations was done while ensuring objectivity, fairness, consistency, thoroughness and pointing out strengths and opportunities for improvement.

3.6 Data Analysis, Interpretation and Presentation

In this study, all the information gathered from the field using questionnaires was edited and entered into an Excel computer programme continuously until the end of data collection exercise. An analysis plan was made to guide the exercise after which data was exported to an SPSS data analysis programme (Version 7.0) where the data was finally analyzed.

Quantitative data was analyzed using descriptive statistics such as percentages and their results presented in tables, pie charts and bar graphs. This analysis approach was mainly applicable to the objective on status of environmental sanitation management within the study area.

Qualitative data from interview schedules (which were used to achieve the objectives on policies, legislations and institutional roles of organizations as well as the potential for PPP within Migosi Estate) and questionnaires were analyzed by first coding and organizing data into themes and categories where generalizations were formulated. The results obtained were presented by use of text, statistical tables and graphs in order to show the interrelationships of various variables, as where were necessary to depict the relationships.

3.7 Reliability and Validity

Pretesting of the questionnaires was done to establish their reliability and validity using the test-retest technique. In this case, five questionnaires and two interview schedules were pretested and tested within a time frame of five days and analysis done prior to actual data collection. A few adjustments were done to the tools for data collection before the actual data collection. The changes involved the language used and the relevance of the information being sought by using those specific tools.

3.8 Constraints on the Methodology used in the Study

The major composition of targeted respondents from households in Migosi are engaged in income earning activities and are not easily available during normal working hours and days. This affected the duration of data collection as the research assistants had to access a number of

them during weekends or late in the evening however, this challenge did not affect the quality of information collected.

For all the other players in ESM other than public institutions, there was poor data storage (by the private garbage handlers), non-focused objectives and therefore it was not easy to synthesize the information collected from them. Although some in depth information would have been gathered from proper records, the validity of the data collected from these actors was still valid and very useful.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter contains the results and discussions of findings on various items that give information on the current ESM and the problems arising from the ESM in the study area. Focus is given on the roles of public actors and policy/legal and institutional gaps in undertaking their duties in ESM. Finally, there is discussion on pre-existence of PPP and stakeholders take on PPP as an approach in addressing ESM problems.

4.2 Status of Environmental Sanitation Management in Migosi Estate

4.2.1 Water Supply

4.2.1.1 Sources of Water, Costs and Affordability

The main water source for many households in Lower Migosi Estate is by water vendors (plate 1). Majority of the respondents (58%) said they obtain water from the water vendors. Similarly, a reasonable proportion (33%) admitted that they get piped- water while others get this precious commodity from shallow wells (1%) and boreholes (8%). Figure 5 shows the proportion/percentage of water sources as described by the respondents during the study period.

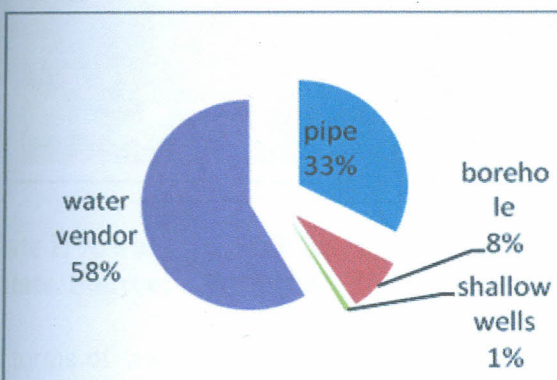


Figure 4: Water sources in Migosi Estate

One of the major concerns or fears of the respondents is that the source of water sold by the vendors is not known and therefore its quality is not trusted by the users. The piped water is

supplied into households and there are no stand pipes shared communally in the estate. A study conducted by Wagah *et al* (2010) for Kisumu city found out that 35.7% of the sampled households (from Milimani, Migosi, Arina and Nyalenda Estates) use the vendors or kiosks. The study further revealed that water vending is by far the most prevalent alternative to piped supplies, with 35.7% of the households using them as their primary source. According to Wagah *et al* (2010), majority of the households are of middle income in Migosi Estate with 85.7% of them relying on water vendors. The results from this study conform to that of Wagah *et al* (2010) in that majority of the households relied on water vendors.



Plate 1: A water vendor ferrying water to households around Car Wash area of Migosi Estate. Source: Field data.

In terms of water pricing, majority of households (62 households) buy water at a cost of about KShs. 500 per month. Still, others (20 households) buy this commodity with about KShs. 1001-1500 monthly (Figure 6.). The high cost of water is a great concern as it may result in enhancing vulnerability and reduce work productivity at the household level. Incidences of water borne and water related diseases such as typhoid, cholera, dysentery and diarrhea that are associated with

unsafe/ unfit water sources are likely to be high and thus reduce work productivity and human well-ness/welfare of the inhabitants of Migosi. Migosi estate is less than 10Km from Lake Victoria, the main source of treated/ piped water for Kisumu City residents. This cost is therefore worrisome compared to the distance to the main water source.

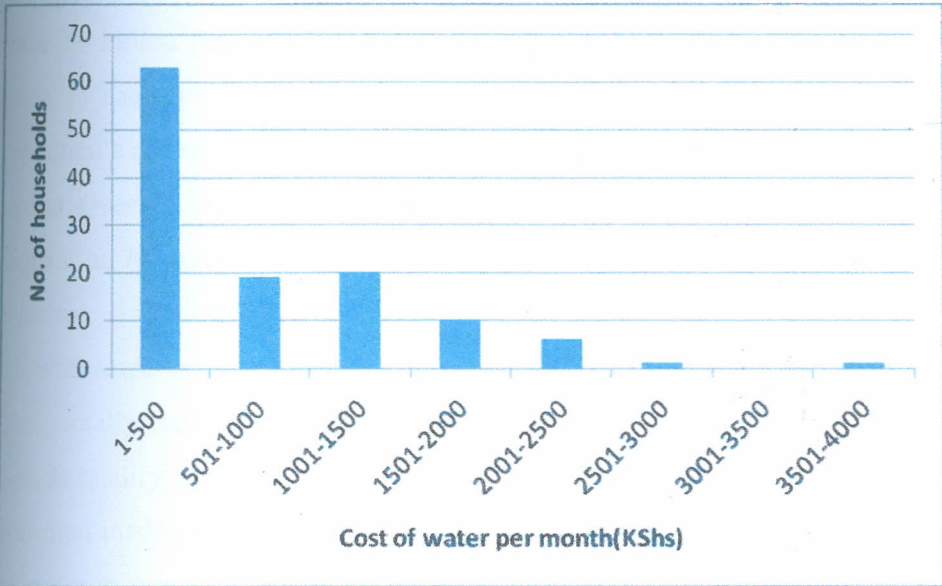


Figure 5: The cost of water per month for Migosi households

Regarding the aspect of water affordability, percentage of those households that said it was affordable and those that that responded that it was not affordable was 50% each (Figure 7).

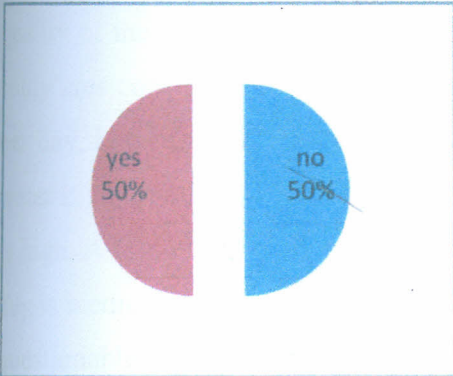


Figure 6: Water Affordability in Migosi

UNICEF/WHO (2006) reports that at the start of the twenty-first century one in five people living in the cities of developing countries—some 1.1 billion people in all—lacked access to clean water, with Sub-Saharan Africa having by far the lowest coverage rates of 55 percent. Some 2.6 billion people, almost half the total population of developing countries, do not have access to adequate sanitation. Again according to UNICEF/WHO (2002) in 2000 the urban population's access to safe water in Sub-Saharan Africa declined from 86 percent in 1990 to 83 percent. Over the same period, the urban population with access to improved sanitation remained stagnant at 74 percent. It is thus amply clear that the challenge of providing safe water and improved sanitation in urban areas of developing countries persists as not much has been achieved since the early 1990s. These reports by UNICEF/WHO (2006) and UNICEF/WHO (2002) totally conform with the study findings that water supply in the study area is not good and even its quality cannot be guaranteed. Even where these facilities have been installed, they are still often inadequate, unsafe, and in various states of disrepair. Moreover, private connections for water in urban Sub-Saharan Africa remain very low, with only 2 to 7 connections per 100 households (Plummer 2003). This statement concurs with results from the study where only 33% have access to piped water from KIWASCO connections and none from private connections.

4.2.1.2 Water Quality and Reliability

Figure 8 shows that majority of the households (55%) surveyed were of the opinion that the quality of the water supplied to them is good while still a big chunk of members (45%) in this study area consider the water supplied to them is of poor quality (Plate 2). In terms of reliability per day, both the extremes were evident in this study with 29% of the respondents saying that water is not reliable (reliability is low) while 24% said that water reliability per day in this estate is high. A higher population of the respondents (47%) held the opinion that water reliability per day is medium/average (Figure 9). Wagah *et al* (2010) also found out that the quality of water is questionable and the vendor prices are normally higher than the utility prices. With only 19.8% of the residents having access to main water connections, alternative sources are by far the most prevalent. Further, Wagah *et al* (2010) found out that the situation is more deplorable in middle income Migosi Estate where only 1.4% of the respondents interviewed have direct water connections, and in unplanned Nyalenda Estate, it is slightly better with 8% of the respondents having direct connection while in low income Arina Estate, the figure stood at 19.7%. In Migosi

and Arina Estates, the houses have network connections but most of the houses do not receive water (Wagah *et al*, 2010)

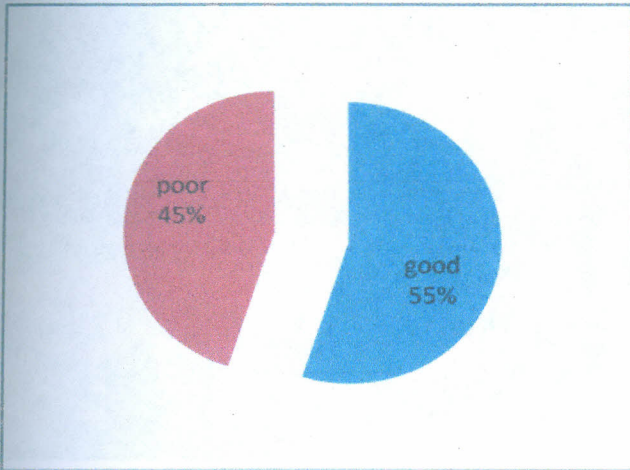


Figure 7: Water quality supplied to Lower Migosi households according to the Migosi residents

According to Cordaid (2008), the access to safe drinking water is a key development challenge in Kisumu. Only 57% of the total population has access to piped water supply of the utility. Of those accessing water supply from the utility, only 13 % have individual connections out of whom over 80 % are the non-poor with only 11 % of those connected being amongst the poor (in the low income settlement areas.) The current water system can only supply 21,000 m³ of water against a demand of 50,000 m³. The results from the study agree with Cordaid (2008) report since according the report, since only half of the water demands could be met. It is estimated that 94 percent of the diarrhoeal burden of disease is attributable to environmental degradation and is associated with risk factors such as unsafe drinking-water and poor sanitation and hygiene (WHO 2006).



