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Livelihood impacts of solid waste management in informal settlements of Windhoek, Namibia.

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Abstract

Solid waste management (SWM) is a growing global concern, especially in urban areas and even more so in urban areas of developing countries. Informal settlement areas, *slums*, face grave challenges of inadequate municipal service delivery. The impact of solid waste management is related to impacts caused by lacking water and sanitation, through the common issue of public health. Service delivery varies among the residents within a city, and reflects the historical background and the current priorities of the municipality. Livelihood opportunities in the informal settlements are shaped by the organisation of urban space, setting the preconditions for access to services, level of inclusion in decision-making and forming of the 'social self'.

This paper investigates the solid waste management system within the capital of Namibia, Windhoek, with a special focus on the informal settlement areas. The direct livelihood impacts of inadequate SWM and general service delivery are visible through unhealthy living environments. The physical surroundings reflect the marginalised and peripheral status of the informal and illegal settlers in Windhoek. The residents' awareness of connections between waste and livelihood varies, and is often limited to concrete issues in the neighbourhood, and not to structural arrangements and inequities within Windhoek.

The research finds a divided city, where the traditional apartheid neighbourhoods are growing into large informal settlements due to continual urban migration. These settlements located in north-western Windhoek present the municipality with vast challenges related to basic service delivery. The residents are aware of their low priority in the city, which impact negatively on their livelihood opportunities.

Key words: waste, solid waste management, livelihoods, 'social self', Namibia, Windhoek, municipal service delivery, informal settlements, slum.

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Abbreviations

CBS	Clear Bag System
CSIR	Council for Scientific and Industrial Research
CW	The City of Windhoek
EMA	Environmental Management Act
HSD	Health Services Division
ISWM	Integrated Sustainable Waste Management
IWMSA	Institute of Waste Management in Southern Africa
NHAG	Namibian Housing Action Group
PAH	Polycyclic Aromatic Hydrocarbons
PHA	Public Health Act
PPP	Public Private Partnership
SDFN	Shack Dwellers Federation Namibia
SWD	Solid Waste Division of the City of Windhoek
SWM	Solid Waste Management
The Policy	Solid Waste Management Policy of the City of Windhoek
WMH	Waste Management Hierarchy

Central concepts and words

Skip container: big metal containers provided by SWD in areas without transfer stations, exclusively for garden refuse and rubble, but are often used for un-recycled household waste.

Wheelie bin: Green plastic bin with wheels given to every property in Windhoek. If you don't own you own property (informal and illegal settlements) you don't get a wheelie bin.

Black bag: For general household waste provided by the SWM for residents who don't have wheelie bins.

Clear bag: Provided and collected by Rent-a-drum for recyclables: glass, paper/cardboard, plastic. Transported to their recycling plant where it is sorted, packed, sold and shipped to South-Africa.

Transfer station: a site where private solid waste, as well as garden refuse and rubble can be disposed, before transported by SWD to Kupferberg landfill.

Satellite site: Sites within informal settlements, for disposal of garden refuse and rubble, which is stored on site (not transferred to Kupferberg). A satellite site is sometimes combined with a transfer station for recycling. The recycled waste is collected by Rent-a-drum.

Livelihood: the means of gaining a living, the possibility to live the life you want.

Formal area: Brick houses where the owner has property rights and pay for services. Each property has wheelie bins, electricity, water, waste collection and private toilet.

Informal settlements: Access to limited waste management, and varying access to electricity, public taps and toilets. Shack-residents have limited and temporary property rights, but only partly services because the settlement was originally illegal. Do not pay for municipal services.

Illegal settlements: Also called Not Declared Settlements. These areas have no electricity and varying access to waste management, public tap and/or toilet. Shack-residents have no property rights. Do not pay for municipal services.

Note: In many respects the illegal and informal areas interlock, both physically by cohabiting the same areas, and in terms of service level. Due to the close interconnections and difficulty of separation, the areas inhabiting both illegal and informal settlers will be referred to as informal settlements in this thesis.

Ward Contractor: Private business hired by the SWD to perform SWM services in the wards. Services include waste collection, street sweeping, litter picking and maintaining public toilets.

Kupferberg: main landfill site in Windhoek for general and hazardous waste

Solid Waste Management: all activities related to cleaning and collecting solid waste on municipal, business, community, and individual level.

Dumping: to leave any kind of waste in public areas which is not assigned for waste disposal is by definition illegal.

Burning: the burning of waste in any location, or for any reason, is illegal in the City of Windhoek.

Residents: if not specified this refers to the residents of the informal and not-declared settlements

Chapter 1: Introduction

The consequence of the world's economic organisation; where globalisation frames trade, finance, technology and demography, is becoming visible through environmental degradation worldwide. According to UNEP´s Global Environment Outlook 5 (GEO5) the current main drivers of change in human society are demographic and economic, putting pressure on the environment and thereby on human well-being (Levy & Morel, 2012, p. 4). This is markedly visible in developing countries where environmental and socio-economic vulnerability is defined as ability to cope or adapt, and thus impacting on people's livelihood sustainability (Jäger & Kok, 2007, p. 302). The world's population tripled from 1925- 2000 (Schulman, 2011, p. 3), a growth which is linked to improved health care, increased food production and economic development. The demographic transition present five stages of demographic development where economic growth is connected to decreasing birth rates. As economic growth is unevenly dispersed, many developing countries are still in the early stages of the transition where death rates are declining, while the birth rates are still high, causing an accelerated population growth (Potter et al., 2004, p. 190). Population growth and economic growth lead to increased waste generation (Schulman, 2011, p. 3). Generation of solid waste is a natural consequence of human life. Removal of that waste is consistent with improved quality of life (Shekdar, 2009, p. 1438). Improved quality of life contributes to increased livelihoods opportunities for residents. Most developing countries lack adequate infrastructure to tackle the mounting challenges of solid waste management (SWM), such as technical, legislative, financial and administrative support. As generation of household waste surpass the municipal capacity, SWM become one of the key concerns for environmental protection, public health and quality of life in developing countries (Karak, Bhagat, & Bhattacharyya, 2012, p. 1510). The impact of waste on the local environment affects residents in terms of livelihood opportunities, which in turn has consequences for sustainable economic development. The wider impact of SWM is underscored by the fact that it is a vital municipal service which serves as a prerequisite for other municipal activities (Hoornweg and Bhada-Tata, 2012, p vii).

Legitimacy for the research of livelihood impacts of SWM can be found within a range of topics touching on economic development, urban studies and poverty research. UN Secretary-General Ban Ki-Moon stated in the 2011 report on policy options for waste management to the Commission on Sustainable Development, that "the barriers to effective management and minimization include lack of data, information, and knowledge on waste scenarios" (Barra, Portas, and Watkinson, 2012, p. 168). In Ki-Moons address to the State of the World Cities 2010/2011 he underscores how inequality and injustice from inadequate policy-making and planning may cause urban poverty and deprivation. Overcoming this means removing barriers that limit access to land, housing, infrastructure and basic services, as well as facilitating participation and citizenship. The world´s inhabitants need just, green and dynamic environments, towns and cities to thrive (Moreno, Oyeyinka and Mboup, 2010, p. 1).

1.1. Background

1.1.1 Waste in a global perspective

SWM is a topic of universal concern for rural and urban areas in the developed and developing countries. Historically, countries dealt with waste by burying it, letting animals eat it and forgetting about it. This approach is no longer sustainable (Joseph: 2006, p. 863). Many developing countries are experiencing problems caused by inappropriate and inefficient SWM, and often short term solutions like uncontrolled dumping is practiced. The need for SWM plans is widely recognised, but may not be feasible due to lack of funds or insufficient institutional capacity (Abrelpe, 2012, p. 13). The pressure on SWM operations caused by a more interconnected global economy is growing due to increasing generation and complexity of waste. In a global perspective this can lead countries to unsound SWM practices and disposal operations. If waste is not managed in a sustainable way, meaning long-term solutions founded in local communities, the connected costs may grow to such an extent that the economy and public services fail to keep up (Barra, Portas, and Watkinson, 2012, p. 175). Such a scenario is seen many places in the world already, and especially in developing countries.

Waste is increasingly viewed as an imperative issue worldwide, although the residential challenges and impacts of general solid waste does not seem to have the highest priority. This may partly be due to the newer issues of e-waste and chemical waste that present immediate problems, while general solid waste is a well-known issue with few surprises, except continual growth. UN´s GEO5 deal with waste in chapter 6: Chemicals and Waste, mainly concerning how hazardous wastes are mixed with solid wastes. The mixed waste is either dumped or burned in the open, raising issues of environmental and social justice, as "the people most affected by these dangerous practices are usually the poor who live and work close to dump sites" (Barra, Portas, and Watkinson, 2012, p. 175). Although chemicals are a threat to health and livelihoods when mixed with solid waste, the focus on "ordinary" household waste and its management is not prioritised in the GEO5 report.

Municipal waste constitutes a significant percentage of the total waste a country generates (OECD, 2008), with annual figures ranging from 0.4 to 0.8 tonnes per person, and solid waste generation increasing at an estimated rate of about 0.5–0.7 per cent per year. In addition, the sound management of municipal waste constitutes to be a sizable and continuously growing part of a municipality's budget (Barra, Portas, and Watkinson, 2012, p. 175). In developing countries the cost of waste collection, disposal and treatment would be between 0.7- 2.6 % of income/capita/year, while in comparison the same numbers for high income countries are 0.2-0.5% (Cointreau, 2006, p. 8).

In 2012, world cities generated approximately 1.3 billion tonnes of solid waste per year, with an expected increase of 2.2 billion tonnes by 2025. In lower income countries waste generation will more than double in the next twenty years, in a business as usual scenario. Solid waste management costs will almost double globally, to around $375.5 billion in 2025.

Cost increases will be most severe in low income countries (Hoornweg & Bhada-Tata, 2012, p. vii). This is mainly due to insufficient infrastructure, as well as SWM planning and budgets lagging behind.

1.1.2 Waste in Africa

Globalisation plays an important part in development globally, but the impact varies from rural to urban areas, as well as between developed and developing countries. The African continent is typically rural, but has experienced an extensive urbanisation during the last decades, accelerated by increased regionalisation and globalisation. For many countries in Africa this has stimulated the already unprecedented urban growth phenomenon and increased the challenges that come with it, one of them being management of municipal solid waste (Achankeng, 2003, p. 1). The local government (civil institutions like municipal institutions, communities and neighbourhoods) are usually responsible for SWM services. These services are often inefficient and outdated in developing countries. This may be due to, and upheld by; increased costs, limited funds, institutional deficiencies, lack of trained personnel and political pressure (Asnani 1996 in Joseph, 2006, p. 864). Technology transfer from developed countries is often seen as a panacea for problems faced by developing countries, so also in relation to waste. Investing heavily in technology suited for modern and wealthy countries can often worsen the challenge of solving SWM in poorer and more traditional countries. High maintenance costs and unsuitable methods in terms of vehicles, disposal and collection can present problems. Furthermore, the ideologies and one-size-fits-all of multinational companies may not fit the needs of a municipality in a developing country (Achankeng, 2003, p. 1).

1.1.3 Waste in Southern Africa Development Community

The Southern African Development Community (SADC) was established in 1992 as a regional economic community and currently has 15 member states, Namibia being one of them. SADC works for development and integration within the southern African region, especially focusing on economic development and poverty alleviation. SADC focuses on development themes such as infrastructure, health and economy, and although waste is highly relevant to these topics, it is not mentioned in relation to them. The interconnected and cross-cutting nature of waste and SWM may present difficulties of placing it within traditional development topics. Waste management is however found within the broad topic of Environment and Sustainable Development, where one of the goals are to “Protect and improve the health, environment and livelihoods of the people of southern Africa with priority to the poor majority“. Household waste is covered alongside Agriculture, Industry and E-waste. The risks mentioned associated with household waste include the connection between blocked drains and malaria, as well as fume pollution from burning of waste (SADC, 2014). An important partner for SADC in activities and development of SWM is the Institute of Waste Management in southern Africa (IWMSA). The two organisations, SADC and

IWMSA, cooperate closely on SWM issues, and much of the work is driven to a large extent by legislation, resources and initiatives from South Africa. For instance, most of the publications on waste from the two organisations are produced by CSIR; Council for Scientific and Industrial Research in South Africa. CSIR is a leading organisation of scientific research, technology and implementation in Africa, directed towards development for socio-economic growth. The publication Guidelines for Human Settlement Planning and Design is only one example of research done by CSIR where the South African back-drop becomes important as the research is regionally adaptable, while also being holistic and practical (CSIR, 2000). The southern African region, including Namibia, could benefit from sharing experiences and research with South Africa through CSIR, SADC and IWMSA.

1.1.3 Waste in Namibia

Establishing the impacts of how solid waste management is handled and prioritized in a local context is crucial to frame the links between waste and livelihoods. The City of Windhoek´s (CW) aspirations of being the cleanest and greenest city in Africa, or even the world, led to the adoption of Solid Waste Management Policy of 2009 (the Policy). A holistic and ambitious policy was created, supported by the national environmental legislation and local authority regulations. The Policy outlines a connection between improved waste management, cleaner environment and human development. This connection is based on an assumption that inadequate waste management leads to an unclean, unsanitary and unhygienic urban environment which hampers human development. Furthermore, it is based on the fact that stakeholder participation within waste management planning and implementation will lead to increased sustainability of waste management. The sustainability of a SWM system will in turn affect the stakeholders themselves. Clean public urban areas will thus lead to increased livelihood opportunities, through less disease, more income and enhanced community integrity (City of Windhoek, 2009). In this way the Policy creates anticipations for environmental, as well as economical and developmental consequences in local communities.

In terms of urban development, adequate goods and service delivery will enhance the poor people's economic and livelihood opportunities, as well as empower them in their communities (Keyter, 2010, p. 6). The pressure on local governments to provide basic services often exceeds the municipal budget. Both public private partnerships and community involvement has proven to be beneficial within urban waste management. The CW has a history for community participation and public-private partnerships in their SWM. The Ward Contractor system is an example of this, and has operated in its current form since 2002 (Keyter, 2009, p. 13). As the Ward Contractor system incorporate local government, private enterprise and local communities in SWM it presents a starting point when investigating the connections between government policy and local perceptions of waste management and livelihoods.

1.2. Study Area

1.2.1 Namibia

Namibia is a country in the Southern part of Africa, bordering to South Africa, Zimbabwe, Botswana, Zambia, Angola and the Atlantic Ocean (see Figure 1). The country has approximately 2, 3 million inhabitants comprising 10 ethnic groups (Coleman, 2013, p. 2). The ethnic diversity has created a flexible society of acceptance, but may also lead to internal disputes due to diverging habits and traditions. Namibia was under South African rule from 1915 until 1990 when the country gained independence (Coleman, 2013, p. 10).

Figure 1: Namibia is located on the southern African continent

Source: Google maps (2014)

In recent years Namibia has had a strong GDP growth and a rise in overall income. However, the economic growth has not translated into overall development as the country face large socio economic development and structural challenges, while struggling with high unemployment rates and widespread income inequality (IMF, 2014). In 2011 58 percent were living in rural areas, while almost 1 million people, 42 percent, were living in urban areas. In 2001 the same numbers were 67 percent and 33 percent respectively, showing an increasing urbanisation rate (NSA, 2011, p.4). Although Namibia follows the global trend of urbanisation, a large proportion of the citizens are still living in rural areas. The rural households are also the largest households, while smaller households are found in the urban areas (NSA, 2011, p. 3). However, the demographic distribution on national and regional level may have internal variations, due to large changes in movements and settlements after Namibia's independence from South Africa in 1990. Namibia and the capital of Windhoek in particular, have increasing population growth, urbanisation rate, as well as rising economic activity and living standards. All of this cumulates in a constant demand for improved services and an increase in the amounts and types of waste generated (City of Windhoek, 2009).

1.2.2 Windhoek

The capital city of Windhoek is located in the Khomas region, in the central part of Namibia (see Figure 2). The City of Windhoek (CW) is the most populated region with approximately 350 000 inhabitants in 2011. This is also the region with the highest urbanisation rates (NSA, 2011).

Figure 2: Namibia's capital Windhoek is located in the middle of the country.

Source: CIA (2014)

Urban primacy is total, as CW is the only real city in Namibia (Potter et al., 2004, p. 380), putting high pressure on CW in terms of population growth, economic activity and service delivery. The Vision of the City of Windhoek is focused on creating a "vibrant, economic and technological centre of excellence in Africa in order to enhance the quality of life of all our people". The mission statement of the City of Windhoek is more directly concerned with how the vision will be reached. It emphasises service delivery through "optimal use of resources, technology and sound financial and environmental practices" (City of Windhoek, 2014). Migration was controlled until the 1980´s following the liberation process from South-Africa, leading to a vast migration into the cities, and especially Windhoek.