Plate 2: Some water vendors fetching water from a drainage system near Ezra Gumbe area in Lower Migosi Estate. Source: Field Data.

WHO (2006) noted that providing access to improved drinking-water sources in developing countries would considerably reduce the time spent by women and children in collecting water. Providing access to improved sanitation and imparting good hygiene habits would help break the overall cycle of faecal-oral pathogen contamination of water bodies, yielding benefits to the country's health, poverty reduction, wellbeing and economic development efforts. Globally, WHO has estimated that the economic benefits of investments in meeting this MDG 7 would outweigh costs by a ratio of about 8:1. These benefits include gains in economic productivity as well as savings in healthcare costs, more healthy lives that are free from diarrhoeal diseases, intestinal nematode infections and related malnutrition (WHO 2006).

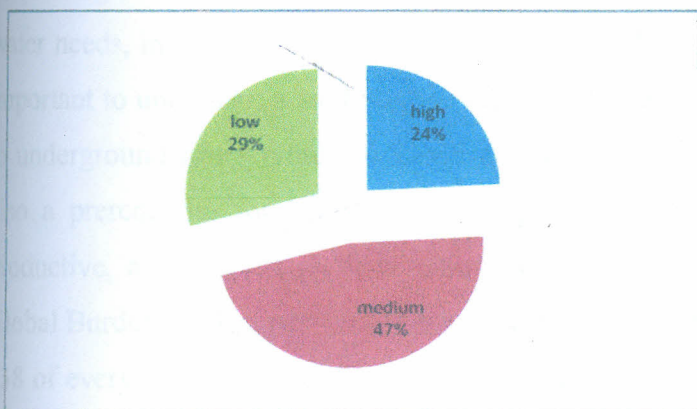


Figure 8: Water reliability in Migosi

4.2.2 Sewerage and Drainage Facilities

4.2.2.1 Sanitation Facilities and Sewerage Connections

Most residents (89%) in Lower Migosi Estate agreed that they use water closet/flush toilets while the rest (11%) still use pit latrines (Figure 10). Out of the total number of households that rely on water closets, 45% of them are connected to septic tanks, 43% are connected to main sewer line while 1% is connected to the pit latrine and the remaining do not know where their liquid wastes are connected to (Figure 11).

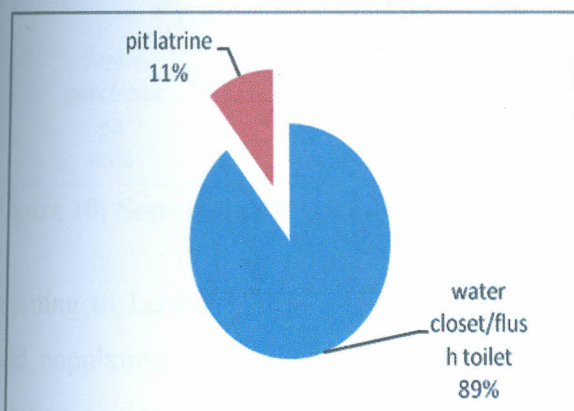


Figure 9: Sanitation facilities in Migosi

The results in Figures 10 and 11 show that even with the overwhelming use of water closet/flush toilet, there are chances of cross-contamination of groundwater, particularly the shallow wells and boreholes which predominantly provide the main water source for household use even to those who derive piped water from the water service providers. According to WHO (2007) it is the underground water sources such as boreholes that provide fall-backs for many households water needs, in the face of frequent burst pipes and therefore lack of piped water. It is therefore important to undertake a study on the effect of these sanitation facilities and their use in relation to underground water pollution. Good health is central to human happiness and wellbeing. It is also a prerequisite for economic development as healthy populations live longer, are more productive, and save more. It is estimated that the global burden of disease measured by the Global Burden of Disease (GBD) is heaviest in the sub-Sahara region where it affects an average 538 of every 1 000 people. The comparable Figures are 190 for Latin- America and Caribbean, 387 for Asia, 277 for the Eastern Mediterranean and 127 people for the most developed regions.

Kenya's Environmental Burden of Disease (EBD) stands at 101 which compares favourably with that of other developing countries such as Ghana (89), Uganda (137), Nigeria (165), Malawi (165) and Rwanda (183) (WHO 2007).

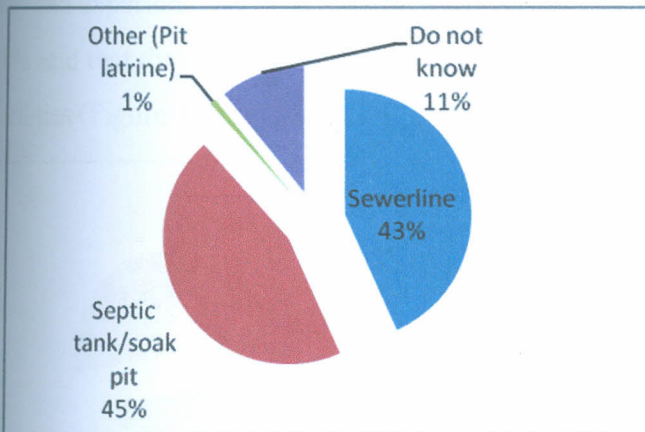


Figure 10: Sewer (waste water) connections in Migosi

According to Leuthi (2008), approximately 2.6 billion people, about one third of the current world population, do not have access to public water or sewer systems. This lack of proper sanitation is responsible for most infectious disease and child mortality, greatly affecting impoverished populations in developing countries. While there are significant sanitation deficiencies in Asia, African countries are the most vulnerable (UN HABITAT, 2003). Each day, there are 6,000 deaths from diarrhea mostly amongst children under five. In fact, child mortality rates in cities without proper sanitation are 10 to 20 times higher than those in cities with adequate sanitation. City level data for 43 African cities, for example, show that 83 percent of the population does not have toilets connected to sewers. In Mahira, a section of Huruma slums in Nairobi, for example, there is one toilet with 10 units and two bathrooms for a settlement of 332 households or 1,500 inhabitants (UN HABITAT, 2003). Similar problems have been experienced in most of the Kenyan urban areas where there is inadequate water supply and sanitation services the results being poor public health (World Bank, 2012) and Migosi Estate is no different with the 58% respondents noting that they get water from water vendors whose source is not known to them and 45% of the households still rely on septic tanks meaning that the study is not well sewered despite being a planned estate.

4.2.2.2 Blockage of Sanitation Facilities

a) Maintenance of Sanitation Facilities

The households also reported on their experiences in terms of maintenance of the sanitation facilities that they use as the final recipients of liquid wastes. Many households (72%) said that they had experienced problems either due to blockage or the system filling up and the remaining 28% said that they had never experienced any problem regarding maintenance of the sanitation facilities (Figure 12).

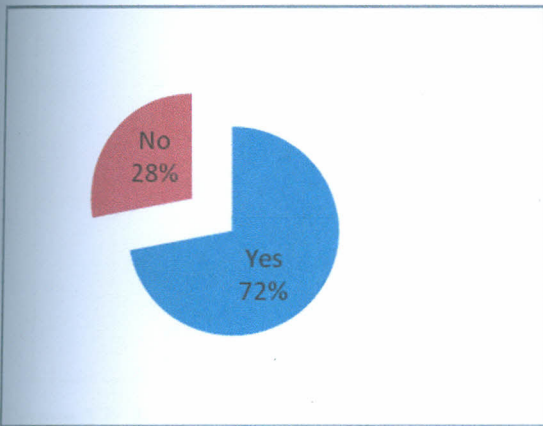


Figure 11: Households' opinion on experience of blockages of sanitation facilities in Migosi estate

b) Reasons for blockage of sanitation facilities

The reasons given by respondents to the frequent blockages were divergent. A total of 51% attributed blockage of sanitation facilities to frequent flooding during rains, while 24% felt that it was due to poor maintenance of sewer lines whereas 22% associated it to poor design and 2% attributed it to poor solid waste management (Figure 13).

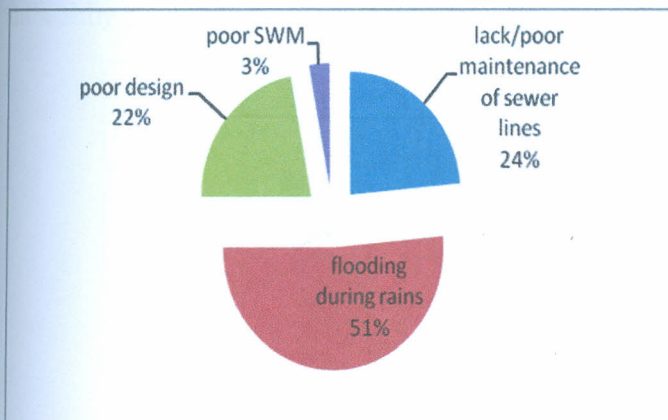


Figure 12: Reasons for sanitation facility/system blockages

c) Frequency of Blockages

The frequency of blockage tended to be very high with 39% of the households experiencing monthly blockages, 45% experiencing the blockages biannually while 16% annually (Figure 14). The outcome of the study are further confirmed by UN-HABITAT (2008) which noted that frequent sewer bursts and blockages are common, resulting in groundwater contamination, environmental pollution and possible outbreaks of water-related diseases

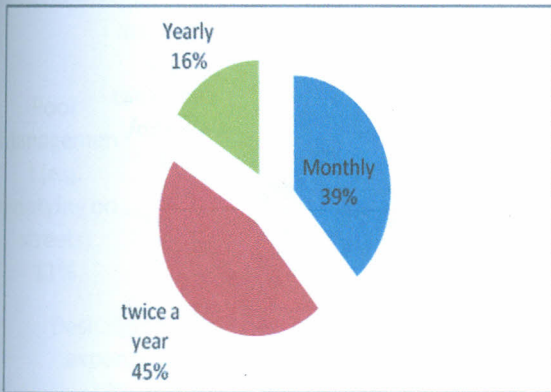


Figure 13: Frequency of blockages of sanitation facilities

d) Desludging Methods for Maintenance of Blockages

Desludging of blocked sanitation facilities was the responsibility of households rather than the service providers. In this study, 82% of the households surveyed relied on generator pumping to desludge the septic tanks while only 10% depended on the landlords/landladies to clear the system and 5% opted for services by CCK (Figure 15). The remaining 3% employed crude methods such as manual removal where people are hired to enter the septic tank and scoop out the sludge. Generator pumping which is used by most households is not only illegal but also an unhealthy practice.

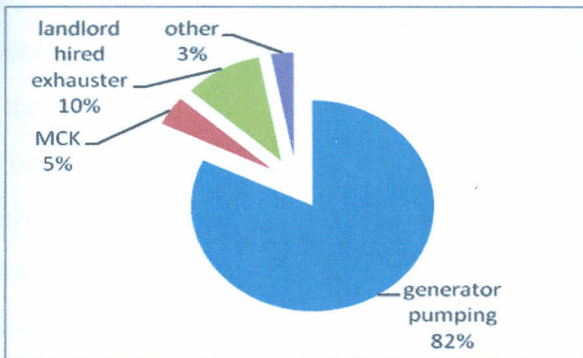


Figure 14: Desludging methods for maintenance of blockages

A number of reasons were given by the households as to why they never engaged the services of the sewerage service providers. According to the respondents, 67% were not comfortable employing services of sewerage service providers due to regular blockages while 11% attributed their lack of engagement with the service providers to poor management. Some 7% of the households were not comfortable because of inconveniences and 7% due to inadequacy of the services while 8% felt that desludging is expensive.

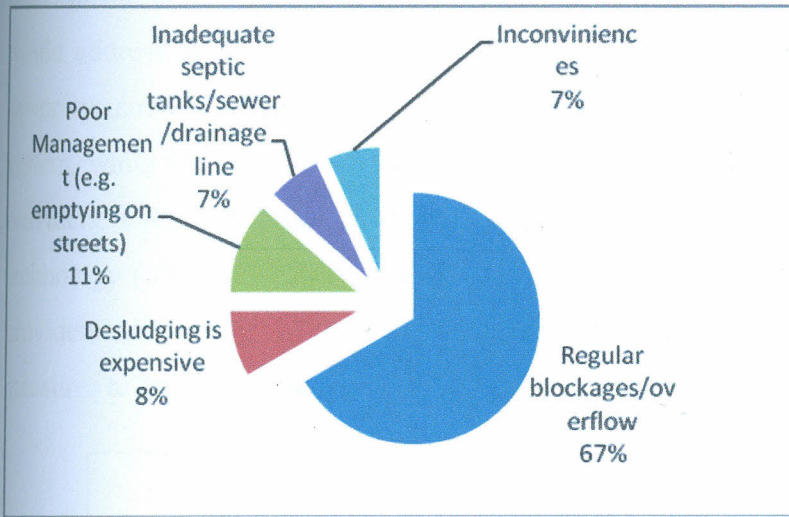


Figure 16: Why households never engaged services of sewerage service providers

The fact that many households rely on crude methods for emptying their septic tanks negates the principle of protecting human life through environmental conservation. This method poses serious pollution and health risks to those directly engaged in the activity/operation and the neighborhood.

According to the survey, the respondents attribute their lack of engagement with service provider to; frequent and regular blockages which not always corrected by the service providers, therefore making them constantly incurring unnecessary expenses, poor management as well as the cost implications of such operations. The respondents also cited that the poor drainage and sanitation is triggered by frequent flooding regimes, poor maintenance of the sewer lines, poor designs of the facilities and poor solid waste management (SWM), which eventually compound pollution and environmental and health related challenges. Poor SWM results in frequent clogging/blockage of the sanitation facilities including sewer lines/systems.

4.2.2.3 Suggestions for Improving Sewerage Services

When asked about suggestions and measures to improve sewerage systems in the estate, 27% of the households did not have any suggestion-did not know what to say while most of the respondents (73%) had very progressive and interesting opinions towards handling sewerage services challenges.

Some of the households (29%) suggested that expansion and rehabilitation of city sewer lines would address the problems while 21% indicated that proper and regular maintenance of the sewer system would address the menace. Other respondents (8%) cited redesigning the whole system, while 6% said there is need to improve on the quality of services by mandated service providers. Others demanded for proper planning of the estate (4%), employment of modern technology (3%) while only 1% said it is important to enhance accountability among service providers and proper SWM (1%). Figure 17 provides the details of the suggested remedial measures to improve sewerage services.

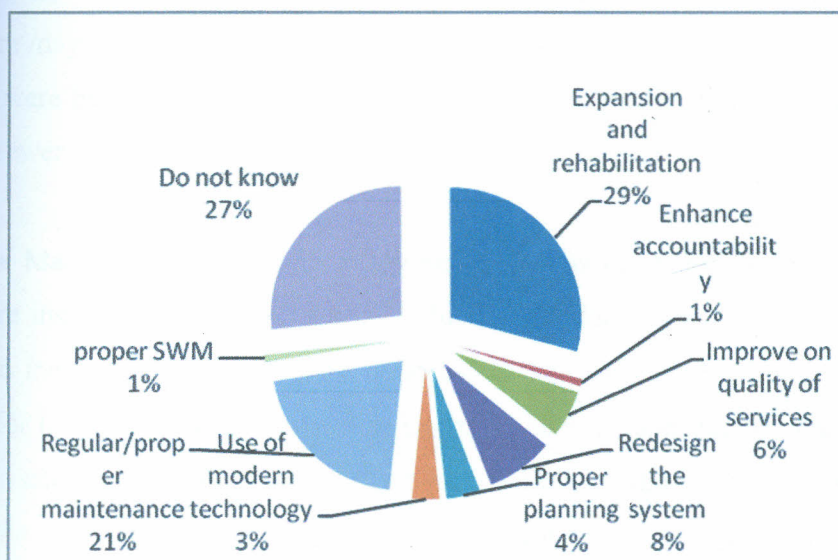


Figure 15: Suggested remedial measures for sewerage service maintenance

The main sewage treatment plant in Kisumu is the Kisat Conventional Sewage Treatment Plant (STW), built in 1958. In addition, there are three main private industrial wastewater treatment plants, but two of these are pre-treatment facilities only, with just one effective treatment plant. Another plant, serving the eastern part of the city, is the Nyalenda Waste Stabilization Pond

(WSP), located adjacent to the Nyalenda low-income area. However, this plant has not been properly maintained and is not fully operational (LVSWSB, 2008).

Ong'or and Long-Cang, (2007) report that there are two types of sewer systems in Kisumu City: a conventional sewer system and a lagoon system. However, the 6,800m³ sewer system serves less than 10 percent of the population, and the two sewer systems do not accommodate most of the generated wastewater (UN-HABITAT, 2008). The low-lying areas of Manyatta and Nyalenda have no sewer system, as they are lower than the conventional sewer.

In a study conducted by CRC (2007), estates in Kisumu City with access to the public sewer network include Lumumba, Makasembo, Milimani, Ondiek and Robert Ouko. CRC (2007) reports that some toilets are emptied into storm sewers, soak pits and cess pits, where fecal waste presents an environmental health hazard. The capacity of the sewerage infrastructure is 17,800m³/day (if operating at full capacity), far less than what is required (LVSWSB, 2008). The sewers were built more than four decades ago, and there has been no rehabilitation or extension of the sewer system, except for the Kibos Trunk sewers, which were built in 1980 (LVSWSB, 2008).

Moumié Maoulidi, (2010) in his study noted that as the population increases and more septic tanks are installed in Kisumu, and as industrial production increases, wastewater production is likely to increase. The wastewater collected in sewers will require treatment before it can be reused for industrial and domestic use. Usually, the most appropriate treatment process is carried out by waste stabilization ponds. Organizations such as the German development agency GTZ, (*Deutsche Gesellschaft für Technische Zusammenarbeit*), are already supporting knowledge-sharing regarding wastewater recycling, but further engagement is needed as domestic wastewater generation is projected to outpace collection by 2015 (Moumié Maoulidi, 2010).

4.2.3 Solid Waste Management

4.2.3.1 Solid Waste Generation by Households

Over 19.2% of each of the households surveyed generate on average of 1Kg of solid waste every week. Another 14.2% generate 12 Kg per week of solid waste (Table 2).

Table2: Amount of solid wastes generated by households per week (Kg)

Amount of solid waste/HH/Week (Kg)	Frequency of households producing solid waste/Week (Kg)	Percentage of households producing solid waste/Week (Kg)
1	23	19.2
2	10	8.3
3	1	0.8
4	1	0.8
5	5	4.2
6	11	9.2
7	1	0.8
8	9	7.5
9	5	4.2
10	6	5
11	4	3.3
12	17	14.2
13	2	1.7
15	1	0.8
16	5	4.2
18	2	1.7
20	3	2.5
21	2	1.7

In their study, Mwesigye *et al* (2009) noted that waste generation is expected to increase significantly as a result of industrialization, urbanization and modernization of agriculture in Africa. This will further aggravate the currently-existing capacity constraints in waste management. This argument is strongly supported by the results above (about 14% of households generate 2Kg of solid waste per week). In cities of developing countries, solid waste generation rates are said to be between 0.3-0.6 Kgs per day (UNHCS, 1996). The waste generation rate for Kisumu City as a whole was estimated by Seman (2003) as being a maximum of 0.6 kgs/person /day. In the 1990s, it was estimated that middle income households in Nairobi generate solid

wastes of 0.595 kgs/person per day (JICA, 1997). The solid waste generation in the study estate is 0.3kg per day which is within the mean value for Kisumu.

4.2.3.1 Solid Waste Collection and Disposal

In terms of satisfaction with garbage collection services, 92% of the households were happy with the garbage collection and disposal while only 8% of them were not. Regarding comfort with the disposal system being used by the various households, majority (55%) said they find the disposal system quite in order while 45% said they were not (Figure 18).

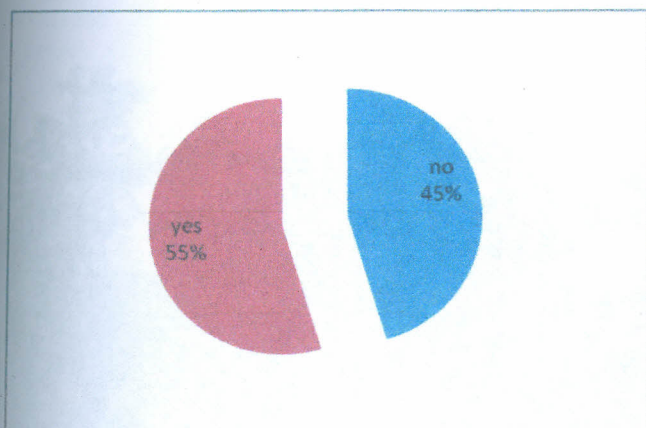


Figure 16: Lower Migosi Households opinion on satisfaction with disposal system

Apparently, majority (92%) of the households that were not satisfied with the disposal system did not respond to the question on why they were not comfortable, probably due to lack of interest. The remaining 8% gave various reasons why they were not comfortable with the disposal system. According to the results, pollution due to littering was the major reason why some of the households were not satisfied with SWM services. Others enumerated careless dumping, poor quality of waste disposal bags and lack of professionalism as reasons behind their reluctance and dissatisfaction with SWM services.