Figure 3 below illustrates the proportion of slum dwellers in the urban population of African countries. Despite Namibia being a rather small country the percentage of urban residents living in slums is large, pointing to widespread urban poverty. Poverty points to limited livelihood opportunities, which in turn can be connected to lacking infrastructure and municipal services.

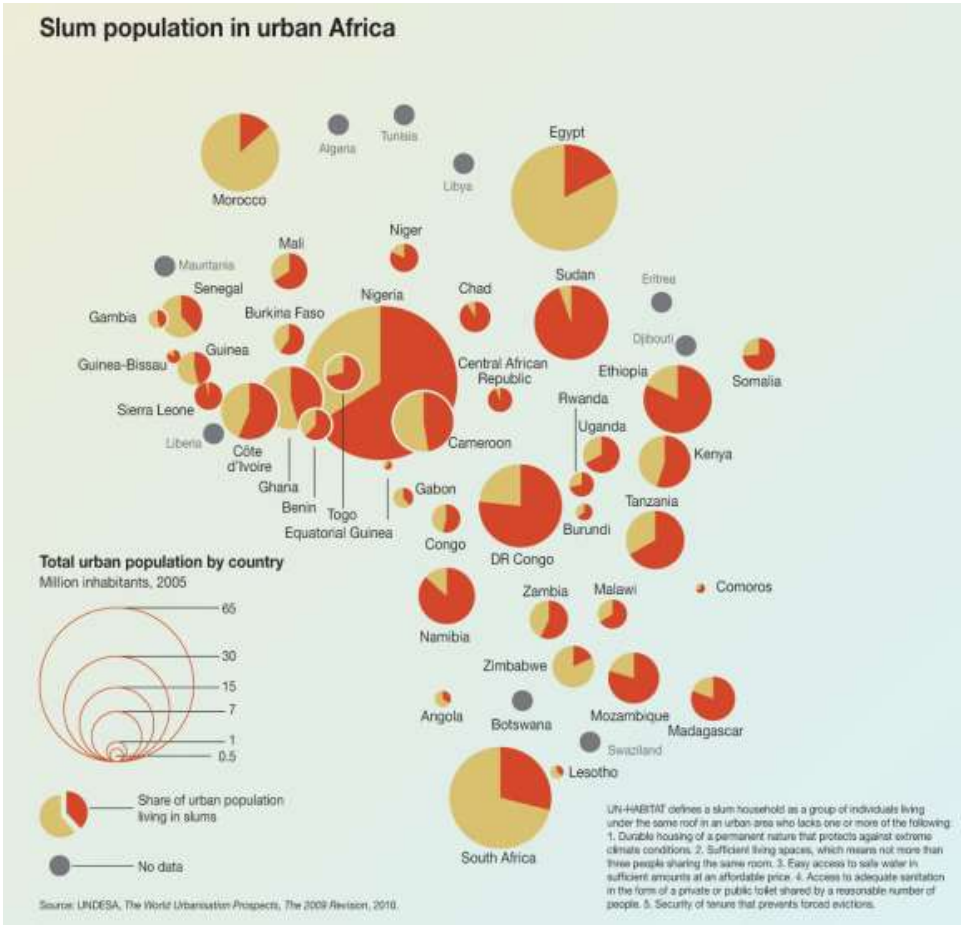

Figure 3: A relatively large proportion of Namibia's urban dwellers live in slums.

Source: UNDESA, The World Urbanisation Prospects (2010)

Windhoek is experiencing increasing urbanisation with subsequent pressure on basic municipal service delivery. Internal migration in Namibia grew quickly after independence from South Africa in 1990. Independence led to more open settlements nation-wide, and many people moved to the capital. The migrants were mainly low-income people and moved to the outskirts of Windhoek, on the north-eastern border of the Soweto Katutura (World Bank, 2002). The focus of this thesis is primarily on how waste management as part of basic service delivery affects the local communities, including waste generation, disposal alternatives, collection and cleaning of public areas. As the issue of service delivery in informal and illegal settlements is relevant in urban areas of all developing countries, the study of such areas in Windhoek is useful for shedding more light on the connections between lacking waste management and challenged livelihood opportunities.

1.2.3 Informal settlements and illegal settlers

Katutura and Wanaheda townships were established, for blacks and coloureds respectively, after South-Africa's implementation of apartheid laws in 1961. In the following decades, migration laws were strict until they were finally opened up in the 1980´s prior to Namibia's independence from South Africa in 1990 **(REF).** The challenges of service delivery in these areas seem to originate with their original establishment, only to increase over the years. The City of Windhoek was not prepared for the great influx of migrants after 1990, and almost immediately faced problems of providing sufficient land, shelter and public services, such as adequate waste management. To deal with these problems the Open Space and Street Cleansing System (OSSC) was introduced in 1991 and changed into the Ward Contractor system in 2002, with the division of CW into 19 wards (Keyter, 2009, p.19). By 2008 up to 25 % of Namibia's 2 million inhabitants lived in informal settlements scattered across the country (CLIP, 2009, p. 9). The post-Independence effects stress a situation of diaspora and displacement of citizens. The Khomas region, where Windhoek is located, has 32 informal settlements, and 2 illegal or Not Declared Settlements, with a total population of app. 120 000 in 2008 (CLIP, 2009, p. 8). Seeing as these numbers are six years old and the estimated number of immigrants to Windhoek alone is 600 per month, the number of settlements and residents are no doubt a lot higher today.

According to Devas one of the major constraints preventing the municipal government from addressing vital livelihood needs of the population are settlements extending beyond municipal boundaries, leaving the urban poor with no or lacking services (in Rakodi, 2002, p. 215). This is especially true in Windhoek, where the original townships are well-established in terms of municipal services, while the newer settlements on the fringe have fewer, if any, services.

Formalisation of settlement areas is happening slowly and is spreading from the formal areas into the informal areas. This leads to areas containing a mix of formal, informal and illegal settlers, with various degrees of living standards and service delivery depending on their level of property rights. The municipality is continually working to register new migrants and shacks, while controlling the already existing settlers, as well as trying to stop further migrants to settle. Due to uncertainties on the part of residents and municipality alike, as to which areas or settlers are informal, illegal or a mix, the term informal settlements will be used for all the investigated areas which lie to the north and west of Katutura. However, illegal settlers will be mentioned in terms of issues relating to them specifically.

Figure 4: Outline of the City of Windhoek, Katutura Ward in yellow.

Source: Wikipedia (2014)

Figure 4 show the Katutura ward in the north-western part of CW. Far beyond the borders of Katutura ward, to the north and west, informal settlements have formed. It is clear that the urban growth of CW constitutes thousands of migrants in unregulated areas. Although these new informal neighbourhoods have names, this entire area of CW is commonly referred to as Katutura (Nangombe and Ackermann, 2012, p. 184).

1.3. Main objective

The main objective of the thesis is investigating to what extent the effectiveness of municipal SWM systems impact on livelihoods of the residents in informal settlements. A link between a cleaner public environment and increased livelihood opportunities are expected to be found. Topics connecting urban livelihood opportunities and the SWM system are chosen based in the ISWM model. The findings will help focus the relevant topics. Relevant issues that will be analysed through the Windhoek´s Solid Waste Management Policy using the ISWM model could be legal, institutional, health, participation and awareness. The Ward Contractor system of CW is responsible for removal of waste in public places, a problem that may be more prominent in the informal settlements where basic infrastructure is lacking. The Ward Contractor system presents a platform to investigate how the Windhoek´s Solid Waste Management Policy is implemented at a local level, as waste in public places is linked to livelihood opportunities.

1.3.1 Research objectives

1. Investigate how livelihoods are addressed in legislations, regulations and policies regarding SWM at national and local levels in Namibia.

2. Assess to what extent the municipal SWM systems address the connection between waste management and improved livelihoods in local communities.

3. Identify how the connection between waste management livelihoods opportunities is perceived at ward and resident levels.

4. Identify the level of awareness, responsibility and participation concerning waste management and its impacts.

1.4 Methodology in brief

The thesis research is based in qualitative methodology, and has a case study design, where one specific situation is investigated. Semi-structured interviews are the main mode of data collection, complemented by document review and observations in the areas covered by the field work.

1.5 Thesis Outline

Chapter 1: Introduction presents the topic of waste from the global, through the regional, to the national level. The study area is outlined and narrowed down from country, to neighbourhood level. Chapter 2: Literature review will explain and elaborate on the concept of waste. The Integrated Sustainable Waste Management model (ISWM) is used to elaborate on the connections between waste and topics such as health, livelihood and environment. The ISWM model is also used in chapter 3: Theoretical application to clarify how the findings will be organised within certain concepts and categories. Chapter 4: Methodology lays out the methodological choices made in terms of data collection and analysis. Findings from the data collection are found in chapter 5: Findings, where the data is organised according to the ISWM model. The analysis of data is done in chapter 6: Analysis, utilising the ISWM aspects. The closing remarks are found in chapter 7: Conclusion, along with a short assessment and some recommendations.

Chapter 2: Literature review

The literature review will summarise the central topics of special relevance to waste in a developing country context, such as livelihood, health and sustainability. It should be noted that the Integrated Sustainable Waste Management (ISWM) model forms the outline for the literature review, as well as the theoretical framework guiding the presentation of findings and finally the analysis. The ISWM model focuses on key factors affecting the sustainability of a waste management system, such as the relationship between key stakeholders.

2.1. Waste

2.1.1 Definitions

Waste is most often defined as unwanted leftover or excess materials that are discarded and needs to be handled in a specific manner to avoid negative impacts (City of Windhoek, 2009, p. ix). Waste can also be viewed as something which is no longer of use to one individual or for a specific purpose, opening for the idea that it might become useful again, for someone else, or for a different purpose (Uriarte, 2008, p. 2). This idea is gaining ground as reduce, reuse and recycling of waste is becoming the main focus of solving the mounting problems of waste globally. However, a large quantity of waste is unwanted and potentially dangerous material that needs to be removed from human habitats. Along with technological advancements, waste becomes more diverse, increasing the demands on separation, collection, recycling, treatment and disposal systems. The specific elements of the waste chain will be explored as part of the Waste Management Hierarchy (WMH) below.
There are several terms used in the literature discerning the different types waste. *Solid waste* (SW) is a term used to highlight the separate between *solid* waste and *liquid* waste, such as waste water and sewage. Municipal solid waste refers to the kinds of solid waste that are generated within and by a municipality, and which the municipality as administrative unit is responsible for collecting and treating (Schübeler, 1996). MSW usually incorporates waste from households, businesses, institutions, markets and public areas and streets (OECD: 2010, p. 172). Furthermore MSW normally excludes hazardous wastes of any kind (Karak, Bhagat, and Bhattacharyya, 2012, p. 1511). However, each country and city might operate with their own definitions of waste relating to their specific waste composition, regulations and waste management systems. Although waste is often divided into categories by legislation, in reality waste is anything that has been discarded that the municipality has to handle (Shekdar, 2009, p. 1439).

The City of Windhoek defines waste-related terms in the Waste Management Act of 2011, Amendment to the Local authorities Act of 1992 (2011, p. 4). These definitions are also utilised in planning and implementation through the Solid Waste Management Policy (City of Windhoek, 2009). The definitions are very specific in terms of types of waste, such as

builders, bulky, business, garden, hazardous, health care and industrial wastes. The definition that comes closest to the definition of municipal solid waste presented above is *general waste* which is defined as household, public and institutional waste, excluding all the other kinds of specific waste types mentioned above.
Solid Waste Management (SWM) is the organisation of waste from generation to disposal, collection and transportation and final destination of municipal, institutional or household waste (Awortwi, 2006, p. 224). The field of SWM is of great interest in terms of economic growth through formalization of jobs and securing livelihoods, creating healthy living environments and also in terms of the environmental perspective of avoiding the damage caused by waste.

2.1.2 Impacts

Waste is a growing challenge due to increasing production and consumption, especially in urban areas where the waste problem is magnified by overpopulation (Guerrero, Maas, & Hogland, 2013, p. 220). Municipal solid waste is a bi-product of the urban lifestyle, and according to the World Bank the quantities of waste is growing faster than urbanisation itself (Hoornweg and Bhada-Tata, 2012, p. x). High urbanisation rates challenge the already strained municipal services, especially when the growth is concentrated in informal and unserviced settlements. Traditionally waste has been mostly unproblematic in developing countries because most waste was organic, and consequently buried, left to rot or left for animals to eat. When the quantity of inorganic materials increases due to technical advancements, waste becomes a threat to the environment and to the people (Uriarte, 2008, p. 3). The problems arising from increased generation of waste are relatively new, and partly explain the delay in and lack of effective waste management systems. According to the World Bank, poorly managed waste has an enormous impact on health, local and global environment, and economy; improperly managed waste usually results in down-stream costs higher than the cost of managing the waste properly in the first place (Hoornweg and Bhada-Tata, 2012, p. viii). The environmental problems caused by inadequate waste management lead to negative repercussions for economic and human development through decline in health, loss of workdays and unnecessary municipal costs, to name a few (Joseph, 2006, p. 863).

2.2. Sustainability in waste management

Sustainability is a term linked to development and environment, and subsequently to waste. The definitions and use of the term *sustainability* are broad and flexible, presenting both opportunities and need for delimitation. Agenda 21 is a comprehensive plan of action that was presented at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. In a world of increasing disparities and ecosystems risk, Agenda 21 proclaims sustainable development as a way towards fulfilling “basic needs, improved living

standards for all, better protected and managed ecosystems and a safer, more prosperous future" (United Nations, 1992). According to Agenda 21, municipal authorities are responsible for promoting sustainable development through implementation of social and environmental policies at local level (Botta, Comoglio, & Petrosillo, 2013, p. 1073). In regards to public services in developing countries the growth and long-term maintenance of local communities run parallel to environmental concerns. The social and developmental policies prescribed by Agenda 21 to reach sustainable development conjoin in the improvement of waste management, due to its necessity for local communities functioning. In this way sustainable development can be achieved through addressing waste management through related issues such as health and livelihoods, which directly impacts on human development. The World Bank underscores waste management as a crucial point in development, by stating that municipal solid waste management is the most important service a city provides (Hoornweg and Bhanda-Tata, 2012, p. 6). In this thesis the term *sustainability* refers to the effectiveness, efficiency and equity of a SWM system and will be guided by the main principles within the ISWM. Connections will be made to the determinants for and realities of local livelihoods opportunities.

2.3 Integrated Sustainable Waste Management

There is a growing need for sustainable and coherent SWM planning and solutions, especially in developing countries where SWM seems to present social, economic and institutional challenges. Increased volumes and types of waste combined with economic growth and urbanization is creating complex challenges regarding population growth and infrastructure (Abrelpe, 2012, p. 13). The concept of Integrated Sustainable Waste Management (ISWM) was first presented in 1995 by the Dutch NGO WASTE. The organisation works to transform waste into opportunity through advising on urban environment and development. Since 1995, ISWM has been developed and utilised suiting various situations and presents a viable framework for planning and assessing SWM system.

2.3.1 Concepts of ISWM

The ISWM concept is founded on four basic principles; *equity* means that all residents are entitled to an appropriate waste management system for environmental health reasons; *effectiveness* in waste management will lead to the safe removal of all waste; *efficiency* means that the management of all waste is done by maximising the benefits, minimising the costs and optimising the use of resources, while; *sustainability* means that the waste management system is suited to local conditions and viable from a technical, environmental, social, economic, financial, institutional and political perspective. It can maintain itself over time without exhausting the resources upon which it relies (van de Klundert and Anschutz, 2001, p. 11). These principles functions as a backdrop for the perspective used in research and data collection.

The ISWM model is special in adding the terms “sustainable” and “integrated” to waste management, emphasising a local focus on key stakeholders. An “integrated” system is fundamentally local and involving all stakeholders, while a “sustainable” system is locally integrated and able to maintain itself over time (van de Klundert and Anschutz, 1999, p. 3). Sustainability and integration could be viewed as mutual pre-requisites, because sustainable long-term systems demand integration, just like integration through stakeholder participation ensures sustainability.