Previous studies conducted by Rotich *et al.* (2005) and ILO (2001) noted that households who collected their own waste, did so daily due to proximity to disposal site whether the site was appropriate or not. This implies that for those households that could not access any disposal site, they could pay the private garbage handlers (if financial resources allowed) or openly dump the waste near residential areas or along road reserves (Plate 3). These have been on going without

consideration of the negative impacts of poor SWM onto the environment. Environmental damages arising from poor waste disposal include: poor aesthetics from littering and open dumping, ground water pollution due to leachates from open dumps or air pollution caused by the inappropriate burning of wastes (WHO, 1992). Munala and Moirongo (2011) noted that waste collection services are provided only sporadically to peri urban areas because of poor accessibility and very high waste generation which cannot be contained with available vehicles and equipment. Uncollected heaps of garbage find their way into open drains, which become blocked and thereby promote breeding of mosquitoes – the most dangerous insect in Kisumu today.



Plate 3: Backyard of a residential unit around Car Wash area in Lower Migosi estate used as a dumpsite. Source: Field Data.

37% of the households suggested that service delivery improvement would address the problems associated with solid waste management closely followed by outsourcing of SWM services at 33%. While 15% felt that there was need to undertake appropriate infrastructural development, and 15% suggested that there is need to develop and enforce better policies and municipal by-laws (Figure 19). They also suggested the need to develop better SWM strategies such as recycling and ensure professionalism to improve management.

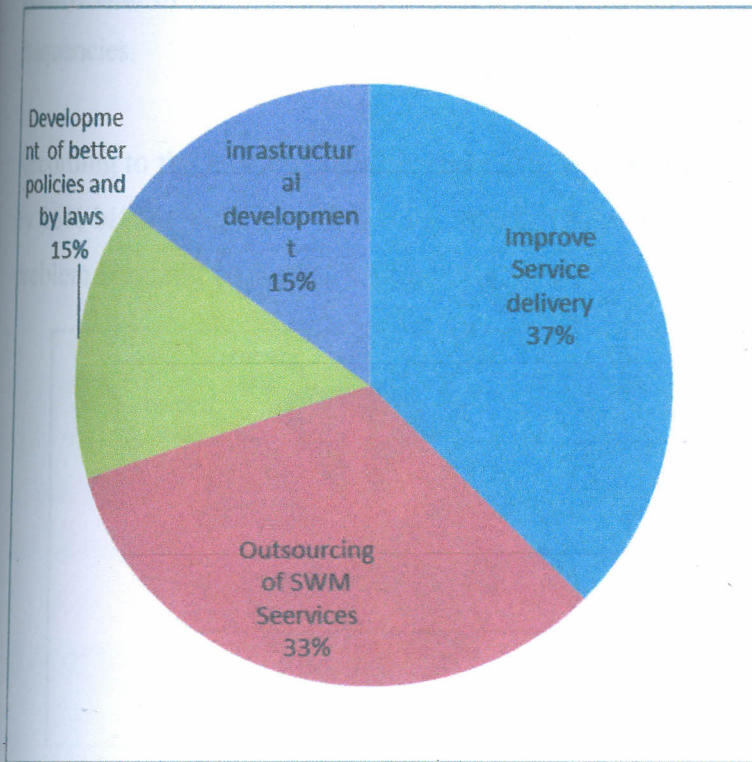


Figure 19: Suggestions to Improve SWM Services

4.3 Policies, Legislations and Institutions' Roles in ESM

This section sought to understand and appreciate the legal mandates and roles of institutions charged with ESM within Migosi Estate of Kisumu City. Involving a consumer of a product in its production has great successes to the supplier/service provider. In this study, the households' views were sought on any involvement in ESM work within the estate. Majority of the respondents (92%) reported that they are not involved at all while only a mere 6% attested to the fact they were involved in ESM activity and 2% did not respond to the question.

4.3.1 Water Supply

In terms of institutional role, majority of the respondent households (96%) confirmed experiencing problems with water supply, one of the basic necessities for sanitation with only 4% indicating that they do not have problems with water supply. All the respondents receiving piped water mentioned that they do experience water problems such as scarcity, availability or quality. One of the problems identified was pipe bursts and that such problems have different frequencies.

According to the households, the frequency of pipe bursts was 65% on a monthly basis followed by 16% bi-annually and 10% on a weekly basis. The other included those who experienced the problem annually being 9% (Figure 20).

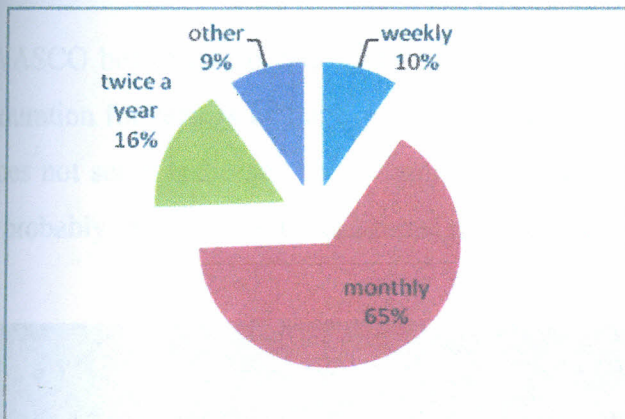


Figure 17: Frequency of bursts of water pipes

The response given by households with regard to frequency of pipe bursts is not very encouraging and clearly indicates lack of maintenance or poor workmanship. Water pipes in this area are installed underground and therefore not always prone to incidences such as vehicles running on them.

Regarding repair of burst water pipes, which was asked mainly to understand the effectiveness in service provision by KIWASCO, specifically in supplying water to the households, 89% said they had their pipes repaired after one-day while 11% had their pipes repaired at least after two-days. If already facts are there that water is a scarce resource in Migosi while it takes at least one day to have the repairs done, then it shows either lack of effectiveness of discharging duties by

KIWASCO. This explains that their priorities of ensuring efficient water utilization is misplaced and as a private entity in charge of water provision, the institution needs to give appropriate focus on its mandate and strategies for implementation.

4.3.2 Sewerage and Drainage Facilities

A good number of the households (89%) were aware of KIWASCO as being in charge of sewerage and drainage services provision, 3% responded that it was other (which meant that in essence, they did not know KIWASCO) and while 8% of the respondents thought it was other institutions that was be public. However, majority of households (62%) disapproved of the services while only 35% were satisfied with the services and 3% did not respond. Plates 4 and 5 confirm poor management of sewerage and drainage facilities as noted by the households.

KIWASCO began its operations in July 2003 and have a customer service charter highlighting the duration for repairs of burst pipes and leakages for water and sewerage but from them study it does not seem to be so. The customer service charter has not been implemented to the letter and probably the reason why customer satisfaction is low (62%)



**Plate 4: Over flowing manhole from a house around Car Wash area in Lower Migosi.
Source: Field Data.**

Plate 5 shows how untreated waste water gets its way into the storm drain which definitely poses public health risks. Another evident scenario is illegal dumping of solid waste which in this case include plastic wastes and end up into water bodies and can lead to choking of the aquatic organisms.



Plate 5: Drainage system filled with raw sewerage and solid wastes in Migosi (Car Wash area) Source: Field Data.

a) Lake Victoria South Water Services Board

The establishment of the Lake Victoria South Water Services Board (LVSWSB) as set out in section 51 of the Water Act, 2002 and section 53(1) provides that as a licensee, the board will be responsible for the efficient and economical provision of water services authorized by the license. It further stipulates in section 53(2) that water services authorized by a license shall be provided by an agent of the board in accordance with section 55, except in circumstances where the regulatory board is satisfied that the procurement of an agent is possible or that the provision of services by an agent is not practicable.

The LVSWSB was mandated with functions of development of infrastructure for water and sewerage services. It is also responsible for water and sewerage services provision through an appointed agent agreed upon by the Water Services Regulatory Board. According to the

LVSWSB, the piped water coverage for the municipality is at 50%. As much as the LVSWSB highlights 90% for water and sewerage services coverage in the estate, the households of Migosi Estate from state that majority of the households (58%) rely on water vendors whose source of water is not known to them while only 33% access piped water for domestic consumption (Figure 5). This is divergence of opinion between the service providers and the service consumers.

The sanitation facilities used within the municipality were identified as water closets, public toilets and V.I.P latrines whereas in Migosi Estate, all of them are used except the V.I.P latrines and their level of adequacy is also considered as adequate. Whereas the LVSWSB acknowledges that waterborne sewerage system is adequate in densely populated and planned estates while on site sanitation is appropriate in sparsely populated and unplanned estates, this is not really the true situation in Migosi. Referring to Figure 11, it is very clear that despite the fact that Migosi is a planned estate as per the zoning plan of CCK, majority rely on the septic tanks (45%) with 43% relying on sewerage system and the remaining percentage use pit latrines.

It is worth noting that the role of the LVSWSB is service provision and not regulatory however self regulation is still important for a good working system. The institution is being regulated by Ministry of Public Health and Sanitation, the CCK and the National Environment Management Authority who all have laws to ensure compliance on ESM. The existing legislations on ESM are adequate but the challenge facing it is lack of effective coordination and enforcement by the concerned authorities thus making compliance levels moderate.

The LVSWSB feels that they are adequately playing their role and is currently involved in rehabilitation and expansion of water and sewerage services through Kisumu Water and Sanitation Project through donor funding. In undertaking this role, the Board in liaison with the private water service providers have set the charges for these services. For those who are connected to the sewerage services, 90% is charged based on total cost of water consumed.

The LVSWSB noted that blockages of the sewer lines are not common though it occurs and blames this on irresponsible behavior of the public who dump waste in the manholes. Though

this opinion raises concerns from the 72% household respondents who reported frequent breakages at the feeder sewer lines.

The two treatment plants in place are Kisumu Sewerage Treatment Works and Nyalenda Waste Stabilization Pond ((WSP) are put at 60% effectiveness by the Board. The treated effluent finally ends up in Lake Victoria which is used for domestic purposes by many other consumers. A Master Plan on Sanitation which was developed in 2009 is in place and is currently being implemented. The two treatment plants were rehabilitated by 50% under Short Term Action Plan (STAP) yet the effectiveness remains at 60% after the works. Further, under the Long Term Action Plan (LTAP), the two plants will be fully rehabilitated and a new waste water treatment plant developed at Otonglo.

The LVSWSB appreciated that it has capacity for administrative issues but technical expertise is always outsourced and that implies a challenge in terms of effective delivery of services. As much as the LVSWSB notes progress in ESM, there are however challenges such as poor coordination and it recommends the need for harmonization of all the relevant legislations and policies and also integration of enforcement by one body such as NEMA.

b) Kisumu Water and Sewerage Company

The establishment of the KIWASCO is provided for in section 55 of the Water Act, 2002. Section 55(5) of the Water Act, 2002 allows the water service board to enter into agreement with more than one service provider in respect of its area of supply. The KIWASCO which has been contracted by the LVSWSB gives a contradicting report on the status of water supply and sewerage services. In its view as a private water and sewerage service provider, it notes that the coverage of these services within the municipality is at 40% while in Migosi Estate, it is only 23.5%, a much lower figure compared to the one (33%) given by the respondents who benefit from this service from Migosi Estate.

With regard to the sanitation facilities, KIWASCO acknowledges that sewerage services stand at 27% and the existing drainage channels are poorly managed, maintained and also misused by the

consumers. Also, as much as the CBD is well served with the both sewerage and drainage facilities, the peri-urban estates and slums lack well planned institutions concerned with ESM.

Plate 6 confirms the poor maintenance of sewer lines and the picture clearly indicates that the sewer line has been broken for a reasonable period of time by looking at the sprouting plants at the point of discharge.



Plate 6: Raw sewer flowing into the environment from the main sewer line.
Source: Field Data.

KIWASCO, mandated by the LVSWSB to provide water and sewerage services for residents within Kisumu City notes that it is not adequately playing its role due to the existing inadequate infrastructure. The quality of water is good but demand cannot be met as it can only supply 16,600 m³/day against the required 30,000 to 45,000m³/day. This deficit of 25,000 m³/day compares well with estimates made by Ong'or and Long-Cang (2007). According to these authors, Kisumu's water demand in 2007 was approximately 45,000 m³/day and the water supplied by KIWASCO was 19,000 m³/day, leaving a deficit of 26,000 m³/day.

In his research, Mourié Maoulidi (2010) highlights that there are currently two raw water intake points on Lake Victoria and one intake at Kajulu. There are also two water supply systems: an electrical pump system, supplying about 92 percent of the total water, and a gravity system. The

water from Lake Victoria is treated at the Dunga Water Treatment Plant, located 0.6 km from the intake, and is then pumped to a storage tank in Kibuye, while the water from the Kibos River is treated and then flows by gravity to a reservoir. To address this challenge the water service providers are constructing a new treatment plant in Dunga and also have plans to expand the Kajulu Treatment Works.

With regard to the sewerage services, it is a great cause for worry as the storm drains still end up in sewerage treatment works which are not sufficient to serve the town. KIWASCO has been involved in maintenance activities to address the challenges by replacing stolen man hole covers and desilting blocked sewerage lines. In addition, public awareness on good use of the sewerage lines is being undertaken in estates with sewerage connections.

The service provider charges 90% for the sewerage of total amount of water consumed over and above the standing charge of Kenya Shillings 150 per household. There is a general feeling on the need to reduce the service charges for the households whereas the polluting industries be made to pay for their action and given strict penalties. KIWASCO sells small amounts of sludge but requires better regulation for the sludge usage.

Concerning compliance levels with the relevant legislations, both KIWASCO and LVSWB agree that there is the need to bridge the gap within the regulating authorities since there is a tendency of overlap in duties. For example, between NEMA and WRMA, it is not clear who should issue the effluent discharge license. NEMA and WRMA have developed and gazetted separate legislations on water quality management with the aim of licensing at a fee effluent dischargers into the environment including water bodies.

The institutional challenge that KIWASCO is currently experiencing is inadequate personnel which is due to the financial constraints and lack of appreciation by consumers on management of sewerage system. KIWASCO notes that it has made progress in ESM by engaging the consumers through public awareness programme though it is slowly picking up.

To overcome the challenges, the institution proposes an all inclusive approach to ESM where all the consumers including learning institutions and local politicians are engaged in the process. There is also the need to source for more funding to meet the financial gaps such as for enhanced awareness programmes.

4.3.3. Solid Waste Management

Many respondents (86%) indicated that they are more aware of private garbage collectors than CCK (6%). Many households recognized garbage collectors role from a garbage collection point of view (Figure 21). 77% of the households have no problems with services provided in SWM while 19% are not satisfied.

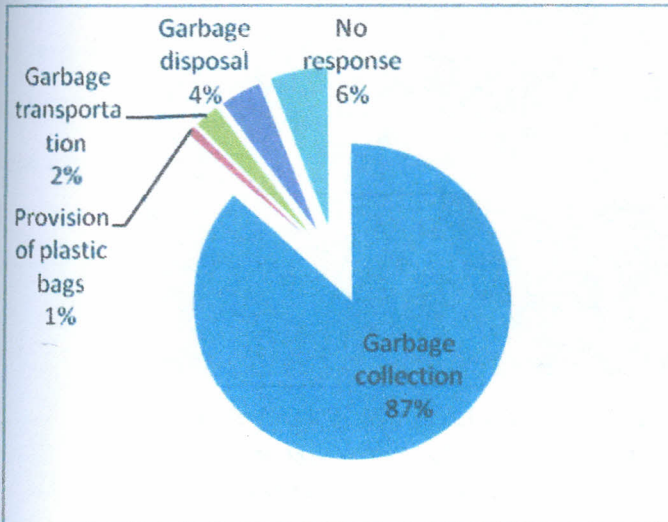


Figure 18: Roles of private garbage handlers in Migosi

a) City Council of Kisumu (Department of Environment)

The Department of Environment which is the youngest has three divisions namely; environmental planning and management, environmental regulation and urban aesthetics (Republic of Kenya, 2010). The Division of Environmental Planning and Management is in charge of SWM within Kisumu City whereas sewage management falls under docket of a private company contracted by the LVSWSB.

Solid Waste Management is not adequately undertaken within the municipality including Migosi estate due to poor enforcement. As it is, the garbage collection is privatized in which case the garbage collectors are licensed by CCK to collect garbage of the households on their (CCK's) behalf at a certain cost. With 20% as coverage of SWM facilities within the municipality, the status is pathetic. The municipality lacks a landfill and uses open dumpsite though designated by CCK (plate 7). Further, no appropriate sorting out of the waste is done and this places into question the dangers being posed onto the environment as well as the public health.



Plate 7: Part of the Kachok Dumpsite, indication of lack of proper solid waste disposal, a duty that CCK is legally mandated to undertake
Source: Field Data.

Annually, the department presents its budget proposal to the finance committee of CCK which does not mean automatic approval but based on the availability of funds and priorities of the Council. According to UN HABITAT (2010), the budgeting process involves the presentation of the budget proposals to the Budget Committee which will depend on their understanding on the need to fund this particular sector, otherwise the Budget Committee can put money where it feels it will gain more monetary outcomes or helps it gain political mileage. It is imperative to note that the Budget Committee consists of the area councilors who always lack the political will on environmental management. CCK has a budget of Kenya shillings 6.7 million and 1.8 million for personnel and operations respectively which is not adequate. The CCK is not involved in any

waste recycling programmes and this is only done at a small scale by CBOs operating within municipality.

The department has an organizational structure for SWM while of interest is that the private garbage collectors cost-share with CCK to collect the waste for dumping, what would rather be referred to as passive public-private partnerships.

In June 2010, ISWM Strategy was launched which should adequately handle the problems associated with the SWM such as introduction of skips to collect the wastes in a decentralized manner within Migosi Estate, garbage collection trucks, decommissioning of the current dumpsite and construction of an appropriately located sanitary landfill. Unfortunately, these face a lot of challenges due to inadequate finances, land and inadequate technical capacity. The adequacy of solid waste collection even after the launch of ISWM Strategy is still wanting. Although the Department of Environment considers it average, the real picture is still worse off. There are many illegal dumpsites within the estate created by residents who cannot meet the costs of private garbage collectors or due to apathy or ignorance. Plate 8 shows that kind of picture where solid wastes are dumped behind a house oblivious of the dangers of such practices.



Plate 8: Solid waste dumped behind a house in Migosi.
Source: Field Data.

The Council still uses one designated open dumpsite within commercial and residential area which has not been legalized by the National Environment Management Authority. It is not an environmentally suitable site for land filling. Although it has been in operation since time immemorial even before enactment of EMCA, 1999 and its subsequent EIA/EA Regulations, 2003. This however does not negate the CCK's responsibility on environmental management by ensuring compliance to the existing environmental legislations.

The Local Government Act (1984) is the framework law governing Local Authorities in Kenya, and places the responsibility of waste management on the respective Local Authority. Section 160 states that every municipal, town and urban council shall have power to establish and maintain sanitary services for the removal and destruction of, or otherwise dealing with, all kinds of refuse and effluent and, where any such service is established, to compel the use of such service by persons to whom the service is available.

The Public Health Act (1986) concurs with the Local Government Act that it is the responsibility of the particular Local Authority to ensure proper sanitation and housing within its area of jurisdiction. Section 116 of the Act imposes a duty on every Local Authority to maintain its district in a clean and sanitary condition, to prevent nuisances and prosecute those responsible for nuisances. Nuisances include, among others as listed in section 118(h), any accumulation or deposit or refuse or other matter which is offensive or which is injurious or dangerous to health. The Act provides for the regulation of Local Authority actions by a medical officer of health issuing a notice to remove such nuisance (section 119). The government has in the past used the Public Health Act to compel Local Authorities to improve sanitary conditions. It should also be noted that the heterogeneous nature of the waste that the waste handlers deal in exposes them to a number of serious health and safety risks.

Kisumu City, in collaboration with UN HABITAT, is implementing the Kisumu Integrated Solid Waste Management Project (KISWAMP) to improve waste management in the Municipality through the improvement of the waste management by-Laws. The project is assisting waste pickers to become organized in order to gainfully participate in waste management, although the project is still at an early stage of implementation. In 2008, the City Council of Kisumu revised

its Solid Waste Management By-Laws, 2008. The council does not specifically make reference to waste pickers, but at the operational level the Council has made efforts to integrate waste pickers into the waste management processes. It has started a process of registering waste pickers, who are then issued with a letter of recognition. At present a permit to operate is not required, but this may well change in the future. The waste pickers have begun to organize themselves through establishing an umbrella association called the Kisumu Waste Management Association (KIWAMA). By-Law No. 9 places the responsibility of waste management on the owner or occupier of premises where waste is generated, and states that every such owner or occupier of premises shall have a suitable receptacle provided and maintained in accordance with these by-Laws. Furthermore, By-Law No. 10 states that every owner or occupier of any premises should ensure that any refuse bins on the premises are easily accessible to the Council refuse removal staff for the purpose of removal. These by-Laws restrict the sites for waste disposal as well as participation in waste management. By-Law No. 12 states that any person who "... places, causes or permits to be placed any domestic refuse anywhere except in a refuse receptacle" shall be in contravention of these by-Laws.