2.3.2 The ISWM model

The need for sustainability in planning and implementing SWM systems has been established by linking environmental protection and human well-being. ISWM is a model that allows complex studies of the multidimensional components of waste management. The model has been continually developed since the mid-1990s by organisations and scholars concerned with urban environment and development (Guerrero, Maas and Hogland, 2013, p. 220). The ISWM model is continually modified depending on the needs in specific contexts, creating a flexible framework of concepts and theories used for assessing, developing and improving waste management systems. ISWM is geared towards transitional low to middle income economies, thereby capturing vital development issues by including a wide understanding of the fundamentals within urban waste management (Abrelpe, 2012, p. 11). As this research thesis focus on the livelihoods impact of the SWM system in a middle income country, the ISWM model is suitable.

The ISWM model forms a basic outline that attempts to create a holistic approach to the management of solid waste based on the four main principles. The model consist of three main factors; *stakeholders, elements* and *aspects*. Stakeholders are anyone with an interest in any part of solid waste management, elements are the physical flow of waste through the system (linked to the Waste Management Hierarchy), and aspects are the lenses through which the system can be analysed, as well as the potentially supporting and enabling environment (Hoornweg and Bhada-Tata, 2012, p. 26). Together these aim at facilitating sustainable waste management planning, see Figure 5.

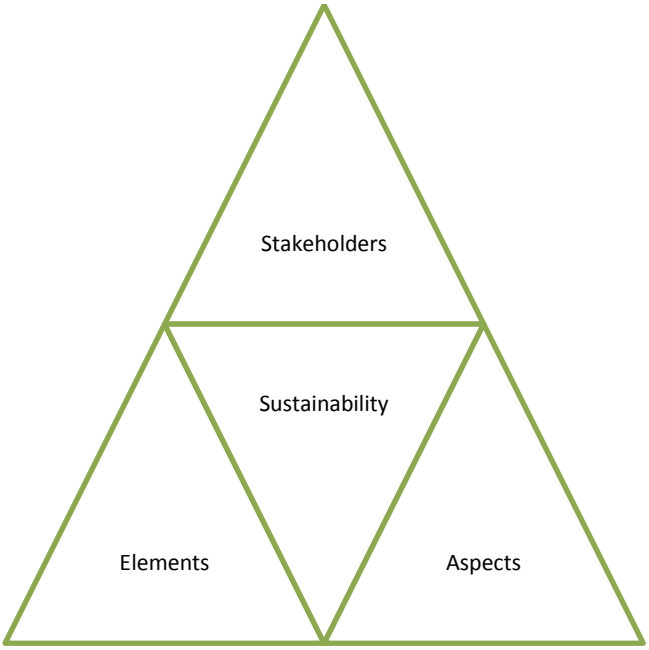

Figure 5: Integrated Sustainable Waste Management model

Source: Author (2014)

As mentioned earlier the ISWM model is continually changed and modified depending on the perspective taken. The UN Habitat has drawn out three key system elements of the ISWM model which are emphasised as crucial to the sustainability of waste management. The three elements are; public health linked to collection of waste, environmental protection linked to treatment of waste, and finally resource management linked to the waste management hierarchy. This thesis investigates the impact of the SWM system on the urban poor in informal settlements and will focus on the appropriate parts of the waste management hierarchy (WMH). Treatment of waste relates to operations after final waste disposal at landfill sites and is not within the scope of this research. However, the issues relating to the lower stages of the WMH such as disposal and collection of waste, as well as resource management within the WMH will be investigated in terms of livelihoods and health.

The ISWM model will be modified to suit the research objective by focusing on selected parts of the model. The *elements* will emphasize the early stages of the waste flow elements; generation, disposal and collection, while the *stakeholders* will focus on the main stakeholders; residents, waste employees and the municipality. Finally the *aspects* will address the connection between stakeholders, waste system and livelihood opportunities and impacts; legal and policy; institutional and organisational, and; socio-economic. The scope of the thesis does not allow for an analysis of the technical and financial aspects of the ISWM model.

2.4 Elements of ISWM

The elements of the ISWM model are the physical manifestations of waste; from generation, through the three r´s of "reduction, reuse and recycling" to collection, treatment and final disposal (Abrelpe, 2012, p. 14). Within most waste management systems there exists some sort of hierarchy where the stages of the waste elements are outlined. As the cost of waste management is rising the efforts of reducing waste have become more important. Within the City of Windhoek this is also the case, and one of the guiding principles for the Solid Waste Management Policy is the Integrated Waste Management Hierarchy (City of Windhoek, 2009, p. 3).

2.4.1 Waste Management Hierarchy

The Waste Management Hierarchy (WMH) is an outline that contains all of the elements mentioned above, with a definite focus on handling waste as early as possible in the chain. The WMH is also called the *Integrated* or *Solid* WMH depending on who is using it, but the main issue of early management remains the same. The core focus on waste-avoidance and not disposal denotes a marked shift in the ideas of waste management, as it focuses on minimisation of waste throughout the waste-chain, and not solely on the traditional end-of-pipe clean up (City of Windhoek, 2009). The WMH is often illustrated by a priorities pyramid, and often the pyramid is up-side down to highlight the prominence of waste minimisation above waste disposal as shown in Figure 6.

The thesis research is concerned with the lower stages in the waste hierarchy, both in terms of habitat scale; residents and local community, as well as the physical elements related to these levels. For this reason the generation, recycling, household disposal and collection of waste is covered on the lower habitat scales. Issues of avoid, reuse, recover, treatment and final disposal are left out, because these operations are beyond the household and neighbourhood habitats.

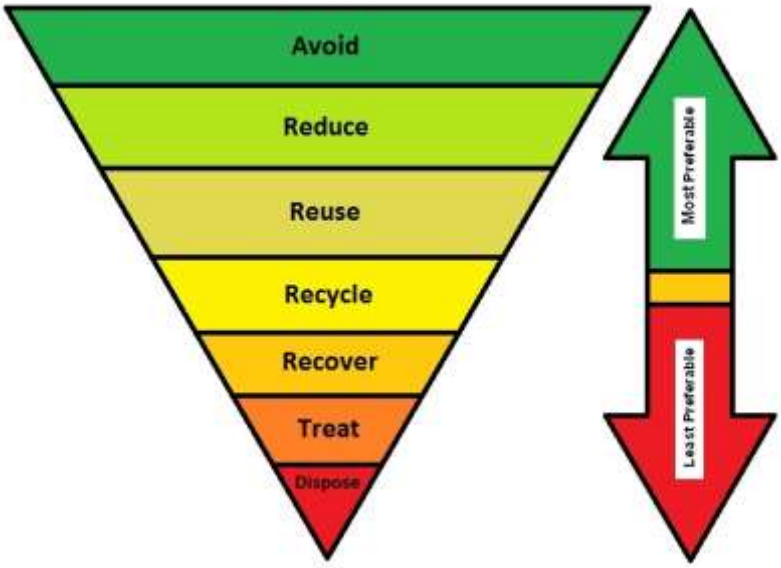

Figure 6: The SWM priorities pyramid inverted

Source: www.moira.vic.gov.au

2.4.2 Generation and disposal

Waste generation quantities generally grow alongside a country's GDP (Shekdar, 2009, p. 1439). Consequently developing countries with low GDP have lower quantities of waste than developed countries with higher GDP. Although this is generally true, the rapid urbanisation rates of developing countries counteract this assumption by creating overpopulation and dense habitation with high levels of waste generation (Hoornweg and Bhanda-Tata, 2012, p. 8). Sub-Saharan Africa generates approximately 62 million tonnes of waste each year, with an average of 0.65 kg/capita/day. In comparison the OECD countries generate 572 million tonnes per year, with an average of 2.2 kg/capita/day (Hoornweg and Bhanda-Tata, 2012, p. 9). As the economic development goal in general, as expressed in the Millennium Development Goals, is to increase living standards globally, the level of waste generation will rise markedly in the future, in developed and developing countries alike, with a business as usual scenario.

Litter is an important term within SWM because it refers to waste in open spaces and public places. Many of the urban waste related problems stem from inadequate collection leading to illegal dumping in public places. Litter is defined as any material discarded outside containers or sites approved by the Council (City of Windhoek, 2009, p. vii). The effective and safe removal of all kinds of waste, also litter, will be investigated.

2.4.3 Minimization through recycling

Separation of waste at source is highly variable in developing countries, depending on awareness and accessibility, as well as the possibility of selling the waste to informal waste collectors (Guerrero, 2013, p. 224). Awareness, knowledge and equipment, together with a shared responsibility between the municipality and the community will increase the level of recycling, and thus decrease the level of waste generation (Guerrero, Maas and Hogland, 2013, p. 224). There has also been noted a positive impact by entering into public- private partnerships in service delivery such as recycling. This is primarily based on the efficiency gained through the profit-seeking nature of private enterprise (Keyter, 2009, p. 13). GEO 5 emphasise the need for integrated policies to support sustainable economic development by focusing on recycling, recovery and reuse, both to reduce the use of resources, as well as the quantities of waste (UN, 2012, p. 175).

2.4.4 Collection

Collection of waste can happen in many different ways, the three most relevant to this study are; house-to-house, community bins and curb side pick-up (Hoornweg and Bhanda-Tata, 2012, p. 13). Collection coverage rises with GDP, and is also higher in cities where the authorities are concerned with the city's image (UN-Habitat, 2010). As Namibia is ranked as a middle income country by the IMF (2014), while also focusing on tourism as means of income, the country should manage to reach a decent coverage level.

Collection within the ISWM model is connected to public health. Locally, uncollected solid waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhoea and dengue fever (Hoornweg and Bhada-Tata, 2012, p. viii). Waste which is disposed in public areas may clog drains and present a health threat through breeding mosquitos that are both dengue and malaria vectors. There is also a risk of waste functioning as a cholera vector when lacking sanitation leads to a mixed disposal of general and faecal waste (Spies, 2010, p. 14). In the research this is linked with lacking waste collection because it can create situations of dumping which in turn can result in health hazards for local communities.

2.5 Stakeholders in ISWM

The main focus within the ISWM model is the participation of and cooperation between the stakeholders. Stakeholder involvement is one of the pillars in a SWM system, securing social, economic and environmental sustainability of waste management systems, where the participants feel responsible for the long-term success of the system. Although the context and preconditions in terms of economy, legislation and administration may vary, the inclusion of

the stakeholders is paramount. Securing the support of the stakeholders is vital for any policy, because a successful policy implementation requires the action of a large number of people (Brinkerhoff, 2002, p. 52).

In line with the ISWM model, the efficiency of SWM depends on the inclusion of and collaboration between stakeholders, all along the waste-chain. Achieving a satisfactory level of participation is important for a holistic SWM, and it requires legal, economic, governmental, political, administrative and environmental support (Periathamby, 2011, p. 114).

Stakeholders can be divided into formal and informal stakeholders. Local and central government, private businesses as well as service users are recognised as the main formal stakeholders (van de Klundert and Anschutz, 1999, p. 3). The informal stakeholders are people who gain a livelihood through waste related activities such as picking, collecting, trading and recycling (Guerrero, Maas and Hogland, 2013, p. 223). However, these informal stakeholders are excluded from this research, because the focus is on the formal and indirect connection between waste and livelihoods. According to Hoornweg and Bhada-Tata (2012, p. 1) a successful solid waste management requires a strong social contract between the municipality and the community. The main stakeholders in this research are the local government; The City of Windhoek and its Solid Waste Division (SWD), the private sector; Ward Contractors and Rent-a-drum; as well as the communities and its residents.

2.6 Aspects of the ISWM

The Central Aspects of ISWM are the basic foundations of any waste management reality, differing with context and society. The aspects are technical availability, environmental challenges, health problems, financial constraints, socio-economic context, institutional framework and political, policy and legislative supports. They all impact on how SWM is planned and they can help to identify the strengths and weaknesses within a SWM system.

However, three main aspects are vital to the research objectives. Legal and policy aspects; institutional and operational aspects, and; socio-economic aspects are chosen as a framework to investigate the solid waste management system in Windhoek. These aspects will limit the research sufficiently and give room for thorough analysis of the main research objective. It should also be noted that the governance features of inclusivity and good governance, identified by the UN Habitat will be used to assess the level of sustainability in the SWM system, along with the Aspects and Findings (UN Habitat: 2010, p. xxiii).

2.7 Livelihood

Livelihood approaches are widely used within the development literature in relation to poverty. The term is defined and conceptualised in many different ways while new approaches are added. Livelihood can most basically be defined as "means of gaining a living" (Chambers, 1995, p. 174). These means correspond to a broader understanding of the basic needs approach. The concept of basic needs have developed and widened since its introduction at the International Labour Organization's World Employment Conference in 1976 (Jolly, 1976). The basic needs approach is criticized for its oversimplification of poverty issues and its narrow scope of development. At the same time it can be argued that the basic needs approach points towards the inevitable connection between economic growth and human development. Todaro and Smith claim that economic growth is a precondition for human development, as improved quality of life is attained through covering basic needs. They support their case by referring to Goulet who states that one needs to "have enough in order to be more" (Todaro, 2003, p. 21).

The materialistic view of livelihoods can be related to waste through the informal waste workers industry. The labour intensive nature of waste collection and recycling in developing countries may provide employment for the poor and unskilled (Barr and Mafuta, 2007, p. 225). Millions of poor people in the developing world, and especially in developing cities, make a living from informal waste handling (Ahmed and Ali, 2004, p. 467). However, the aspect of livelihoods focusing on a basic needs approach will not be utilised in this thesis. In recent years the basic needs approach has been substituted for a basic empowerment approach, focusing more on empowerment and "capibilities" than needs (Chittoor, 2012, p. 1). Capibilities relates to an individual´s freedom to lead the life they value, emphasising the close connection between deprivation of income and deprivation of capabilities (Sen, 1999, p. 4). Furthermore, a person's possibility to live the life they want depends on opportunities, which are determined by the arrangements and circumstances within which the person live and act. Also, the concept of sustainability is linked to livelihoods in that gaining a secure living implies to "maintain and enhance its capabilities and assets, both now and in the future" (Carney in Rakodi, 2002, p. 4). That is to say; livelihoods are only good if they are secured in the long term.

2.7.1 Livelihood as arrangements

Livelihoods can be framed in a social relations setting, where the utilisation of capitals, assets and resources (CARs) are determined by the arrangements people enter into (van Dijk, 2011, p. 102). According to van Dijk, human well-being is an interdependent social phenomenon, meaning that material gain is only one of many elements necessary to make a good livelihood. A healthy 'social self', being respected and acting confident are all prerequisites for making the most of the CARs available (2011, p. 102). It could be argued that a healthy 'social self' is dependent on the social structures an individual is placed in, while the physical environment

must also be seen as a vital part of livelihood opportunities. The idea that personal integrity is dependent on the state of your environment can be contextualised by the connection between concentration of waste and level of income. Although the cause and effect is hard to differentiate, the fact is that inadequate SWM within an area signals a lower priority of the people living there, than people living in areas that receive a better service. Furthermore, the physical manifestation of service delivery is closely connected to the infrastructure and organisation of an urban space (Sibley in Müller-Friedman, 2006, p. 76). Thus, residents in any area would get an idea of the value of their `social self' and the priority of livelihood opportunities through the level of municipal service delivery. In addition, littering causes a loss of integrity in local communities and thereby increasing barriers of development, linking the loss of ecological integrity to the loss of human integrity (Costanza, Norton and Haskell, 1992, p. 236). The totality of waste related issues puts pressure on the SWM performed by local governments.

Meeting basic needs, such as education and health, preconditions a freedom of choice, also when it comes to environmental management of daily life (Matthew et al in Jäger, 2007, p. 312). This freedom to avoid harmful environmental consequences is concretely exemplified by the local issues pertaining to waste management. The livelihoods of the urban poor in developing countries are very much influenced by how a city is managed (Devas in Rakodi, 2002, p. 220). SWM is usually the responsibility of the local government, irrespective of the city´s size or demographic variations. To highlight the scope of this responsibility; SWM is usually a municipality´s single largest budget item, the largest source of employment, as well as the biggest public health threat in a city (Hoornweg and Bhada-Tata, 2012, p. 1). So, the physical environment of urban space relating to infrastructure and municipal service delivery could influence the residents' opportunities to achieve and maintain a healthy 'social self'. Resident's level of 'freedom of choice' and their ability to enter into beneficial arrangements within community, government, family and private sector, is decisive to their livelihood. Ultimately, every citizen's right to create the life they want is influenced by level of social justice or inequity. One of the founding principles of the ISWM concept is equity. Van de Klundert and Anschutz point to three issues where waste connects with livelihoods:

1. Pollution in one part of the city ultimately affects the rest of the city, and 'travels' in the form of communicable diseases, flies, insects, rats, air and water pollution.