By-Laws No. 19 and 20 similarly specify the requirements for disposal of waste and refuse. By-Law No. 21 states that only a person in possession of a Council permit or who is a member of the cleansing or conservancy team of the Council may enter council property. Thus, effective enforcement of By-Law No. 12 could significantly reduce the amount of waste disposed of in the illegal dumpsites, as all domestic waste should be put in the authorized receptacles. In most cases, the receptacle is either non-existent or in a state of disuse. The many illegal dumpsites in any open space within the Municipality shows the failure of the Council to enforce this by-Law. Apart from the failure to provide for waste pickers, the by-Law requires any actor engaged in waste management to possess a valid license issued by the Council. However, waste pickers presently operate without a permit. This suggests that either the Council tolerates waste pickers or it is unable to enforce the by-Laws.

In the ISWM Strategy (UN HABITAT et al, 2010), the present organizational structure of the CCK gives little leverage to undertake effective SWM in the municipality. This is especially in view of weak planning and development control frameworks and inadequate capacity to enforce

environmental regulations. Institutional norms are weak and unsupportive of environmental planning and sanitation. Moreover, their garbage trucks are ineffective because of the much heavier, wetter, and more corrosive quality of their burden. The number and type of refuse vehicles purchased by CCK since 1980 with some of which are operational up to date are a Rear-Loading Hydraulic Compactor, Isuzu Canter Vehicles and tractors (table 3)

Table 1: Refuse Vehicle Types under Operation at CCK

Type of Vehicle	Number of vehicles for 1980-2009		
	1980s	1990s	2000s
Isuzu canters	-	-	2
Tractor	2	2	1
Compactor	1	1	1

Source: ISWM Strategy, 2010

In the ISWM Strategy, UN HABITAT, et al (2010) consequently note there has been a steady decline in the volume of waste collected by the Council over the years relative to the growth of the built up area. The frequency of collection ranges from daily (33%), weekly (38%) and fortnightly (2%). The waste collection in Kisumu City is by a number of agents who collect approximately 36.4% per day. However, the individual households still undertake most (63.6%) of the collection, which is often, disposed off in open spaces by hand i.e. river banks, roadsides, alleys and undeveloped plots. The Council caters for 13.2%, private garbage handlers 21.2% and salvaging about 4% (UN HABITAT, 2010).

As stated, the CCK only deals with SWM and therefore any relevant policy or legislation is meant to deal with the same. The key role played by the CCK is to undertake collection, storage and disposal which from the study undertaken in Migosi Estate shows that is not a duty well undertaken. The Council is only providing this service to the Central Business District where business operators pay cess for them to access such services. Within Migosi Estate just like the other estates, waste collection up to disposal is an engagement between the households and the private garbage collectors only.

Regarding the coverage of SWM facilities within the municipality, CCK reports only on about 20% which presents a sad picture when critically considered that solid waste a great contributor to environmental pollution in every urban setting and in addition, prioritization by the CCK to handle waste is something which could have been given due consideration given the technical and financial support it has been receiving from aid agencies such as UN HABITAT.

The Environment Department however acknowledges their role as adequate but capacity can only meet 30% of the total work required in SWM. The CCK has the Solid Waste Management by-laws and also borrows heavily from EMCA, 1999 and Environmental Management and Co-ordination (Waste Management) Regulations, 2006 whose custodians are NEMA.

Solid waste is mainly dumped onto nearby open sites along main roads or rail tracks or into drains and water ways. Pressure to improve solid waste collection arises as other services become available and awareness mounts regarding the environmental and health impacts of poor waste collection service. Solid waste management problems in Kisumu are largely a result of lack of waste management policy and framework that would aim at improving the standards, efficiency and coverage of waste from "Cradle-to-Grave." (UN HABITAT, 2010)

As much as the department appreciates the adequacy of these legislations, the problem is noted in implementation. A number of challenges are faced by the council itself as well as its external clients (the public). The enforcement mechanisms are highly inadequate and public attitude is often negative. This probably a responsibility to be borne by the concerned authorities mainly the CCK whose SWM activities are kind of delineated. The management approach is also not participatory and therefore the public consider it as the sole duty of the Council. The other challenges faced by the Local Authority include inadequate institutional capacity as well as lack of technical expertise in SWM.

It is important to acknowledge the progress being made in addressing the challenges being faced by CCK in SWM. Two key changes that have taken place are the development and henceforth the launching of the ISWM Strategy and the efforts towards active PPPs through Kisumu Solid

Waste Management Programme (KISWAMP) where CBOs can access loans to boost SWM related activities.

b) National Environment Management Authority

The National Environment Management Authority (NEMA) is an environmental regulatory agency created under the Environmental Management and Co-ordination Act (EMCA), 1999. According to NEMA, its roles in ESM are to undertake coordination of environmental activities within Kenya; undertake environmental education and awareness; ensure compliance to regulations related to ESM; and undertake enforcement actions against environmental offenders in ESM.

In fulfilling those mandates, NEMA uses various legal instruments namely; EMCA, 1999; Environmental Impact Assessment and Environmental Audit Regulations, 2003; Environmental Management and Coordination (Waste Management) Regulations, 2006 and Environmental Management and Coordination (Water Quality) Regulations, 2006.

EMCA is the framework law on environmental management in the country. It makes provisions for waste management in various sections that regulate waste generators, transporters and disposal through licensing procedures and punitive measures against non-compliant person or facility. Waste picking involves transportation of waste, but the legislation entrusts the responsibility of transporting waste to either waste generators or licensed operators, thus excluding waste pickers who operate without licenses. The regulations have inadequacy of exclusion of a very important player in the solid waste management sector. Going by the current status of development of Kisumu City, the waste pickers especially within the study area cannot be ignored for better results to be achieved in SWM activities.

Integration of waste pickers in waste management therefore calls for review of the existing waste regulations. This is important, as it does not appear feasible to expect waste to be fully handled by waste generators. For example, there have been cases where waste generators dispose off

waste in unauthorized locations, necessitating the intervention of either the Local Authority or other players such as waste pickers.

Further, the waste management regulations provide for waste segregation into hazardous and non-hazardous waste, which should be disposed off in an appropriate facility as provided for by the relevant Local Authority. CCK just like other local authorities has not designated facilities for disposal of such wastes. In addition, the existing site does not meet the basic requirements of a sanitary land fill.

The regulations also call upon generators to ensure waste segregation at source, a provision NEMA being the regulator has not been able to monitor or enforce. In addition to this, the provision on specific waste transportation vehicles, use of approved routes has not adequately been enforced due to challenges of understaffed personnel.

NEMA's assessment of the level of compliance by various facilities or institutions to these legislations is low however much the instruments in place are adequate. This poor compliance level may be attributed to lack of awareness on ESM, inadequate personnel to ensure compliance, lack of household level participation and limited capacity for specific skills in urban planning for ESM.

As a coordinating institution in all matters of environment, NEMA works with other government agencies as the lead agencies. In that respect, NEMA works in collaboration with these agencies and is empowered to advise them as well as take any appropriate enforcement action to ensure compliance. An important aspect of collaboration is through the District Environment Committee (DEC) of Kisumu City which is a committee mandated to make decisions on environmental issues within the City. Such government agencies such as CCK with a role in ESM are bonafide members of the DEC and therefore are expected to work harmoniously in implementing the environmental legislation. The unrealistic part involves taking punitive action against the CCK who is a DEC member in the district- indication of conflict of interest. The CCK has problems of handling solid waste and should be assisting in enforcement of these environmental legislations especially in the case of its landfill situation.

To overcome these challenges, the Authority suggests that ESM should be made a participatory approach where all public and private sectors have a stake, ensure ownership and enforcement. Secondly, there is need for enhanced prioritization for ESM by the CCK in order to develop the appropriate institutional capacity as well as financial resources to meet the increasing demand. Thirdly, the private sector needs to effectively invest in ESM due to their capital stability.

c) Private Garbage Handlers

The private garbage handlers include any individuals or firms involved in awareness campaigns, waste collection and disposal of the households' wastes within Migosi Estate at a fee as well as those involved in desludging the septic tanks in the estate. Table 4 gives a summary of the private actors in SWM within Migosi Estate that were interviewed during the research.

Table 2: Summary of the active private actors in SWM that were interviewed and their roles within Migosi Estate

Name of Private Garbage Handler	Type of Private Garbage Handler	Areas of Coverage	Main Activities
Shades Self Help Group	Community Based Organization	Migosi, Lolwe, Kenya Re-Insurance & Tom Mboya Estates	Environmental awareness campaigns Waste collection & disposal
Upperhill Youth Group	Youth Group	Migosi, Lolwe, Kenya Re-Insurance & Tom Mboya Estates	Environmental awareness campaigns Waste collection & disposal
Peak Group	Small Medium Enterprise	Migosi & Lolwe Estates	Waste collection & disposal
Gasta Poa Waste Management Services	Small Medium Enterprise	Migosi, Manyatta, Gudka, Railways, Lolwe, Kenya Re-Insurance, Milimani & Ondiek Estates	Waste collection & disposal
Edota Investment	Small Medium Enterprise	Migosi, Lolwe & Kenya Re-Insurance Estate	Waste collection & disposal
Charles Owiti	Small Medium Enterprise	Migosi, Milimani, Tom Mboya, Kondele, Manyatta & Obunga	Desludging septic tanks

i) Shades Self Help Group

The role of this group as already summarized above is to undertake environmental awareness through campaigns and clean ups within the estates experiencing solid waste management problems; door to door garbage collection and disposal and waste separation whereby recyclables is sold out to other Small Medium Enterprise (SME) in other estates within the municipality.

In their key role of waste collection, the group markets themselves to the households from door to door based on a willing buyer willing seller principle. The garbage collector provides the polythene bags to the households for an entire month and collects the wastes once every week and charges a fee of between Kenya Shillings 150-200 per month for every household.

The group hires transport vehicle, in most cases an open pick-up which collects the wastes from every house and disposes off in a dumpsite designated by the CCK located in an area called Kachok. But due to need to minimize cost and maximize returns, chances of over heaping the garbage onto a pick-up van is very high resulting into frequent spillages. Further, the scavengers board these vehicles to look for any valuable items causing more spillage. Furthermore, the dumpsite is an open land fill within a residential cum commercial area and its negative impacts onto surrounding environment and the public health cannot be overemphasized.

Shades acknowledges other players in ESM such as World Vision, which is an international NGO with operations within Kisumu City as having supported them both financially and through trainings; the regulatory role of CCK by charging the garbage collectors who dispose off at the dumpsite and also enforcement of the Council by-laws where non compliance has been observed; and the KISWAMP which has been instrumental in entrepreneurship activities by offering short term loans to the Group.

In their own experience, there are positive changes due to such PPP projects where youths have been given job opportunities, reduction on illegal dumpsites and due to increased awareness on

ESM. There is also the change of attitude within the community towards environmental management (specifically, SWM).

The status of environmental sanitation in Migosi Estate is rated as fair due to lack of appropriate disposal sites for solid wastes and inadequate recycling techniques.

Shades Self Help Group holds the idea that "we should not consider waste as waste but we should look at it as a resource so we need to learn new technologies of recycling waste right from household level and promote the Reduce, Reuse and Recycle Principle (3Rs).

ii) Upperhill Youth Group

This is a youth group undertaking garbage collection services as well as sorting out and selling the recyclables within the mentioned estates in Kisumu City (table 5). The group also undertakes sensitization activities on the need for better management of the environment within the municipality. The process involved in waste collection and disposal is more or less similar to the one used by Shades Self Help Group and all the non recyclable waste is dumped at the open dumpsite in Kachok.

The group has also participated in the KISWAMP which has increased the level of awareness on the need for proper solid waste management and created job opportunities for the youths within the municipality.

The situation on environmental sanitation is viewed by the group as a big challenge since the local council mandated with the duty on SWM is highly incapacitated due to poor governance, inadequate technical expertise and funds. Further, the designated dumpsite is within a residential area and therefore poses risks to the public and the environment.

iii) Peak Group

Peak Group is located within Kisumu City. Its main activity is to collect and dispose off domestic wastes from Lolwe and Migosi Estates. The group charges Kenya Shillings 150 as a fee for every household and it provides polythene bags for temporary storage. Collection is done once every week and disposal is done at the designated dumpsite owned by the CCK. In their

view, their clientele is very comfortable with their charges and the terms of operation a situation that applies to all the CBOs involved solid waste collection from households at the estate. Some of the 77% of the respondents are satisfied with the private garbage collectors compared to 19% who are not satisfied.

The group unlike the others has no problem with the dumpsite and refers to it as "legitimate dumpsite" which brings to the question their understanding of the word "legitimacy." As much as it acknowledges that it is aware of the existing regulations on waste management, it has been operating without a waste transportation license.

Peak Group is also comfortable with the operations and their working relationship with CCK. Some of the reasons highlighted include trainings offered to the group members by the council, creating networks with the group and donors as well as being authorized to collect and dispose the solid wastes from households therefore earning them an income. The group recommends that for better SWM there is need for enhanced enforcement of the relevant by-laws and auditing of the private garbage handlers is also necessary.

The members also rate performance of KIWASCO at 55% and feel that in terms of water and sewerage services, KIWASCO should improve on service delivery while they have no concern on SWM.

iv) Gasta Poa Waste Management Services

Gasta Poa only deals with waste collection and disposal within the estates summarized in table 4 above and on average, collection is done twice a week. This SME charges between Kenya shillings 150-200 for each and every household and provide them with temporary storage polythene bags. This group also sorts out the recyclables and sells to recyclers within the municipality.

Just like the other groups, they do not own a waste transportation vehicle but hires uncovered pick-ups thereby raising the probability of spillages during transportation to the dumpsite.

In their view, the dumpsite is not appropriate due to its proximity to residential areas, learning institutions as well as commercial centre. They feel that there is an urgent need for proper siting of the facility to reduce the risks associated with it.

The group notes that it is aware of the roles of CCK and NEMA in waste management as well as that it has no waste transportation license despite the knowledge of the existing waste management regulations that require them to be authorized through licensing by NEMA.

The organization partners with CCK through capacity building, offering waste transportation vehicle at a subsidized cost and their recognition as waste handlers. However, it is worth noting that they are not satisfied and suggests that CCK needs to urgently gazette and enforce the relevant by-laws as well as install the skips or waste transfer points to ease waste collection.

It acknowledges the roles played by CCK, KIWASCO in ESM but the service delivery is rated as inadequate and that the institutions must improve to address the challenges of ESM. Gasta Poa supports the PPP as a good approach in ESM that will reduce duplication of projects which is common with the private sector players.

v) *Edota Investment*

As summarized in table 4 above, the SME deals in waste collection and disposal for the specified estates and charges Kenya shillings 200 per month for every household. Their operations are also similar to other waste handlers as they provide polythene bags for temporary storage. Waste collection is done once per week and the wastes disposed off at the CCK's dumpsite. The organization feels that their clientele is satisfied with their services due to reliability and better service delivery. However, it also takes note of the inappropriateness of the dumpsite due to its proximity to households and proposes a proper siting after an EIA license has been issued by NEMA. It is aware of the waste management regulations but has no waste transportation license and anchors its operations on its recognition by the CCK as a waste handler. This group however notes that its engagement with CCK is only at technical capacity building and feels that the CCK needs to provide transfer points within the strategic places in the estates for ease of collection.

d) Exhauster Services

Exhauster services are offered to those households or premises with filled up septic tanks or cess pools and these services are hired at the cost of the landlord or the tenant. During the study, one operator was interviewed as already illustrated in table 4. This was because the operators are never willing to talk to strangers due to lack of trust. The group suffers from frequent harassments by the council askaris (due to illegal parking despite having been authorized by CCK).

The operations here have a lot of contrast in comparison to private garbage handlers in the sense that the KIWASCO charges an annual fee of Kenya shillings 20,000 for disposing sludge into their ponds at Nyalenda and NEMA also charges them annually Kenya shillings 3000 as application fee and 5000 for license to transport such wastes (the sludge).

The households or landlords however have to part with Kenya shillings 3,000 for every trip of a tanker with a capacity of 7 tonnes. As noted earlier, from the interview for the households, this service is more costly and crude methods are always employed to desludge the holding pools such as exhaustion with a generator and disposal within the neighbourhood at night.

The service provider is convinced that their clients are very comfortable with their charges as they offer good and environmentally sound approach to desludging the pools. Regarding awareness of the existing waste management regulations, the operator is familiar but has not applied for the license from NEMA though due to weak enforcement still continues to operate.

The operator appreciated the good financial returns in the business but noted some challenges such as poor status of access roads to the Nyalenda WSP, lack of personal protective equipment (which should be provided by the employer) and corruption by some council officers as well as the high cost of licensing.

Concerning best ways of addressing the challenges, the operator suggested that there is need for awareness creation to discourage crude desludging, need for accountability and transparency at the CCK offices and maintenance of access road to the disposal site of the sludge.

From the assessment of the private garbage handlers in Kisumu specifically those operating in Migosi Estate, they have an informal relationship with both the Council and the consumers of their services. Services are rendered on a verbal agreement and based on a willing buyer-willing seller basis. The undoing of this arrangement is that it lacks steering and integration which ought to be the role of CCK in a governance system and the capacity of the council is almost lacking, resources inadequate and bureaucratic processes lack efficacy.

4.4 Potential for Public Private Partnership in ESM

4.4.1 Households

Most of the households (71%) preferred private service provider such as KIWASCO for water supply. Only 14% and 13% preferred CCK and LVSWSB respectively. The other 2% were the households that preferred newly created institutions other than the existing ones that are known to them. 77% of the households said they have no problems with services provided in SWM while 19% are not satisfied and the remaining percentage (4%) did not give their opinion. Concerning SWM, 71% supported service provision by private institutions and 26% preferred CCK while the remaining 3% preferred other totally newly created institutions (Figure 22).

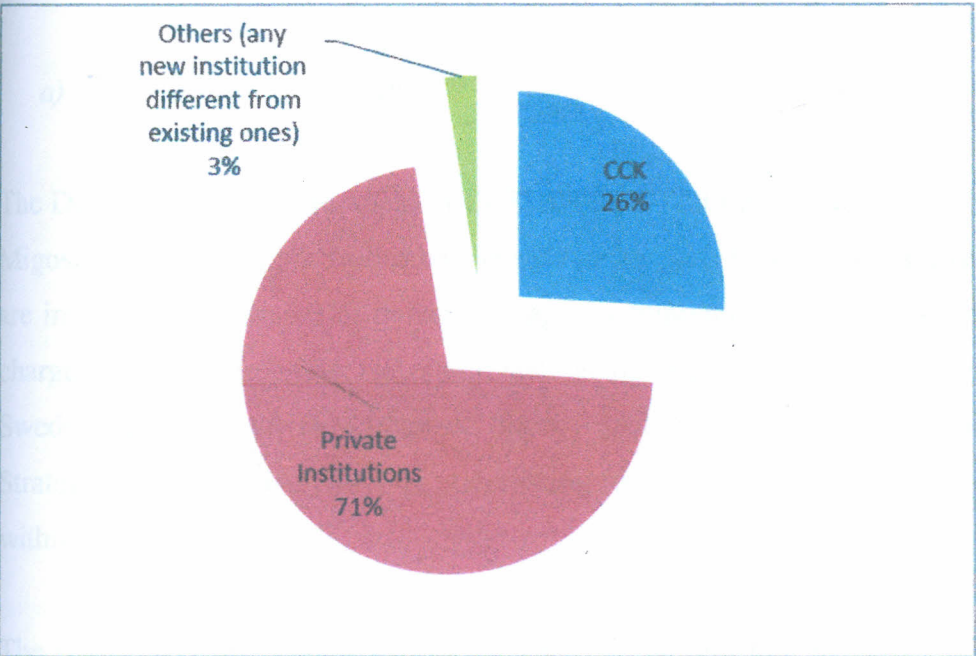


Figure 22: Households preference on institution to undertake SWM

Majority of the respondents (89%) gave support to PPP as an approach towards addressing challenges associated with ESM within the estate and 8% opposed the approach (Figure 23).