2. Polluted areas lead to poor living conditions, which in turn foster social unrest and anti-governmental activities. Abandoned waste is a symbol of a failed public service.

3. Unclean neighbourhoods can affect the city's economy and inhibit development. Investors will not invest in a dirty place and sick labourers have low productivity.

(van de Klundert and Anschutz, 2001, p. 11)

Equity, as presented above, relates to economic, social and environmental development for the city as a whole. Although environmental health is most often associated with the poor citizens, the wider urban interconnections of failed municipal services reflect the importance of social justice to a prospering city.

2.7.2 Livelihoods through participation

Participation has become an important concept within development since the 1980s, opening up for a broader understanding of what development can be and how it should be planned. Adams asserts that participatory approaches are naïve by implying that development can happen through non-hierarchical systems of organisation (2009, p. 130). *Participation* is in many ways presented as a panacea, like *empowerment* and *sustainability*, making the use of these concepts difficult because of their pragmatic nature. Cornwall and Brock add to this notion by calling *participation* a buzzword, often associated with other unambiguous and positive concepts like democracy, civic society, grassroots and 'development from below'. As they put it "It is easy enough to get caught up in the emotive calls for action, to feel that, international institutions are working together for the good, and are really going to make a difference*"* (Cornwall & Brock, 2005, p. 1043). However participatory a development effort wants to be, there is no escaping the established power relations within a society (White, 1996 in Adams, 2009, p. 130). This reflects back to livelihoods as arrangements, through pointing to the fact that the circumstances in which people try to enhance their livelihoods are already established arrangements. The arrangements are systems of organisation where power and resources become physical entities influencing both directly livelihoods opportunities, and indirectly the imagined possibility for change among marginalised citizens.

Although the concept of participation is contested, there is no doubt that its presence in development planning and policies, as well as in actual implementation is very strong. Tomina argues that participation as a part of development has followed the same discourse as the focus on strong democracies within development. Participation refers to a strong civil society with citizens interested and engaged in the life of their community, oriented toward social and economic development (Tomina, 2008, p. 432).

Within the ISWM model stakeholder participation is vital to a sustainable SWM system. The level of participation relies on political will, institutional facilitation, education and awareness to name a few. In relation to livelihoods as arrangements, the level of community integrity as well as the residents `social self` would be important prerequisites to participation. Poor and marginalised residents in informal settlements may not feel included in local government or find natural channels of communication.

2.7.3 Livelihood and health

The Millennium Development Goals are all grounded in interconnected, long-term and sustainable solutions. Although not mentioned explicitly in the MDGs, proper waste management is important in reaching many of the goals, especially the ones concerning health and livelihoods (Speise, 2010, p.22). The connection between a sustainable SWM system and the combined socio-economic issues of health and livelihood are a focal point in this research and will be explored using the aspects of the ISWM model. The sustainability of a SWM

system is dependent on the degree of holistic approach taken by the municipality to ensure the incorporation of livelihood into the totality of the city and the system.

Background

Public health is an issue closely related to waste management, due to the public nature of waste handling. Municipal Solid Waste (MSW) refers to the varieties of waste generated within a municipality, mainly from households and street sweeping, as well as non-hazardous business and institutional waste (Periathamby, 2011, p. 110). The municipal responsibility of providing waste services was established during the nineteenth century, parallel to and because of the medical discoveries linking infectious disease and poor sanitation and waste management. UN-Habitat asserts that removal of solid waste and proper sanitation are two of the most vital urban environmental services (Spies, 2010, p. xx). The public nature of waste is more pressing in urban areas, and can stem from lack of space for waste disposal, and also from the fact that the SWM system may be inadequate (Abrelpe, 2012, p. 11). SWM can be inadequate due to for instance uncontrolled disposal and inadequate waste collection systems.

Waste and disease

The general level of municipal service delivery, including waste management, is closely connected to the hygienic conditions in local communities. Although developing countries have low waste generation rates, the waste composition is dominated by organic matter, especially prone to decomposing in the warm climate. In addition, the low levels of waste separation at source create problems if waste is not properly or frequently collected (Spies, 2010, p. 14). In most developing countries household waste is not disposed of in closed containers, but is put straight on the ground. This leads to labour intensive waste collection because the waste must be shovelled off the ground. Another consequence of inadequate disposal is that the waste lies open to animals and insects, i.e. potential disease vectors, while waiting to be collected. People living close to disposal sites and waste collectors are especially prone to waste related infections and disease (Cointreau, 2006, p. 6). The impact of poor SWM is easily related to environmental health risks experienced by urban populations, especially in slums. The basic risks include lack of safe water, sanitation, hygiene and vector-borne diseases, all of which can be directly related to poor SWM (Jäger and Kok, 2007, p. 321). Overpopulation of informal urban areas presents a dangerous health issue and has the potential for disease outbreaks (Keyter, 2009, p. 19).

According to The World Bank most SWM programmes have their origins in public health concerns because inadequate waste collection and disposal are breeding grounds for disease vectors such as insects, vermin, and scavenging animals (Hoornweg and Bhada-Tata, 2012, p. 26). The disease vectors can pass on air- and water-borne diseases, a problem that is underscored by often inadequate water and sanitation infrastructure.

Air pollution

In a global context the GHG emissions in Sub-Saharan Africa are small, both in absolute and relative terms. The region contains 12 % of the global population, but accounts for less than 3 % of the world's emissions (Couth, Trois, and Vaughan-Jones, 2011, p. 131). Although GHG emissions have negative impacts on regional and global climate and must be reduced, the global aspect and consequences of waste related emissions will not be emphasised in this text. The direct health impacts in local communities are relevant when relating environmental degradation and waste management practices to health and livelihoods. Public health concerns and goals of emissions reduction can be viewed as counterparts, because the traditional way to prevent spreading of disease is incineration of waste (Sakai, 1996, p. 346). GHG emission from incineration of waste is markedly higher in Africa then elsewhere, and the CO2 emissions are growing rapidly in all sub-Saharan countries (Couth and Trois, 2011, p. 132). Polycyclic aromatic hydrocarbons (PAHs) are released during incineration of unsorted solid waste and are especially widespread in the environment of developing countries. The carcinogenic (cancer-causing) properties of the PAHs have led to classification as primary pollutants by agencies such as the US Environmental Protection Agency (Barra, Castillo and Torres, 2007, p. 3).

2.8 Main objective

The main objective of the research is identifying to what extent the effectiveness of municipal solid waste management systems impact on local community livelihoods. A perceived link between a cleaner public environment and increased livelihood opportunities are expected. Issues within improved urban livelihood opportunities, such as health, employment, participation and awareness will be analysed using the ISWM model and Windhoek´s Solid Waste Management Policy. The Ward Contractor system and the residents will be respondents to investigate how the Windhoek´s Solid Waste Management Policy is implemented at a local level.

2.8.1 Research- objectives

1. Investigate how livelihoods are addressed in the legislation, regulations and policies regarding solid waste management at national and local levels in Namibia.

2. Assess to what extent the municipal solid waste management systems address the connection between waste management and improved livelihoods through municipal solid waste management systems in local communities.

3. Identify how the connection between waste management and livelihoods opportunities is perceived at municipal, ward and individual levels.

4. Identify the level of awareness and participation concerning waste management and its impacts.

2.8.2 Research questions

1. How are livelihoods addressed through legislation, regulations and policies regarding solid waste management at national and local levels in Namibia?

2. To what extent do the municipal solid waste management systems address the connection between waste management and improved livelihoods in the informal settlements?

3. How is the connection between waste management and improved livelihoods perceived at municipal, ward and households level?

4. How are participation, responsibility and awareness concerning waste management and its impacts perceived?

Chapter 3: Theoretical application

The theoretical framework consists of the main principles governing current solid waste management discussions, as well as concepts and frameworks relating to livelihoods and development. The research will utilise the main theories and concepts in the ISWM model, using the Aspects as an outline through Data collection and Findings. The Aspects integrate the ISWM concepts of Elements and Stakeholders, and will be organised around the Objectives from the Solid Waste Management Policy of the City of Windhoek, as well as the livelihood perspectives of *arrangements, health and participation*.

The main ISWM principles of *equity, efficiency, effectiveness* and *sustainability* function as a backdrop for the perspectives used in Data collection and Findings. Finally, in the Analysis, these four main principles summarize the features of the SWM system in relation to livelihood opportunities and SWM improvements.

The perceptions of waste and livelihood in local communities will be investigated, searching for positive and negative links. If links are not found, the issues of awareness and participation within the CW must be addressed. The analysis will try to explain the various relationships within the SWM system of Windhoek, with the goal of highlighting possibilities and blockages of gaining better livelihood opportunities.

3.1 Habitat scale

The goal of the thesis research is to identify links between clean environment and human development through waste management. One of the goals of the ISWM model is integration of the various habitat scales of city, neighbourhood and household, into the SWM system to ensure sustainability.

A conceptual framework (Figure 7) has been outlined to illustrate the broad scope and multiple levels of stakeholders within the field of SWM. The theoretical application of ISWM will be presented together with the appropriate conceptual level.

Habitat scale	Management	Environment impacts	Development impact
Household	Residents	Nuisance	Social self
Neighbourhood	Ward Contractors	Littered integrity	Social justice
City	Solid Waste Division	Health hazard	Discrimination

Figure 7: Waste as conceptual levels.

Source: Author (2014)

3.2 Aspects of ISWM

The research will be top-down, starting at the highest (habitat) level and moving down towards household (individual) level, using document review for the higher levels, and fieldwork research for the lower levels.

In each level the aim is to assess the interconnected issues of livelihoods and waste within the SWM system of Windhoek. The World Bank suggests that sustainability and integration are mutually dependent concepts that together determine the level of success within a SWM system (van de Klundert and Anschutz, 1999, p. 3).

3.2.1 Legal and Policy Aspects

Document review will be used to investigate the legislation regarding waste and environment. The section on Legal and Policy Aspects is divided into three parts moving from the national, to the regional and local level of legislation. First; the national Environmental Management Act of 2007 and the Public Health Act of 1919, second; the Waste Management Regulations of 2011, and third; the local Solid Waste Management Policy of the City of Windhoek of 2009. The Solid Waste Management Policy of Windhoek includes 11 objectives which comprises the practical application of the legislation at the local level. Four objectives are

selected based on their relevance to the topic of the thesis. The Policy objectives will be examined closely to identify potential lacks or links with the waste situation in Windhoek.

3.2.2 Institutional and Operational Aspects

The data collected from the SWD, the Ward Contractors and the residents themselves, will provide information as to the effectiveness of the waste management system, and thus the level of sustainability.

- Objective 1: Legislative framework, Political will and Cooperative Governance
- Objective 2: Waste Minimisation and Cleaner Production
- Objective 3: Optimisation of Resources (Human, Technical and Financial)
- Objective 8: Community Participation

3.2.3 Socio-Economic Aspects

Various understandings of livelihoods connected to waste will be investigated through interviews with all types of respondents (SWD officials, Ward Contractors and residents). The level of consciousness regarding the direct or indirect connections between waste and livelihoods may vary and could be complemented by interconnections found in literature.

- Livelihood as arrangements
- Livelihood through participation
- Livelihood and health

Figure 8 illustrates the methodological application of the ISWM aspects. The interconnections between the various aspects and topics are also visible.

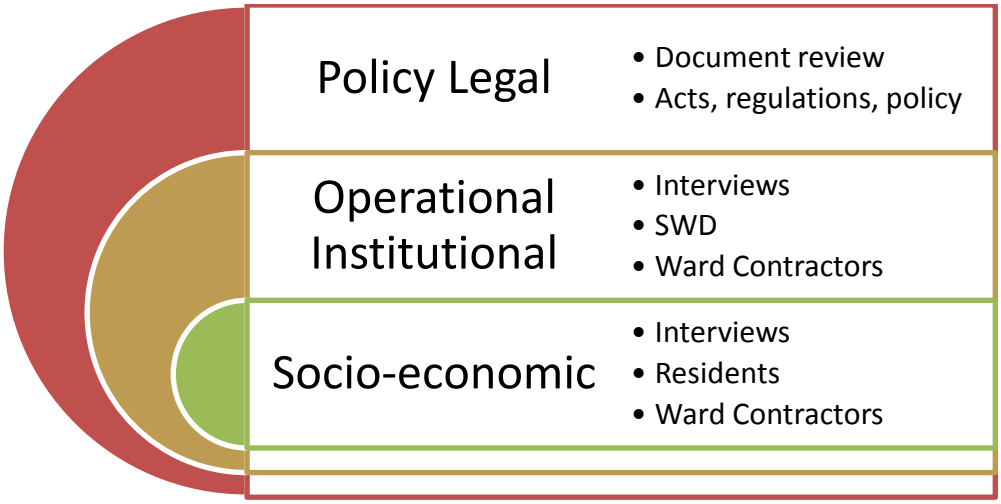

Figure 8: Theoretical application illustrated

Source: Author (2014)

Chapter 4: Methodology

The thesis will focus on assessing a particular phenomenon in a specific locality, i.e. SWM system in informal settlements, in terms of livelihoods impact, calling for a case study research design (Bryman, 2012, p. 66). For the purpose of finding information and identifying perceptions the focus of this study will be on the SWD, the Ward Contractors and employees, as well as local residents. Legal documents, regulations and policies will also be analysed. Through using several kinds of qualitative methods, a picture of the waste management situation in Windhoek will be created and linked to the impacts it has on the livelihoods of people in the informal settlements. The research will focus mainly on the issue of public waste in informal settlements, due to the specific livelihood challenges experienced in unserviced areas. This has general relevance to the challenges faced on the fringe of all urban areas of developing countries.

4.1 Research design and research methods

A qualitative research strategy is chosen because the study will focus on interpreting social actors and phenomenon based in concepts and theories, and not quantified by measurements. The study focuses on making an assessment based on mainly qualitative data collected within a certain topic. The observations and investigations within the thesis topic will generate new understandings of social reality, in line with an inductive approach (Bryman, 2012).

Interpretive methodologies focus primarily on understanding and accounting for the meaning of human experiences and actions (Fossey, Harvey, McDermott and Davidson, 2002, p. 720).

An interpretivist view is utilised as an approach in this thesis. The thesis topic demands an epistemological consideration with an aim of analysing and understanding the workings of social phenomena and human reality within social systems. This choice can be linked to constructionist ontology, reflecting the changing realities through interactions on individual and societal level (Bryman, 2012, p. 28-34).

Phenomenological researchers focus on the 'study the ordinary "life world": they are interested in the way people experience their world, what it is like for them' (Tesch in Fossey et al. 2002, p. 720). In this way the researcher can try to interpret and make sense of the experiences of the respondents.

The access to quantitative data, like census and statistics, within the area of waste is often limited at local level in a developing country. And although this points to the fact that waste has not been a priority for municipalities in developing counties, and thus waste as a rather new field of interest, the statistics are still few. Also the scope of a master thesis limits the ability to collect satisfactory amounts of quantitative data to ensure validity.

Semi-structured interviews, document review and observations are the main methods of data collection chosen for this thesis. The document review will for the large part consist of analysing the various documents issued on a national and municipal level in Namibia concerning waste. Through interviews with individuals with various roles and perceptions in the City of Windhoek, the information from the document review can be balanced. Finally, through observation of the waste management systems in action throughout the city and in informal settlements a fuller picture of the situation can be presented.

Reliability (Bryman, 2008, p. 46) or *transferability* (Fossey et al., 2002, p. 723) is important to ensure that the same research procedures and actions would produce roughly the same result if carried out again. The SWM system and situation is not changing fast, and it is likely that respondents asked within the same area and timeframe would give similar answers.

Hoornweg and Bhada-Tata notes that solid waste data should be viewed with some level of care because of the global variations in definitions, methodologies and completeness of data. This can be visible through undefined or inconsistent definitions or units, as well as information collected at non-representative times. The last point can be connected to seasonal climate variations and lacking municipal infrastructure causing unpredictable conditions (Hoornweg and Bhada-Tata, 2012, p. 32).

Validity (Bryman, 2008, p. 47) or *credibility* (Fossey et al., 2002, p. 723) asks whether the research is actually measuring or observing what the researcher is claiming to measure or observe. If the questions in the interview guide match the research questions in topic and perspective, it is likely that the research has some degree of validity. For this specific research the livelihood aspects in waste policy and operations are linked to livelihoods impacts of waste. These two main elements are the core in all the research methods.

Replicability (Bryman, 2008, p. 47) or *generalizability* (Fossey et al., 2002, p. 723) is closely linked to reliability. Research is reliable if it can be carried out again (replicated) and produce fairly the same results under the same circumstances. This is only possible if the measurements of concepts are specific and well-defined. Generalizability refers to the usability of the work to other people in other, similar circumstances, which requires a certain level of reliability. The research would be useful to people interested in the impact of municipal service delivery, and specifically waste management, in informal areas of developing countries.

4.2 Sampling

The qualitative semi-structured interviewees will be purposively and randomly selected from locations and institutions relevant to the topic. After making initial contacts a snowball method will be used, where one respondent helps identify another. This technique will be utilised beginning with the CW and the SWD, for further contacts with the Ward Contractor employees at the local community level. As the Ward Contractor employees work in the informal settlements, they may help identify households and other residents. Number of interviewees must not be excessive to ensure the quality of data collection and analysis, and also to make the most of each interview situation. The sampling process will depend on the course of the field research, but a guide will be employed for the resident interviews.
After assessing the situation upon arrival in the study area it became clear that a fuller understanding of the waste situation could be achieved through interviewing a wider segment of the population. In addition to interviewing residents in the informal settlements, residents from the formal areas, as well as a community leader, a school teacher and NGO workers were also interviewed to be able to compare their different perceptions and experiences with waste management.

4.3 Data collection

4.3.1 Document Review

A qualitative analysis will be used to identify the central concepts and issues within the Solid Waste Management Policy of Windhoek. Furthermore the supporting legislations and regulations will be investigated for correlation with the Policy as well as for central concepts. This will help to establish a basic understanding of the various areas of responsibility of solid waste management in municipal institutions. Furthermore the findings will be used to find correlations or deviances when collated with the semi-structured interviews and observations.

Investigating the Policy implementation at local level requires a broad analysis of a specific development project in a given location.

Although there are not many previous studies, the waste situation in Windhoek will be analysed concerning the Ward Contractor System, a public-private partnership responsible for cleaning waste in public places and open spaces. In addition, studies and statistical information concerning the development situation in Windhoek and the informal settlements will be examined.

4.3.2 Semi-structured interviews

Although the document review regarding existing SWM systems and responsibilities will be thorough, there is a possibility that the official information might not concur with reality. To avoid encountering a gap in knowledge, this information will be cross-checked through observation and semi-structured interviews with government officials, Ward Contractor employees and residents.

As research progressed I sought out people related to the informal settlements (housing problems) as well as waste related people who could inform on the general situation. The interviews were done in their office or their home and centred on the organisation and experience of waste in their areas. The information they provided gave me a wider understanding of the entire situation concerning residents' livelihoods in the informal settlements and their relation to the SWD and CW.

Type of respondents	**Number**	
Residents	13	**Semi- structured interviews**
Ward Contractor employees	6	
Private business	2	
Solid Waste Division	4	
Community agents	3	
Total	28	

Figure 9: Overview of data collection

Source: Author (2014).

Solid Waste Division/Employees at municipal level (4)

The semi-structured interview is chosen because it allows the research to get necessary information, while also having the opportunity to go into depth on certain issues. It also gives the researcher a chance to investigate and interpret the social world of the official employees in a flexible and open setting (Bryman, 2012, p. 28). Interviewing official employees on the topic of the municipal solid waste management systems could present important information that is omitted from official papers. The interviews will be scheduled in the officials' office or in outside venues related to the research (i.e. informal settlements). In this way the interview setting will decide whether the interview is formal or informal, and the researcher might be

able to do some observations of relevant sites. An interview guide will be created to structure the interview in terms of topics and questions that can shed light on the central issues related to the interviewee's job and policy (Bryman, 2012, p. 217). As the interview situation is also a social setting topics may occur that are not directly related to the questions in the interview guide. This will allow the researcher to understand more of the general perceptions held by the interviewee and thus help in analysing the data.

Ward Contractor employees, officers and warden (7)

The employees of the Ward Contractors will be interviewed to gain information on their direct experience with waste management and livelihood opportunities, both in their individual situation as well as for the residents they encounter through their work. They are the ones closest to the waste management in the informal settlements and their information will be of great interest in shedding light on the municipal efforts and implementations, as well as the Ward Contractors. The information given by the employees will be used when preparing for resident interviews.

Residents (21)

Although the Policy and its implementation through the Ward Contractors may have clear indications as to the connection between waste and livelihoods, interviews with the affected stakeholders and prime participants; the residents, must be undertaken. One of the specific objectives of this study is to identify the perceptions local people have of waste linked to their own livelihood. Semi-structured interviews will be carried out with residents obtained through the snowballing- method. Different types of residents will be targeted, both concerning gender, age, employment and area. This is in line with the idea of creating as full a picture as possible of the effects the waste management is having on people's life. Residents in the formal and informal settlements were interviewed and their level of property rights determined if they could be viewed as illegal settlers (see Figure 10).

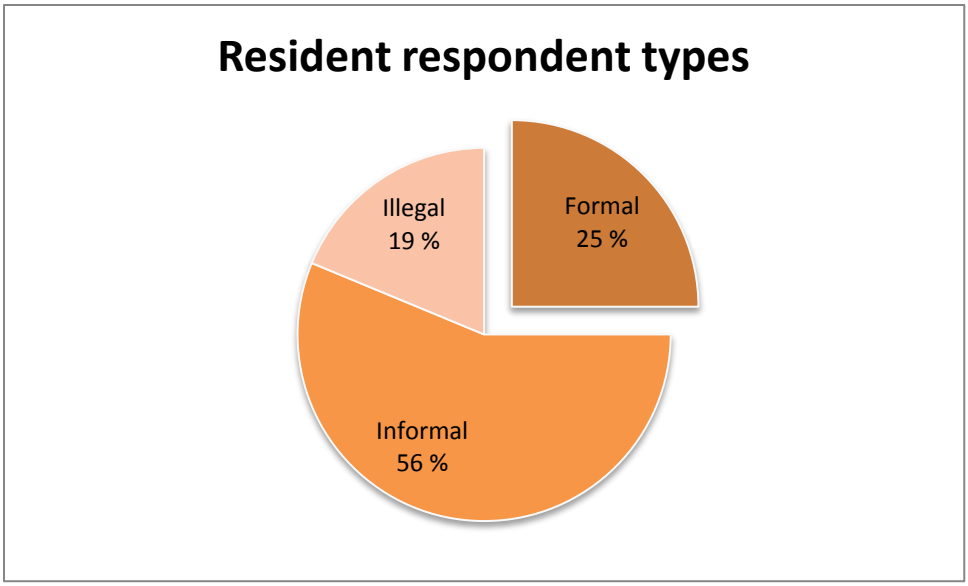

Figure 10: Types of resident respondents

Source: Fieldwork (2014)

4.3.3 Observation

Observation will be a natural part of the field research as I will be living and working close to the areas in question. As the area of study is public places and open spaces in the informal settlements I will have no need to travel to landfills or recycling centres, unless it is viewed as necessary to gather a wider understanding of the waste situation. However, observing public places and open spaces at various locations in Windhoek may be of interest to shed light on possible differences in service delivery.

4.4 Data analysis

4.4.1 Qualitative analysis

The qualitative data collected calls for an interpretivist data analysis where the document review and semi-structured interviews will be interpreted within the theoretical framework of the ISWM. There will be a focus on identifying concurrent or conflicting perceptions of the waste situation, waste management systems, and livelihood opportunities from the various informants. In this way the City of Windhoek's goals and implementations can be compared with the perceptions of employees and residents of informal settlements.

When analysing qualitative data, the amount is often vast due to the narrative nature of the data collection. This calls for a discerning and systematic handling of the data. Taylor-Powell and Renner (2003) suggest a method of analysing narrative data, where all data concerning

one specific topic or question are gathered. In this way, themes and central concepts can be identified and divided into yet other sub-categories, revealing concurrent and conflict views in the data. When processing the collected data this is the first step in analysing the data.

When handling the findings Taylor-Powell and Renner (2003) suggest using emergent and/or pre-set categories. For this data analysis, both kinds of categories will be utilised. As the data is analysed, categories will emerge in line with the main topics and the interview questions. These categories will be incorporated into already pre-set themes in line with selected Aspects of the Integrated Sustainable Waste Management model; Policy and legal; Operational and institutional and; Socio-economic. In this way the main themes will guide the analysis of the categories and sub-categories, making the comparison of the collected data more distinct.

4.5 Limitations and challenges

One of the reasons for conducting semi-structured interviews with government officials is to verify the official information gathered in the document review. This could present problems if the respondents perceive this as attempts at undermining government authority. Another challenge is the possibility that the officials could be influenced in any direction by the research topic or research questions. It is vital that they as interview objects are included in the purpose of study, even if this could create an expectation of what answers are "good" or "bad". Semi-structured interviews could also present challenges when asking the residents questions related to private household issues in the informal settlements may be perceived as too personal and lead to no answers or evasive answers. Simultaneously there is a risk of unintentionally influence the respondents with my presence or the nature of the research questions.

The study will identify impacts of waste on the residents and biophysical environment of the informal settlements. It is important to keep an open mind, while focusing on the research design and thesis objective. It is also important to be aware of impacts stretching out in space and time.

The legitimacy as researcher might be questioned or undermined for several reasons. Namibia is a multi-ethnic society with many different spoken languages. This might cause barriers of understanding as interpretation leaves room for error. As a foreign researcher my intentions might be questioned, especially for asking questions about such a mundane topic as waste. The residents in particular may be reserved due to this. On the other hand residents may view me as a representative of the City of Windhoek who can improve their situation, thus giving exaggerated answers. Attempts are made to connect with local institutions at an early stage to secure goodwill and support in communications, and in practical issues during fieldwork. A related challenge would be to remain unbiased even if the collaboration with official institutions might become very good, or not so good.

As a white, female researcher from Europe, my cultural background might offer challenges of understanding the concepts and life-worlds of the residents in the informal settlements. The

vast difference in background, on many levels, is significant and does present a gap in how the world is perceived and interpreted. However, this gap might be superseded by the universal nature of waste and its management.

The snowballing method was used in regard to the SWM, which means that any respondents gained through them could have an especially close or loyal relationship to the SWM and/or its employees. This could have given biased answers towards the SWM. However, the experience was that the respondents answered the questions as best they could, and openly criticising or pointing out faults in the existing system.

One noticeable limitation is the difficulty of communication before, during and after the fieldwork. Especially e-mail communication is very hard, and most e-mails are ignored and never responded to. This made the planning phase difficult, practical organisation during fieldwork was delayed, while getting information afterwards was close to impossible.

Chapter 5: Findings

5.1. Presentation of findings

The findings will be presented in the chosen categories of the Integrated Sustainable Waste Management (ISWM) model; Legal and Policy; Institutional and Operational, and; Socio-economic. Each category is sub-divided into topics formed by the research objectives and linked to one dominant data collection method (see p. 25 and 27). Legal and Policy aspects relate to research question 1 where the document review concentrate on finding links between waste and livelihoods in legislation at national and regional level, creating a general backdrop for the more specific accounts presented in the next section. The Operational and Institutional aspects relate to research objective 2 and 3 in trying to identify to what extent the legislation is employed in public institutions, private business and local communities, and how livelihoods fit in. Relevant Objectives from the Solid Waste Management Policy of CW are used to frame the central topics. Semi-structured interviews and observations in the SWD and the Ward Contractors inform on the level of awareness of the waste management legislation and situation in CW. The Socio-economic aspects correspond to research objectives 3 and 4 where perceptions of waste and livelihood, as well as participation, awareness and responsibility are investigated through semi-structured interviews and continuous field observation.

The main topics throughout the research are; *collection* (frequency/organisation/satisfaction); *disposal* (dumping and burning); *impacts* (health and environment); *participation* (education/inclusion), and; *awareness* (livelihoods and waste).

5.2. Data Collection

The document review encompasses laws, regulations and policies associated with the topic of waste, focused on the chosen categories of the ISWM model. The document review corresponds to research objective 1 and is divided into three levels; the national Acts, the regional Regulations, and the local Policy. The findings within each level will be contrasted by the more practical findings related to research objective 2. Semi-structured interviews at institutional levels were mainly used when investigating research objective 2. Linking legislation to the reality of waste management also made observation useful. Observation provided an advantage in that it allowed for controlling answers given in interviews and feed-back questions when possible.

Research objective 3 and 4 also utilise semi-structured interviews and observation, but at a local and residential level. The fieldwork was undertaken during one hectic month, and much of the time was spent in the informal settlements. Continuous observation was used to gain as much information and understanding of the situation as possible. Semi-structured interviews were undertaken with different types of respondents to get as full a picture as possible. Using purposively and randomly selected respondents, as well as the snowballing method lead to an organic development of the research. After an initial period of seeking out the planned interview sites and types of respondents, other relevant interviewees emerged. In the end the number and types of semi-structured interviews are as follows: 16 residents and vendors in the formal, informal and illegal areas, 4 employees in the SWD, 2 private contractors, 4 Ward Contractor employees, 1 community leader, 1 NGO representative and 1 school teacher.

5.3. Legal and Policy Aspects

The legal and policy aspects of the ISWM model include the national and regional legislations guiding the work at local level. The higher levels are enabling agents responsible for creating a framework within which the local SWM systems can work efficiently. UN Habitat has identified three governance features central to successful waste management: inclusivity, financial viability and good governance. Inclusivity means participation and cooperation among the vital stakeholders, which are; the users (residents), the providers (municipality) and the enablers (legislators). Financial viability entails a secure planning environment which is necessary to achieve sustainable SWM. The economic details of SWM at any level will only be mentioned briefly, as it is outside the scope of the research. Finally, good governance includes the legislation itself, but more importantly the institutions that are set to administer the laws. The governance features thus include all habitat scales and function as overarching principles and concrete processes (UN Habitat: 2010, p. xxiii). All three features are necessary to assess the sustainability of a SWM system.

5.3.1 The Environmental Management Act

Environmental protection in Namibia is ensured through the Environmental Management Act (EMA) of 2007. The mission of EMA is "to promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making..." (Republic of Namibia, 2007, p. 2). Environment is defined in EMA as the interrelated natural and anthropogenic elements which affect the ecological equilibrium and the quality of life. The natural environment is the land, water and air, as well as all organic organisms and inorganic material. The human environment is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values (Republic of Namibia, 2007, p. 5). Linking the natural ecology and human quality of life in this strategic document could be of great importance to how environmental legislation is understood and carried out at local levels. The EMA goes far in allocating responsibilities in terms of protection of the natural environment and provides a solid backdrop for environmental management at lower levels. However, sustainability and waste are defined and mentioned in EMA, but not in concrete terms and not related to the linking of ecological and human environment. This discrepancy indicates a possible lacking connection between theoretical foundations of legislation and the institutional interpretation into practical employment. Waste is only mentioned once in EMA, under Principles 2h, in regards to Best Practical Environment Option (BPEO). BPEO is a popular tool for decision makers when appraising various solutions within environmental planning. The BPEO influences the overarching choices concerning technology and economy, weighing them against the social and environmental sustainability (Smith, 2002). Although the BPEO is not within the scope of this research it could be generally noted that the existence of a framework does not necessarily mean it is used appropriately or at all. Legislation is crucial when justifying the need for an adequate solid waste management system, although the legislation is only valuable if it results in practical expressions of financial viability and institutional development at local levels (Abrelpe, 2012, p. 16).

The EMA is intended to promote sustainable management of the environment and its natural resources through a number of measures. Among these are the provisions of decision-making principles, as well as the establishment of a Sustainable Development Advisory Council. In Part 2 of EMA the principles that guide the SWM Policy are outlined (Republic of Namibia, 2007). According to the UN Habitat governance features, EMA presents the basic foundations for an enabling environment, giving the stakeholders an opportunity to form strong institutions within the current financial limits.

5.3.2 The Public Health Act

The earliest legislation relating to waste in general is the Public Health Act 36 (PHA) of 1919. The PHA encompasses potentially damaging consequences of human activity, public and private, through what is called nuisances: no person shall cause or suffer any nuisance on the

land of occupancy that can be injurious or dangerous to health. A nuisance is defined as any unclean conditions related to physical surroundings, sanitation, wastes, water, smell and air quality in living environments that can cause offence, injury or spread of disease. PHA also includes rules of enforcement, as well as procedures and penalties if the "author of nuisance" fails to comply (Health Act, § 119). The PHA is a national law which is strongly reflected both in the Waste Management Regulations and the Solid Waste Management Policy of Windhoek. Especially the specific types and impacts of waste and the enforcement of rules indicate that the Regulations and the Policy is heavily influenced by health concerns. The environmental concerns which are evident from the EMA include the overarching activities that can cause negative impacts. Interestingly, the PHA is more concerned with community issues and local regulations concerning livelihoods, while EMA is more geared towards larger private and public interests of resource management and sustainable investments. Although environmentally sound economic interests are vital for everyone living in a healthy society, they do not affect the regular citizen, and especially not the marginal resident of the informal settlements. In this respect PHA presents a viable foundation for regulating and assessing livelihood impacts for the residents in the informal settlements, and will be investigated through the Regulation and Policy below.