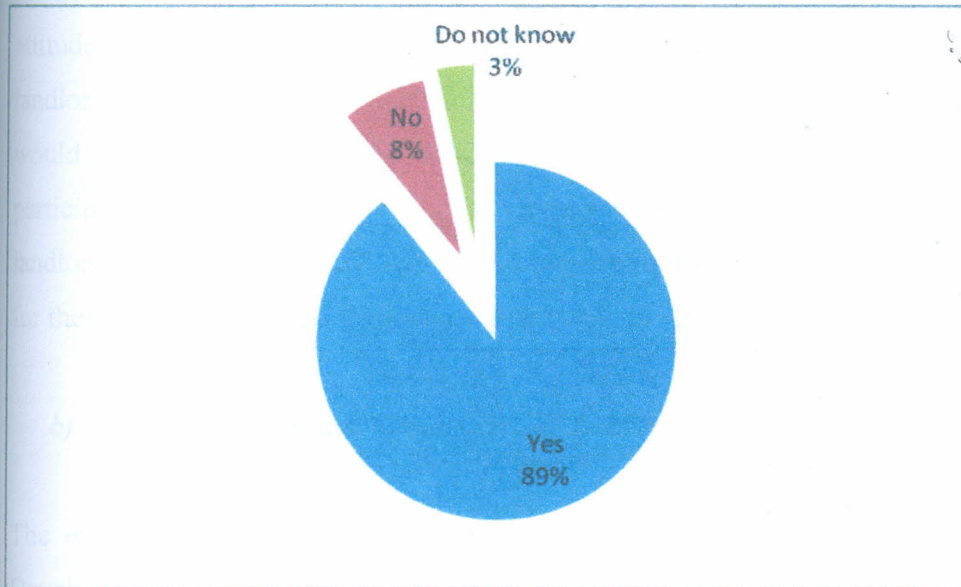


Figure 19: PPP Approach in addressing ESM challenges

4.4.2 Public Sector Institutions

a) *City Council of Kisumu*

The Department of Environment of CCK observes that there is already some kind of PPP within Migosi estate though not well documented neither well structured to make it formal. The CBOs are involved in provision of polythene bags for temporary storage of solid waste at a fee being charged to the households. Other non state actors are French Development Agency (AFD) and Swedish International Development Agency (SIDA) are involved in financing of the ISWM Strategy while UN HABITAT is undertaking technical capacity development of waste handlers within the municipality.

The department acknowledges PPP as a very important tool in ensure efficiency in SWM and notes that the roles and terms of engagement should however be well defined. As earlier noted, their involvement with the key beneficiaries as being inappropriate and therefore not effective,

the department takes note that it would be prudent to sensitize the public to enhance change of attitude towards environmental management and more specifically SWM and also engage the landlords to appreciate the need for SWM by paying for the services. From this research, it would be concluded that if the CCK changes their approach and makes this process of SWM a participatory process, then paying for these services would not be considered a burden by the landlords/households. A fact that can be confirmed by the willingness of the households to pay for these services through their engagement with the private garbage collectors.

b) Lake Victoria South Water Services Board

The existence of PPP within the municipality is also noted by the Board as there are the Development Banks and humanitarian organizations involved in financial support but it recommends that an investment approach needs to be encouraged. In addition, PPP is a very good approach towards addressing ESM challenges as it brings everybody on board however, the government must still organize its stakeholders, laws and policies to make it a reality.

c) National Environment Management Authority

Just like other government players in the ESM, NEMA also notes the existence of PPP within Migosi though with the larger objective of addressing the issues in the entire Kisumu City however, it observes that the structures and roles as well as the objective have not been well defined for each and every player. AFD, UN HABITAT, LVEMP, CBOs and some private firms are already playing certain roles in ESM which might either be duplicating or overlapping one another. It therefore implies that some areas are never addressed and some are over addressed thus no reasonable impact can be observed. The whole process calls for a lot of engagement with well identified and known problems and well defined objectives and goals where each player appreciates the roles and also benefits (especially financially).

4.4.3 Private Sector Institutions

a) *Kisumu Water and Sewerage Company*

KIWASCO acknowledges the existence of PPP within the municipality though these are the meter operators in slum areas and therefore do not cover the Migosi Estate. However, this is an approach that may need to be critically looked into in terms of strengthening its structures.

It would be important to note that there is a thin cut line between the roles of the Board and KIWASCO since the former contracts the latter to undertake provision of water and sewerage services. Also, both play a role in infrastructure management only that LVSWSB maintains the main components (such as trunk sewer line) while KIWASCO maintains the minor components (such as feeder sewer lines) from estates.

b) *CBOs and Private Garbage Handlers*

All the players in garbage handling and desludging services note some not well structured PPP within Migosi estate. They also support the PPP as a good approach in ESM that will reduce duplication of projects which is common with the private sector players.

4.4.4 Media House (Radio Lake Victoria)

Radio Lake Victoria is a media house formed under a non-governmental organization called OSIENALA (Friends of Lake Victoria). OSIENALA was established in 1992 as a national NGO with its head office in Kisumu town in Nyanza province, Western Kenya. It started as a membership organization by local communities who live and drive their livelihoods from the resources of Lake Victoria and its environs. It was also to provide a forum for addressing various environmental problems facing Lake Victoria. OSIENALA's role was to create awareness locally and internationally about the problems facing Lake Victoria while at the same time creating structures that would support local communities to become responsible custodian of their environment and the lake.

In this respect, Radio Lake Victoria was therefore selected because it was formed with the key goal of promoting environmental conservation more specifically for Lake Victoria and its environs through awareness creation. In addition, it is one of the media houses located within the study area. The role of the media cannot be ignored in pertinent cases where it has been observed that lack of information is a contributory factor to challenges such as in ESM and therefore this further justifies the need for their involvement.

The role of the radio station is to educate and empower the society with the relevant information on ESM to improve their livelihoods and their health. The station undertakes this by producing and broadcasting educative and informative programmes on environmental issues including sanitation. The radio station is also implementing sanitation projects within some estates in the municipality. The projects are being implemented through CBOs through Danish International Development Assistance (DANIDA) which is funding the production of the radio programmes and construction of the sanitation facilities. Further, the station works in collaboration with learning institutions through radio participatory initiatives on safe waste disposal mechanisms.

Through these programmes and projects, some success stories have been realized such as change of attitude towards ESM, creation of employment and creation of a platform where residents within the municipality appreciate their roles in enhancing the quality of the environment.

Despite the efforts made in ESM, Radio Lake Victoria still observes that the status is very poor as can be evidenced by waste disposal practices within the municipality. The station adds that the situation had been aggravated by poor planning for SWM within the municipality, high level of corruption and as well poor implementation of policies on sanitation.

Regarding the approach of PPP in ESM, the radio station acknowledges it as the best way to go which will ensure that the public play a major role in execution, of sound, proactive and self sustaining practices for a clean environment.

Moumié Maoulidi, (2010) noted that unsustainable patterns of production and consumption have resulted in a considerable increase in both the quantity and variety of waste. This is a result of

urbanization, economic growth, and industrialization which are growing problems for the national and local governments. These pressures cause severe impacts on the environment in terms of pollution of land, natural resources depletion, public health and costs to the local economy. These in turn threaten the attainment of the MDGs and the economic, social and political pillar goals of Vision 2030. The fact that more than 73% actually listed several options towards sustainable environmental sanitation management within the estate points out the readiness and willingness to adopt/embrace new approaches in ESM. In addition, the overwhelming support (89%) given by households for PPP as an approach towards effective ESM agrees with the findings of Wagah *et al* (2010). Wagah *et al* (2010) report that the sessional paper No. 1 of 1999 on National Policy on Water Resources Management and Development underscores the principle and recognition of the fact that the private sector offers invaluable potential, which has not been fully harnessed to contribute to sustainable development of the water sector.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter gives the concluding remarks after the survey in ESM and also the way forward on addressing the highlighted problems in ESM.

5.2 CONCLUSION

The study concluded that;

1. ESM status in Migosi was poor despite the fact that it is a planned residential estate. This implies that water and sewerage provision as well as solid waste management were not well integrated into the planning framework. There are no well established mechanisms for ESM. Solid wastes generated in the estate are heaped on the road reserves, paths and backyards of dwellings. The quality of water is not reliable as majority of the households obtain water from water vendors whose source is unknown to the consumers. There is poor investment in water and sanitation infrastructure in Migosi even after KIWASCO, a private company had been entrusted with the service provision after the reforms in the water sector. Most of the drainage systems serving as pathways for storm water are either filled with raw sewage and an assortment of solid wastes. The solid wastes collection and disposal is wanting since there is no source separation and the disposal site is a residential cum commercial zone thus raising public health risks
2. ESM in Kenya and CCK is legislated by a number of existing laws, namely the Local Government Act CAP 265, the Public Health Act CAP 242, the Environmental Management and Co-ordination Act No. 8 of 1999, the Environmental Management and Coordination (Waste Management) Regulations, 2006, the Environmental Management and Coordination (Waste Quality) Regulations, 2006, Water Act, 2002, the Model Water Services Regulations, 2007 and the by-Laws of the respective Local Authorities. The requirements for a permit do not cover all categories of waste management actors and the recently gazetted By-Laws have not been well implemented because of a weak

institutional framework. Regulation on private garbage handlers by the CCK is weak and most of the private garbage handlers lack well defined working structures and relationship with CCK. Concerning legislations on the water quality management, there is lack of well-developed mode of operation for better implementation. NEMA through the Environmental Management and Co-ordination (Water Quality) Regulations, 2006 developed to handle effluent being discharged into the environment whereas the Water Services Regulatory Board (WASREB) have also developed the Model Water Service Regulations, 2007 to facilities discharging into the environment. The standoff between the two parastatals has led to confusion for the regulated community and in a way affected compliance.

3. The involvement of households in ESM was mainly through their personal initiatives and only at household level. Such activities include paying for garbage disposal services and desludging services for blocked or over flowing septic tanks. The concerned public institutions in ESM had not appreciated the very important role of households in ESM and did not involve the households in ESM related activities, projects and technologies.
4. There is lack of ownership in ESM. Existing legislations have not incorporated PPP as a suitable approach to dealing with ESM. All players (households, government and private agencies) however, acknowledged that PPP would be the best approach in tackling ESM problems within the Kisumu City.

5.3 RECOMMENDATIONS

1. All the players in ESM should make a concerted effort in addressing the environmental sanitation and associated public health problems in Kisumu City especially Migosi Estate.
2. Harmonization of conflicting laws and roles-In the interest of avoiding conflicting interests, the role of legislators comes in handy in seeing to it that all laws are harmonized to ensure better performance in the sector. Even if the PPP policy is

developed and the existing legislations are not compatible, much success will not be realized due to difference in approach to ESM issues.

3. Piloting of PPP in ESM and henceforth the enactment of PPP policy-Lack of policy framework undermines success even in areas where returns can be obtained. The Government of Kenya needs to utilize the existing opportunities for developing the legal framework to ensure the implementation of PPP in ESM to enhance sustainability of the environment. It is expected that if the framework is developed and operationalized it should address the challenges associated with the PPP.

5.4 Areas for Further Research

The study has only dealt with household solid wastes and a lot of focus needs to be given to;

1. Need for source separation with a view of implementing the 3Rs within the Kisumu City.
2. Effect of the sanitation facilities in relation to ground water (boreholes/shallow wells) pollution within Kisumu City.
3. Institutional strengthening of public and private institutions with roles on ESM

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