5.3.3 Waste Management Regulations

The Waste Management Regulations of 2011 is part of the Local Authorities Act of 1992, directing the practical implementation of EMA through the Solid Waste Management Policy in the City of Windhoek (Windhoek Municipality, 2011). The Regulations include specified responsibilities and enforcements of public, private and residential stakeholders, as well as licensing provisions for private-public partnerships. Also included are the provisions for all the elements of the waste hierarchy from generation to final disposal of waste, as well as regulations regarding prohibited activities. The Regulations form the basic outline for the SWM Policy that will be investigated below.

The Regulations include several definitions that capture the blurred lines and changing realities that lead to wide and flexible terminology. Definitions such as "residential premises" and "occupier" include all kinds of residents, legal or unregistered, as recipients of municipal services (Chapter 1, Definitions p. 7/9). This indicates an awareness of the distinct situation and needs in the informal settlements for the residents in terms of service delivery.
There is, however, an emphasis on formalised communication between residents and the municipality, such as a demand for written requests to obtain or change the municipal services (Chapter 3, point 14, p. 20). This could function as exclusion of certain residents in the informal settlements who are new to the systems of the municipality.

Chapter 5 on prohibited waste practices focuses solely on the residents in terms of responsibility, and does not mention the municipality's responsibility for service delivery. If the SWM system is not functioning optimally the responsibility then falls on the residents, as

the municipality has fulfilled their part by simply providing the service. Access to services can be among the obstacles for residents to fulfil their end of the public service delivery. Residents in informal settlements may occupy illegal land and thus be outside the area of service delivery. These are issues that directly touch upon the interconnectedness of livelihoods and waste management. Inclusivity in terms of active engagement between the various stakeholders is vital for a SWM system to work sustainably. Furthermore, good guidelines must be given for establishing a potentially proactive policy at local level, also including the illegal settlers.

5.3.4 Solid Waste Management Policy of the City of Windhoek

The City of Windhoek (CW) adopted a Solid Waste Management Policy (the Policy) in 2009, outlining the main ideas and tools that form the base for SWM system. The Policy is founded in the EMA of 2007 and Windhoek Municipality´ Waste Management Regulations of 2011, which is part of the Local Authorities Act of 1992 (Windhoek Municipality, 2011). However, the potential for legislative support presented by the EMA and the Regulations cannot be taken for granted, as the actual administrative cooperation, economic grants and political will determines the success of any Policy. CW utilises a BPEO framework when presenting and assessing their waste management plans in accordance with the Policy. The goal of a BPEO is facilitating choices of technology and resources, ensuring minimal damage to the environment at an acceptable cost both in the long and short term (The City of Windhoek, 2009).

Throughout the Policy document the issues of environment and development are connected by improved SWM systems. Although the formulations may be somewhat vague, a clear positive intention is visible; CW "recognises that a clean environment is vital to the wellbeing of its residents as well as to the attraction of economic activity towards Windhoek" (The City of Windhoek, 2009, p. 1). At the same time, the Policy emphasises the importance of avoiding negative impacts of poor SWM, through "unnecessary waste generated and improper waste management practices*"* (The City of Windhoek, 2009, p. 6). This is linked directly to improving the life of all residents through increased livelihood opportunities.

A national legal framework is present and supported by regulations and policies at municipal levels, securing implementation on the local level. However, political will and cooperative governance must be present if the framework is to be effective. The data collected from the various levels of decision-making and implementation within the City of Windhoek, such as The Division of Solid Waste Management, the Ward Contractors and the residents themselves, will provide information on the sustainability and integration of the implemented legislations. This will primarily be done through the selected Objectives in the Institutional and Operational aspects.

Illegal dumping is a priority in the SWM Policy, but is only mentioned directly in relation to Health Care Risk Waste and Priority (hazardous) Waste. Burning of waste is not mentioned in the Policy at all. Illegal dumping or burning of *general household waste* is not mentioned and

may point to the fact that it is not considered harmful. As a large portion of the population live in informal settlements where waste removal coverage and frequency may vary, the issues of dumping and burning of general waste in residential areas should be given more specific attention.

Business and industry are favoured throughout the legislation in terms of more space and paragraphs concerning economic activities and investments, while residents, livelihoods and local environment get less attention. This is most obvious in that most of the Objectives are concerned with production and hazardous waste, as well as various principles and mechanisms to ensure cost efficiency for this kind of waste production. This could be supported by the statements of SWD employees when asked about the impacts of waste in public. The primary negative impact of waste in public, as seen by the SWD, is a potential decrease of business and financial investment. The impacts on residents in the poor and informal settlements were noted, but not as a priority within limited budget resources.

The legal framework, as a whole, contains direct and indirect references to the negative impact of waste on residents' livelihood, although not specifically related to the informal and illegal settlers. The lack of focus on vulnerable population groups in need of basic service delivery may be reflected in the implementation of waste legislation by the SWD. How, and to what extent, livelihood aspects are integrated in institutions and operations could function as a measure of sustainability of the SWM system.

5.4. Institutional and Operational Aspects

This section will focus mainly on the SWD and the Ward Contractors of CW. The data is collected using document review and semi-structured interviews, balanced and informed by observation. The appropriate Objectives from the SWM Policy of CW are used as topical categories, within which sustainability in light of the Legal and Policy aspects will be identified. Although each Objective is rather wide and compact with meaning, the core purpose will be extracted so as to focus each section within the scope of the research. Operational implementation will be linked to the legislative foundations. The main focus of Objective 1 and 2 is the SWD, while Objectives 3 and 8 will focus more on the Ward Contractors and residents. The main topics throughout the research are; *collection* (areas/frequency/organisation/satisfaction); *disposal* (dumping and burning); *impacts* (health and environment); *participation* (information/inclusion) and; *awareness* (connecting waste and livelihoods).

5.4.1 Objective 1: Legislative Framework, Political Will and Cooperative Governance

Objective 1 focuses on ensuring cooperation among various departments within the City of Windhoek in order to harmonise information dissemination to and from clients.

Organisation of the Solid Waste Division

The legislative background of SWM was investigated in the previous section. The following will relate to the framework, within which the Solid Waste Management Division of Windhoek (SWD) is working, and their cooperation with clients and other actors. SWD is a division under the Department of Economic Development and Environment of CW, alongside Divisions of; Economic Development; Environmental Management; Health Services and; Parks and Gardens. SWD have approximately 250 employees divided into six sections; Office of the Chief; Operations and Fleet; Landfill Sites and Technical Support; Licensing and Special Projects; Education and Marketing and; Finance and Administration. Data was collected through interviews of the Heads and some employees of the Operations and Fleet, as well as Education and Marketing. Due to limited time for data collection these sections were prioritized because they are at the core of the study. However, if time allowed the remaining sections would also have been informative to the research.

The Operations and Fleet section

This section is responsible for ensuring that the Ward Contractors fulfil their contracts and provide assistance in waste operations. The section is administered by the Head of Operations, Mr. Hengari, who manages two *Controls* mainly in charge of the official contact with the Ward Contractor as well as the overall situation in the different wards. The Controls manage five Officers working in the field, sharing the 19 wards of CW between them. The Officers make sure that the Ward Contractor fulfils their service level agreement with the SWM by inspecting the areas and talking to residents, neighbourhood leaders and Ward Contractor employees. If breaches are found the Officers or the Controls issue a detection notice where the lack in the service agreement is identified. A deadline is set for rectifying the problems, and if this does not happen fines will ensue. The Officers manage a number of Community Education and Law Enforcement Officers who issue information and make sure members of the public follow the rules set in the waste management Regulations and Policy. If residents are found breaking the rules a transgression notice is issued by the Community Education and Law Enforcement Officers with a deadline for sorting the problem out. If this does not happen a fine will be added to the residents SWM account (if they have one). The Operations and Fleet section also include a truck and front loader team that participate in waste operations, mainly in the informal settlements. This includes assisting the Ward Contractor in areas where heavy machinery is needed to clean up waste; empty the skip containers, clean open spaces like riverbeds. One problem encountered by the truck and front loader team is inaccessibility of some of the newly established informal settlement areas. In these areas the Ward Contractor employees must collect and gather black bags and waste on foot, preparing for collection by smaller Ward Contractor vehicles, like pick-up trucks.

The Operations section is the closest within SWD to the practical and physical waste situation and its consequences on the livelihoods of the residents and the Ward Contractor employees. The actual findings from this section will be presented under Objective 3: Human Resources.

Education and Marketing section

The function of this section is to "facilitate positive behavioural and attitude change among customers towards solid waste management through marketing and promotion" (City of Windhoek, 2014). This includes spreading information and education efforts among all citizens, and especially in areas where the SWM system is not functioning optimally. The Head of Education and Marketing, Mr. Kapere, is in charge of the section, managing partnerships with private businesses and other public institutions, as well as a number of Education Officers who are responsible for the information work out in the settlements.

Throughout the data collection process the issues of information, education and ignorance recurred as explanation of various traits and failures of the SWM system. This is relevant to Objective 8: Community Participation.

Collection

Collection coverage rises with GDP, and is also higher in cities where the authorities are concerned with the city's image (UN-Habitat, 2010, p 22). This is true for CW where being attractive to business investments and tourists is a priority. Unfortunately there are no official numbers of collection coverage in CW, and even if there was they would be highly contested due to the chaotic settlement situation.

Questions of practical organisation and collection frequency were put to the respondents from SWD and Ward Contractor. Answers diverged, and they diverged more the further apart respondents were in the SWD hierarchy. The SWD employees, like Section head Mr. Kapere, would answer according to the Policy and SWD agreements, while a ward contractor employee would answer according to how often he or she collected waste in their ward. Normally the legislated collection frequency is higher than the frequency reported by the waste employees. Answers also diverged between SWD and Ward Contractor employees and residents. One representative example is the questions on waste collection frequency, where answers deviate between twice every week to once every two weeks, typically the residents would report a lower collection frequency than the employees. Residents responded to the question of collection frequency was also divergent, but not to the same extent (see Figure 11).

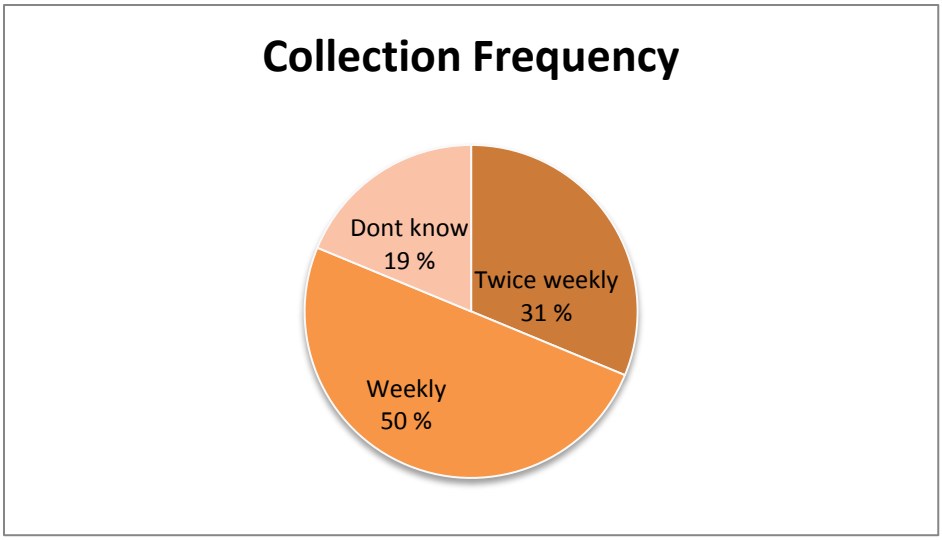

Figure 11: Collection frequency according to residents.

Source: Fieldwork 2014

SWD officials were asked about the coverage and dispersion of wheelie bins (see Figure 12). The answers would range from total coverage of the entire city, to covering only registered households, thus omitting 1/3 of the CW residents (informal and illegal settlers). The issue of actual collection coverage was also disputed and accounts were given of full coverage, while other employees would state that the informal settlements had been given up a long time ago, and that service delivery here was deficient due to rapid, uncontrolled growth, underdeveloped infrastructure and restricted budgets.

Figure 12: Wheelie bins along the road in Havana.

Source: Author (2014)

Disposal

There is a wide recognition that dumping and burning of waste is frequent in the informal settlement areas, although dumping and burning of waste is illegal. Residents choose to burn the dumped waste regularly to keep amounts and hygiene under control in the neighbourhoods. The Heads and employees of the SWD concede that burning is the best and most healthy solution, when waste for some reason is not collected, due to lack of or faulty service. They are, however, afraid to let this be known, as the consequence might be increased burning of waste. In the informal settlement areas the risk of a fire spreading is high due to the close proximity of houses. Big fires are well-known and burning of waste is therefore not advised. Mr. Kapere asserts that burning occurs because of people's "bad attitudes towards waste", i.e. lack of awareness and education. According to Mr. Kapere and all interviewed employees at the SWD, new immigrants to the informal settlements bring waste habits from the village where littering and burning is normal. Informal residents attitude as perceived by the SWD is captured by this statement of Mr. Kapere, "people think that waste is not my, but someone else's problem, out of eye out of mind, there is too much waste-doesn't matter what I do, waste is unavoidable and a huge problem impossible to solve". Ward Contractor employees' admit to burning waste that is dumped in riverbeds because they have trouble cleaning it up. They are also known to burn the waste in or around skip containers where resident's dispose of human waste mixed with general waste. The Ward Contractors employees view this mixed waste as a health hazard and abstain from cleaning it to protect their own health. Although this is illegal it is frequently done, and as one Ward Contractor employee concede: "it is too messy to clean, so we gather paper and start a fire."

Institutional divergence

The diverging answers given by the SWD concerning the practical organisation of SWM could be attributed to the fact that the CW is a heterogeneous city in terms of residents, settlements, income and service delivery. The high- and middle-income areas have a mostly well-functioning SWM system, due to the fact that the houses are registered, meaning they have electricity, water, sanitation, wheelie bin collection, as well as knowledge and ability to recycle and transport their excess waste to transfer sites. The low-income areas have a mix of registered and unregistered housing, meaning that more than 100 000 people have limited access to electricity, water, sanitation and waste collection, with limited knowledge and ability to transport their excess waste anywhere. The CW is effectively divided in two, based on economic and racial lines, which will be covered in the next chapter 5.5 Socio-economic aspects.

Waste and livelihood connections

Employees at all levels in the SWD are true to the SWM Policy founded in the Waste Management Regulations. This is evident through questions concerning the impacts of waste. A core topic in interviews is the connection between the implementation of the SWM system and the livelihood impacts for poor resident in the informal settlements. Mr. Kapere, Mr. Hengari and Mr. Haindongo all refer to practical inconveniences caused by waste: the look

and smell is bad, causes disease, riverbed waste depreciates quality of underground water, depreciates the general rating of the city to tourists, investors and permanent immigrants. Although the SWD work to improve the waste situation in the informal areas, there are few signs of an asserted effort towards the informal settlements and the poor residents living there. Exceptions are municipal Clean-up campaigns, and informal waste projects in schools and neighbourhoods aided by private or public institutions. A concerted effort from the municipality as a whole is hard to see.

Missed business as livelihood impact

Questions regarding awareness of the livelihood impacts of SWM produce a recurring answer among SWD employees referring to missed business opportunities. The Heads of SWD mention this as the biggest livelihood impact affecting everyone in the city; an unclean city is not attractive to regional and international tourism or investments. Namibia has followed a line of market liberalisation after Independence, where privatisation has been widely utilised as means for economic growth (Keyter, 2009, p. 13). This development trajectory favours already established capital interests and the idea of "trickle down" is strong. Likewise, the idea that economic growth among the rich will create economic growth for all is well-established. Following the same logic, one could assume that the development in the informal settlements will 'trickle-down' and affect the city as a whole. According to van de Klundert and Anschutz unclean neighbourhoods can affect the city's economy and inhibit development because investors will not invest in a dirty place where sick labourers might have low productivity (2001, p. 11).

Through observation it is clear that the richer areas are cleaner than the poorer areas. Population density, education level and income can all be used as explanations, and the fact is that the SWD is delivering adequate services in the middle- to high-income areas. To address the connection between livelihoods and waste the CW and SWD needs to focus on the informal settlement areas where the population density is high, education and income levels are low. It is in these areas that the residents are more vulnerable to the quality of SWM and were efforts needs to be intensified.

Potential for SWM improvements

Answers were vague when questioned on the link between these practical impacts and the possibility for improving the implementation of SWM in the informal areas. Mr. Kapere phrased the general idea in this way "removing the waste is improving livelihoods", meaning that the core service of actually removing the waste is adequate in addressing livelihood concerns among informal residents. This statement displays a weak consciousness concerning the links between waste and livelihoods stated in legislation. To the extent the link between waste and livelihood is mentioned, the Section Heads of SWD assumes that "everything will improve when the waste situation is improved". When probing into how and why this will happen the Policy based in legislation is referred to, although without specific or practical examples. Although the SWD employees are loyal to the Policy through exerting a strong

belief in the system, they do not have an active relationship with the legislative foundations. This is evident through the lack of reflection concerning the link between SWM and poor livelihoods, displaying a simplistic view of the complex challenges in vast informal settlement areas. SWD Heads and employees seem far removed from where the actual decision-making and budgetary priorities happen, and could partly explain the "blind" belief in a system that they do not seem to be able to influence. The question of whether extra effort towards informal settlements are needed, the most frequent answer among Heads at SWD was "No extra effort or focus on the poor and informal livelihoods is needed".
When respondents were asked about their general satisfaction with the SWM situation they support the SWD view that SWM is generally good (see Figure 13).

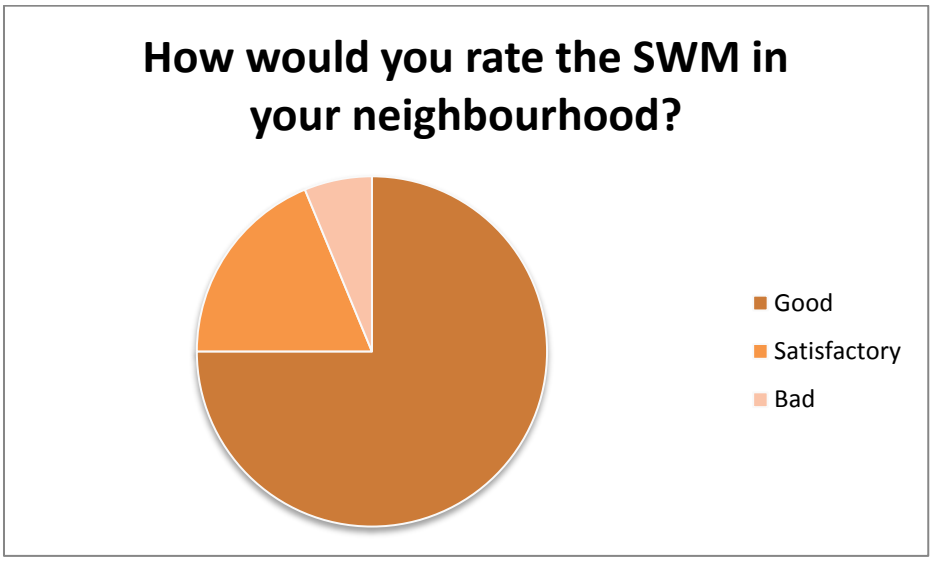

Figure 13: SWM satisfaction among residents.

Source: Fieldwork 2014

The division of respondents are clear; most residents in the formal and informal settlements rate their SWM situation as satisfactory or good, while most illegal residents rate the SWM situation as bad. At the same time, most respondents point to various environmental and health nuisances associated with waste and the SWM situation in their neighbourhood. So, it would seem that although residents view waste as harmful, they perceive the SWM services as adequate within the context of the informal settlements areas.

SWD expectations

When Heads and employees within SWD was asked how the implementation of SWM could be improved, especially focusing on informal settlements the general answer at all levels was that "the system is perfect; people only need to learn how to use it" and "the system in itself is good, with the best employees. Education is needed to utilise the system at our disposal". These statements indicate that the responsibility for the waste situation belongs primarily to the residents. This statement displays a basic presumption that the SWM system through the professional public and private actors provides an adequate service. First of all this leaves

marginalised resident with an unreasonable amount of responsibility to get informed and educated, to understand the system and learn how to use it. Secondly, it could leave the SWD passive, with further improvements of the system viewed as unnecessary. It should be noted that parallel to the high expectations towards the residents are tight municipal budgets, and an immigration situation out of control. This could explain the SWD´s need to distance themselves from the SWM responsibility. The high expectations towards the residents on the part of the SWD and Ward Contractor create a gap between the legislative foundations of the Policy and the practical realities faced by many employees on the ground, as well as most residents. It should be noted that residents do not seem to have direct knowledge of the SWM Policy or the organisation of the SWD or Ward Contractor. The residents only focus on the service they are provided with, irrespective of where it comes from, or on what basis. Although the respondents are generally happy with the SWM situation, most of them would like to see changes in the service. The respondents were asked "Is there need for change in the waste management situation in your neighbourhood?" see Figure 14.

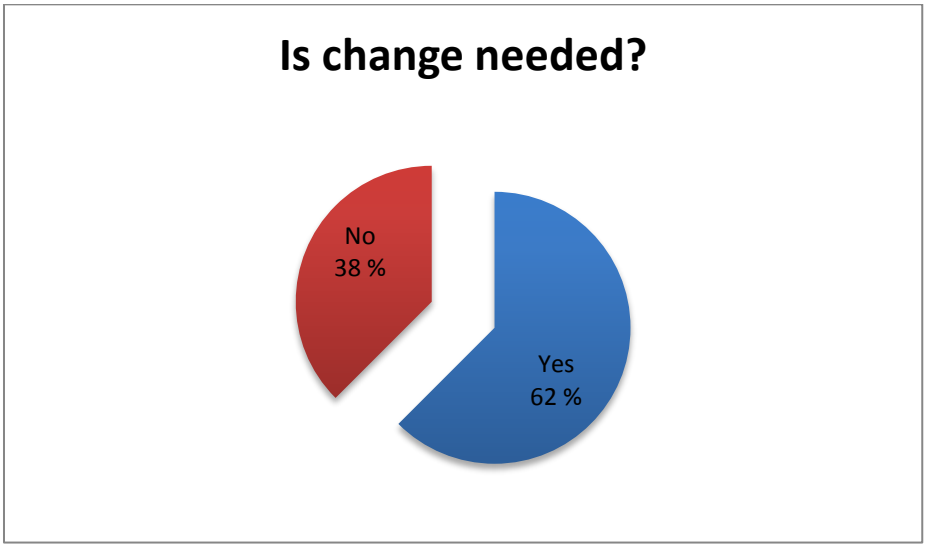

Figure 14: Respondents view in the current SWM system.

Source: Fieldwork 2014

Approximately four out of ten residents see no need for change in the SWM of their neighbourhood, reflecting the level of satisfaction shown in Figure 13. Although the SWM situation is not optimal, the need for change might be lower than in other areas like water, sanitation, employment and infrastructure.

The change most needed, refer to service level formalisation and moving up in terms of disposal methods and collection frequency. Residents with black bags would like to get wheelie bins, and the residents without any disposal means would like the black bags. Collection frequency could be more regular and access areas which today are totally or partly inaccessible.

The SWD also expresses doubts about their role and responsibility for the informal waste management situation because the settlers are, after all, illegal. A waste officer stated that if an illegal resident called in a waste related complaint he could only ask where the resident

lived and he could send the police there and tear down his house. There is an understanding within SWD that the low level of service delivery in the informal settlement might discourage more migration. Edith Mbanga, National Facilitator of the SDFN, express that this view is naïve: people will continue to move to areas where they believe they have better opportunities. Even if they live in shacks, the city has more to offer than the rural areas of Namibia.

Although the SWD employees may not have a very close relationship with the legislation they do exert flexibility and pragmatism in the daily execution of their responsibilities. Mr Haindongo is responsible for 90 % of the informal wards in CW located on the north-eastern fringe of the city. Through my observation and interviews, the various people and situations that are encountered during a day are dealt with as they emerge. The employees "on the ground" both in the SWD and the Ward Contractor have a genuine concern and commitment to the residents in the informal areas, although it is a well-known fact amongst everybody that the challenges they face are too big for their resources. The same pragmatism is recognised amongst the residents, and will be dealt with below.

Cooperative governance

There seems to be little awareness within the SWD of the division of responsibility and work elsewhere in the CW administration, something that became apparent in terms of waste and livelihood linkages. For example in relation to health and waste vague references were made towards other divisions and departments, especially concerning the links between health and waste there seemed to be little cooperation and information dissemination. A joint effort of SWM directed towards livelihood issues amongst the poor in the informal settlements seems to be lacking.

Looking at the responsibilities of Health Services Division (HSD) is becomes clear that there are overlapping responsibilities between the SWD and the HSD on several issues. This is underscored by the fact that the HSD enforces the Public Health Act 36 of 1919, mentioned as a big influence on waste legislation and thus the SWD work. Amongst the issues that overlap are public toilets, illegal dumping and inspection of local markets and shebeens (informal bars) in the informal settlement areas. In addition, the HSD is responsible for pest control, which is overlapping with the SWD responsibility as solid and human waste is mixed at public disposal sites, creating health hazards through disease vectors and spreading of illness (City of Windhoek, 2014). The connection between solid waste and cholera is explored in relation to health below.

5.4.2 Objective 2: Waste Minimisation and Cleaner Production

According to this objective the SWD is responsible for undertaking "a resource assessment in order to identify markets for the recyclable products derived from implementing waste

separation principles". Furthermore, the SWD should implement legal and economic instruments to create incentives towards waste minimisation and reduction of landfill waste through waste re-use and recycling activities. This includes waste separation at source as an integral part of the implementation of the WMH (Policy, 2009, p. 7). Cleaner production refers to industrial and business activities, and is not relevant to this study.

Waste minimisation

Waste minimisation is at the top of the WMH and is the first priority when handling the challenge of waste. Especially when diverting the resources from end-of-pipe to the earlier stages of the waste chain, the minimisation of waste is crucial. One of the most efficient waste minimisation efforts are recycling and waste prevention. The reduction of waste is normally closely linked to consumption patterns, but in the poor and informal settlements the consumption is limited and thus no big potential for waste minimization. Mr. Hengari, Head of Operations, emphasises that the waste generation in the informal settlements is rather small because the residents are poor and do not have gardens or build houses. This keeps the waste generation low and also alleviates the SWD in their work in these areas.
However, dumping and burning of general waste happen on a large scale in the informal settlement areas, meaning that recycling efforts may effectively reduce general waste as well as the problem of dumping and burning. Waste minimisation efforts are usually underdeveloped in developing countries. As waste minimisation rely heavily on household participation, it is important to include many types of stakeholders and especially community groups (Joseph, 2006, p. 870).

Recycling initiatives

Rent-a-drum is the biggest private waste and recycling business in Namibia and is a family business that has been running since 1989. They are a rather big employer with approximately 320 employees in 2014. Since 2010 a sorting facility has been operating in Windhoek; collecting, sorting, packaging, selling and shipping recyclables to South-Africa. Recycling plants do not exist in Namibia as yet, making export of waste necessary and potentially profitable. Rent-a-drum has a partnership with the SWD based on promoting and assisting each other in SWM efforts focused on recycling. The concept of partnership may be contested, as Rent-a-drum view themselves as the proactive partner with an efficient organisation based on a strict profit-driven focus. On the other hand, SWD hold a more passive role, allowing Rent-a-drum to recycle in CW without necessarily acting as an active change agent. Through interviews with representatives from Rent-a-drum, SWD, residents and partners, as well as observation of recycling initiatives, the issue of recycling was investigated. Rent-a-drum provides technical equipment at their sorting facility, city-wide collection to multiple users, as well as organisation of various recycling initiatives (see Figure 15). In this sense the partnership between Rent-a-drum and the CW consist of the SWD sanctioning Rent-a-drums various recycling initiatives and projects. It could seem like the SWD focus primarily on the traditional SWM activities of collecting general waste and disposing of it at Kupferberg.

Figure 15: Recycling unit serviced by Rent-a-drum.

Source: Author (2014)

Clear Bag System

The Clear Bag System (CBS) is the most widely spread recycling activity in CW, encouraging separation at source in households, institutions and businesses. The CBS is run by Rent-a-drum, and have been most successful in middle- and high-income areas. SWDs involvement is a supporting partnership where the private contractors are allowed to use the CW waste infrastructure. The SWD are active in promoting recycling in general and the CBS in particular. Together with the SWD, Rent-a-drum has introduced the CBS, through which the residents of Windhoek deliver 145 tonnes of recyclables each month. According to the SWD, around 2500 tonnes of recyclable waste is generated monthly at household level, presenting a great potential for reducing landfill waste, by over 2000 tonnes pr. month. Or as the SWD puts it: "the more involved we become as residents, the more recyclables will be collected" (City of Windhoek, 2014). Rent-a-drum handles approximately 60 tonnes of glass, cans, cardboard and plastic per day, from businesses and the CBS comprising approximately 2000-2400 tonnes pr. month. According to Rent-a-drum 80 % of general waste in Windhoek is recyclable, but at the moment only about 10 % is collected for recycling. This leaves a growth potential, according to Rent-a-drum, of more than 200 000 tonnes pr. month. So, although their numbers may differ, the SWD and Rent-a- drum agree on the large potential for minimising waste and making a profit from recycling.

Figure 16: Manual sorting of clear-bag contents, Rent-a-drum facility, Windhoek.

Source: Author (2014)

Incentives and participation

It should be noted that there is no payment for waste disposal cost at the main landfill Kupferberg, irrespective of the nature of the waste: all kinds of unsorted general waste is accepted. This heavily counteracts the positive effects of Rent-a-drum offering free delivery of sorted recyclables. Furthermore the clear bags are more expensive than the black bags, creating problems of cooperation and cost responsibility between Rent-a-drum and SWD. In addition the residents and Ward Contractor have one less reason to use the CBS and make an active effort to participate in sorting of waste at site. The polluter pays principle is a guiding priniciple in the SWM Policy and refers to cleaner production and duty of care among businesses. However, if the same principle is transferred to the regular resident, the polluter pays principle could be used to encourage reycling, as the greatest incentive for waste minimization is financial. Unfortunantley the idea that the polluter must pay for not recycling is directly countered by the fact that there is no fee for dumping general waste at Kupferberg. The CW seems to have a great opportunity for encouraging waste minimisation and increasing public income, but they do not seem to have used this opportunity.

Of the respondents asked, only one answered that she recycled. She was a vendor in a formal area, while the respondents in the informal settlements does not recycle. This view is confirmed by the Ward Contractors in the informal settlement who report that they spend time sorting waste at the sattelite sites as well as in and around skip containers. About 90 % of the resident answer no when asked if they sort or recycle the waste before disposal (see Figure 17).

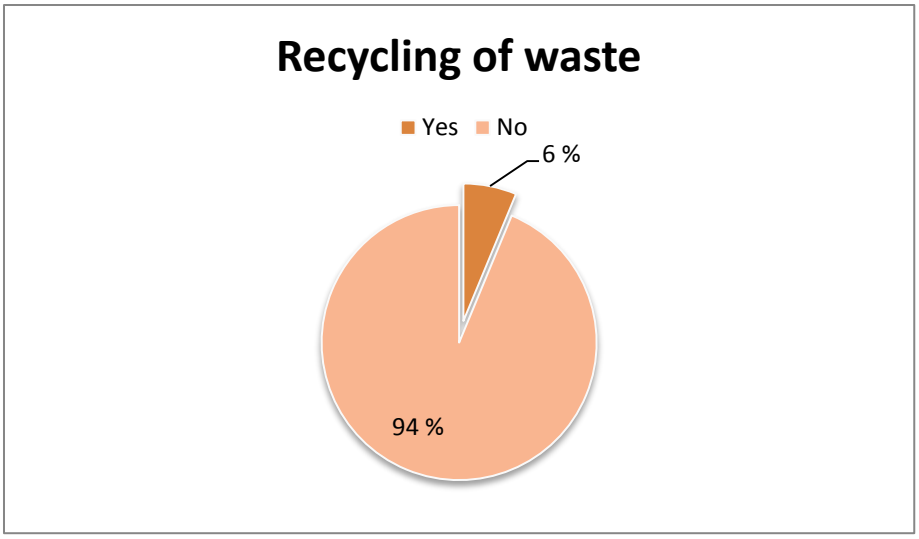

Figure 17: Recycling rate among residents

Source: Fieldwork 2014

External coordination

Rent-a-drum claims that the current scale of recycling is not profitable, and they believe in an expansion of the recycling potential alongside the physical sorting facility. Rent-a-drum provides the Ward Contractor with clear bags at the price of black bags to encourage the Ward Contractor to recycle. However, this incentive is counteracted by the fact that it is free to deliver general waste at the Kupferberg landfill. This makes the choice of recycling harder, because the delivery of waste is free either way, but the recycling plant and the landfill are situated at opposite sides of the CW. The Ward Contractor is instructed by the SWD, through the service level agreement, to utilise the CBS as much as possible, but according to Rent-a-drum there is lacking of enforcement by the SWD on this point. The Ward Contractor are not always aware and educated, making practical choices that counteract the goal of 100% recycling in CW. Rent-a-drum is seeking more support in terms of legislation and finances to increase the recycling of the CW (and their own profit). They also want to receive more recognition from the CW and SWD for the positive contribution to the SWM situation in the CW. Rent-a-drum contributes greatly to decrease the amount of landfill waste which is quickly filling up the main landfill of Kupferberg. Rent-a-drum wants Namibia and CW to change legislation so that recycling becomes compulsory and not voluntary.

5.4.3 Objective 3: Optimisation of Resources

As resources are generally scarce in municipal institutions, the optimisation of resources is paramount, and this is especially true within SWM which is usually not prioritized in municipal budgets. The main resources are human, technical and financial, and they are closely interlinked and managed by the SWD. Actual utilisation and operation of these

resources is shared between the SWD operations section, and the Ward Contractors. Below, the Ward Contractor system will be analysed in terms of resource optimisation, linked to the main topics of collection, disposal, participation and awareness.

Ward Contractor system

The Ward Contractor system consists of the waste employees who are closest to the residents, and the waste. The 19 wards within CW were created to increase supervision and responsibility, as well as introducing education and awareness building closer to the local communities. A demand of bringing planning and decision-making in SWM closer to the communities becomes imminent as waste in public areas is recognised as a growing problem. The problem of public waste must be linked to the specific qualities of the informal settlements, through the organisation of the SWM systems. This may be achieved by organising responsibility outside the SWD, using public-private partnership (PPP). The role of PPP within community participation can be controversial, but according to Keyter the transfer of responsibility from the government to private businesses have proven successful (2009, p. 15). The municipality are in the last instance responsible for adequate service-delivery, something that may be more easily achieved through dispersion of responsibility through PPP. The Ward Contractor employees are only responsible for one ward, and can in this way get close to the residents and their issues of concern. The Ward Contractor was designed in line with the central principle for PPP in development countries, namely as a pro-poor service delivery arrangement that facilitates the implementation of policies concerning waste and urban development. Transferring skills and knowledge leading to empowerment amongst the poor are crucial contributions made by the private sector operators (Keyter, 2009, p. 16). The SWD organise all aspects of the sub-contracting of SWM services, through a service level agreement where responsibilities are clearly stated. The participatory approach taken by the Ward Contractor will be dealt with below in terms of resident and Ward Contractor employee livelihoods.

Human resources

Of the 19 wards in CW two consist of completely informal settlements, while four have mixed formal/informal settlements. The SWD present a guideline for the minimum number of employees pr. Ward Contractor /ward, but this is not compulsory and the service level agreement focus on the actual cleanliness in the ward, irrespective of number of employees. SWD guidelines estimate that the minimum number of Ward Contractor employees covering all 19 wards should be 516, making up an average of 27 employees pr. wards. It is realistic to assume that the number of employees is lower than the minimum guideline because it would save expenses for the Ward Contractor. This is supported by the Control at SWD responsible for the cooperation with the Ward Contractor, as well as through the responses from one Ward Contractor owner. The Control at SWD states that the number of employees probably is lower than the minimum guideline, but the SWD does not have details on employees for each Ward Contractor. Likewise, the Ward Contractor owner interviewed could confirm that he

had fewer employees than the minimum guideline and that this was probably a normal practice among the Ward Contractor owners. As long as the job is done to the SWD satisfaction, there is no problem he stated.

Labour-intensive SWM

The number of Ward Contractor employees is usually between 20 and 30 in every ward. Seeing that the waste challenges are much bigger in the informal settlements, due to higher population numbers and density, it would seem reasonable that these areas have more Ward Contractor employees. The technical, infrastructural, social and hygienic challenges of SWM are larger and of a different nature than the rest of the city. Subsequently the number of employees should be higher to adequately deal with the problems specific to SWM in informal settlements.

Supporting this point is the fact that many developing countries see labour-intensive SWM systems as more cost-effective than capital-intensive systems (van de Klundert and Anschutz, 1999, p. 6). Unemployment rates are high and the government is responsible for creating jobs. If these jobs can be created by the local government in areas with especially high unemployment rates, like the urban poor formal and informal settlements it would be beneficial to the society as a whole. Furthermore, the infrastructure and lay-out of the informal settlements demand human flexibility rather than technical rigidity. Illustrating the need for labour-intensive SWM is the fact that collection of waste must often be done on foot, in order to cover large areas lacking proper roads.

However, the relative low numbers of Ward Contractor employees in these areas could be balanced by the fact that the front loader and tipper truck team from the SWD Operations section only work in these areas and assist the Ward Contractor in removing waste from riverbeds and other inaccessible areas. However, there are areas where the front loader and tipper truck team cannot access, leaving the residents to their own devices.

Responsibilities of the Ward Contractors

The SWD website presents the Ward Contractor system and responsibilities through a list of services rendered by the Ward Contractors. Among the responsibilities on the list are; sweeping and cleaning of all roads, streets and open places, issuing black bags and collecting refuse from all households in informal settlements, ensure correct utilization of skip containers and distribute municipal brochures and information material. In addition there is an encouragement for residents to *liaise* with the Ward Contractor or contact the SWM regarding waste concerns (City of Windhoek, 2014).

"Ensuring the correct utilization of the waste system" can be interpreted as educating residents in use of black bags, clear bags and skip containers. The skip containers are placed in areas where there are no transfer stations and are for garden waste and building rubble only. Informal residents generate little of this kind of waste as they do very little building and gardens are a rare sight. On the other hand they produce general waste that can present difficulties of disposal due to inadequate disposal facilities and/or infrequent or lacking collection. Another interpretation of "ensuring the correct utilization of the waste system" is

that the Ward Contractor is responsible for sorting the waste when openly disposed of, for instance when the residents dispose of general waste in the skip containers, a common occurrence in informal settlements. Manual sorting of general waste from skip containers was reported by the Ward Contractor owner and some Ward Contractor employees interviewed. The separated general waste is transferred into black bags and transported to Kupferberg. However, although it is stated in the service level agreement that the Ward Contractor should sort the waste on site, it is not always done. The five SWD officers who control the Ward Contractor may have difficulty following up on approximately 500 Ward Contractor employees in the 19 wards of Windhoek. In addition, the delivery of waste is free, irrespective of the nature of the waste. General waste to Kupferberg and recyclable waste to Rent-a-drum can both be disposed of for free, but at Rent-a-drum the waste needs to be delivered in the clear-bags, presenting an extra obstacle to the Ward Contractor.

Illegal settlements or "Not declared settlements" are not mentioned specifically in the list of services rendered by the Ward Contractors, although many of the services rendered are exclusive to these settlements. About 1/3 of the city's population resides in informal settlements where the illegal settlers are also found. Not mentioning these specific areas may reflect ambiguity towards their existence, both in terms of physical expansion, complex challenges and special needs. Simultaneously it devalues the distinct nature of challenges and responsibilities demanded from the Ward Contractor in these settlements.

Public toilets are not mentioned in the list of services rendered although the Ward Contractor are responsible for cleaning and maintaining over 400 dry pit latrines established by the SWD. Organisation of public toilets will be mentioned under Technical resources below.

Technical resources

Accessibility

van de Klundert and Anschutz states that a technical standardisation of the waste collection fleet can be a cause of lacking SWM due to the urban variations in living areas and conditions (1999, p. 2). Although it could be claimed that CW have taken serious steps towards diversifying their waste collection through the Ward Contractor system, there are still informal settlement areas that do not receive any kind of SWM. The Ward Contractor employees collect black bags on foot in the hilly and inaccessible areas where the roads are unpaved and too narrow for a truck (see Figure 18). The problem arises when temporary and unofficial waste dumps are created in riverbeds or slopes. The waste in these public and unofficial dumps is often not contained in plastic bags and is also a mix of human and general waste. Ward Contractor employees are often unwilling to clean up this kind of mix due to hygienic precautions. Only a front loader team can do the cleaning, but as there is only one such team in CW, that in turn often cannot access these areas due to faulty infrastructure, the waste is not removed. The residents or even the Ward Contractor set the dumps on fire to avoid disease spreading when it rains or the litter scattering in the wind. Several of the Ward Contractors highlight the positive health effects of burning waste because it prevents disease. The negative impacts of smoke and risk of shack fires is mentioned by some, but the need for

burning of uncollected waste is so high, the benefits supersede the detriments. Although the Ward Contractors know that burning is illegal they defend the residents who burn waste. One Ward Contractor employee state that "Residents burn waste to keep the local environment clean". In relation to this, children are often mentioned as they play everywhere, also in and among refuse, where mixed human and general waste increase the risk of diseases spreading.

Figure 18: Black bag outside a shack in Havana Extension 1.

Source: Author (2014)

Wheelie bins and black bags

The wheelie bins are reserved for households that have property rights, and thus an account with the SWD. Each household in formal areas gets a wheelie bin and the waste collection works relatively well, regardless of the income of the areas (poor, middle or high). Households in the informal settlement areas do not get a wheelie bin, explained partly by administration; they cannot get a costly wheelie bin when they do not have property rights, and no account with the SWD (see Figure 19). Furthermore, the informal settlement areas are inaccessible to waste collection trucks, making the use of wheelie bins meaningless as they cannot be emptied. The residents in the informal areas are also accused, by the SWD, of using the wheelie bins for other purposes than waste storage, due to the good quality hard plastic and large capacity. For this reason the informal settlements that receive waste services gets a black bag which is collected by Ward Contractor employees on foot or in smaller cars. However, it is well known that these black bags are larger and of better quality than the small, white shop-bags, and they are frequently used for other purposes pertaining to business, trade, households and play. Respondents were asked how their waste situation could be improved, and most respondents had practical answers. Most respondents express a wish to get more

formalised services. On the one hand they want better means of waste disposal; black bags instead of no bags, wheelie bins instead of black bags, or more skip containers (for general, and not garden, waste). On the other hand, they want more frequent collection, at households, not along the roads. The wheelie bins are especially attractive because they present a cleaner way to dispose and store waste before collection.

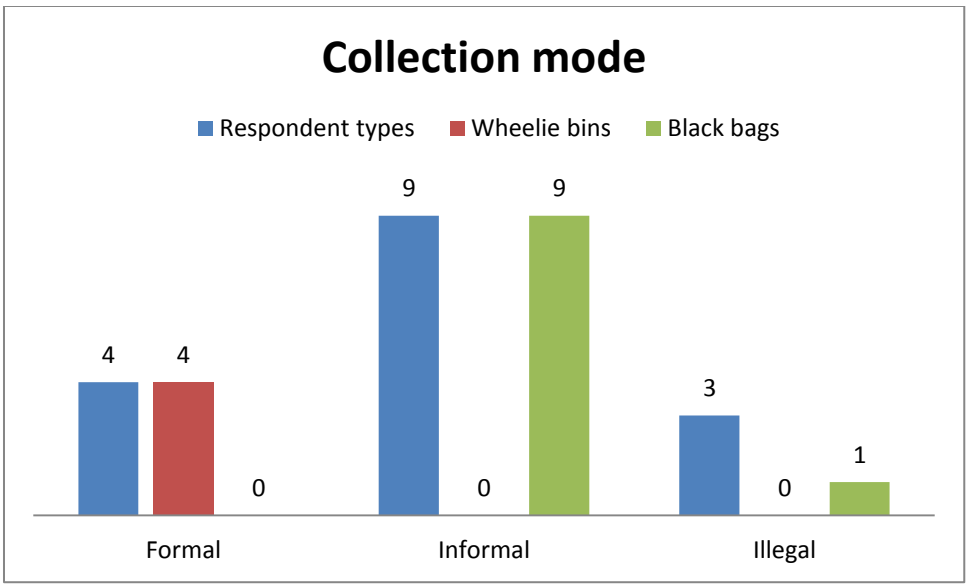

Figure 19: Collection mode pr. respondent type.

Source: Fieldwork 2014

Public toilets in informal settlements

The Control at SWD is responsible for the ward contractor activities throughout CW, making sure they follow up on the service level agreement. One of the important tasks is maintaining the various permanent or semi-permanent services placed out into the wards by the SWD. These include, most notably, skip containers and public toilets in the informal settlements. In total there are more than 400 dry pit latrines dispersed in four different wards, which the ward contractors are responsible for cleaning and maintaining. Public dry pit latrines have the advantage of storing human waste, while facilitating composting for reuse (Dorenfeld et al., 2012, p. 26). The Ward Contractor employees face several problems in relation to the toilets, expressed in detail by a respondent from Okahandja Park, informal settlement; the dry pits do not dry out, making it difficult or impossible to empty; washing the toilets is messy and presents health risks for the employees. On a general note the administration of the toilets is a challenge recognised by the residents, the SWD, as well as by the Shack Dwellers Federation Namibia (SDFN). Building of toilets is a much needed measure as the residents in the informal areas do not have toilets in their houses. The toilets are used by many residents in the area, as well as other people passing through. With such high usage, cleaning once a week is insufficient (see Figure 20). Edith Mbanga, of the SDFN point out that the toilets must be put in charge of the neighbourhoods controlling usage and organising cleaning and maintenance. If not, the situation of today, with broken and unclean public toilets will continue. This is supported by Dorenfeld who assert that the communal organisation of toilets is a basic

challenge because neighbours are not interested in handling or cleaning each-others waste (2012, p. 26). The consequences of this are visible both in terms of livelihoods as the weak parts of the population have big trouble finding alternative places to defecate. Also, the faeces are sometimes put into plastic bags and thrown together with general waste on the streets, in the riverbeds or in proximity to the containers. Both residents and waste employees are targets for contagious diseases spread through scattered waste. Recently the informal settlement of Hakahana experienced a cholera outbreak, and although the source is not identified, faecal matter mixed with general waste in public places may be the cause.

When respondents are asked about how their life could be improved a vast majority mention sanitation and the access to clean and functioning toilets. Private toilets are not realistic to most respondents, but neighbourhood toilets should increase in numbers. Even more importantly the toilets should receive better maintenance so that they are clean and working. These statements are reflected in the Ward Contractor employee interviews concerning human waste, public toilets and general waste.

Figure 20: Public toilet in Okahandja Park.

Source: Author (2014)

Skip containers in informal settlements

There are more than 200 skip containers in both formal and informal areas, the majority of which are centred in the middle income areas, with none in high-income areas, and few in low-income areas. The containers are reserved for garden refuse and building rubble, but are used very differently across the city. The high-income areas do not have containers because they transport their refuse to the transfer station by car, while the low-income areas have few containers because they rarely have gardens, or resources to build anything. The middle income areas have gardens and build houses, and thus have more containers. Due to lacking collection or frequency of collection in the informal settlements, the residents use the containers for all kinds of refuse (see Figure 21). Ward contractors are responsible for sorting the rubbish in the container, separating out general waste which is transported to the landfill.

Figure 21: Skip container in Katutura.

Source: Author (2014)

Livelihoods impact for Ward Contractor employees

Waste workers in developing countries are exposed to high occupational risks of infection and injury due to poor financial resources and inadequate understanding of the size of the problem. Scientific studies show that these waste workers have a higher risk of infections and parasites than the baseline population. Acute diarrhoea occurs ten times more often amongst waste workers, while pulmonary and respiratory problems are frequent and caused by inhaling particulate matter (dust) and emissions (Spies, 2012, p. 15). Other common stress factors are lack of protective gear, mixing of human and hazardous waste with the general waste, heavy lifting and social stigma for occupational choice. As an example, the average life expectancy of a waste worker in Mexico is 39 years, while the rest of the population reaches an average of 69 years (Spies, 2012, p. 16). According to a report by Keyter, the government officials with the Solid Waste Division of CW, the Ward Contractors and their employees perceive the positive impact of the implementation of the Ward Contractor system to be significant. Among the topics investigated were sustainable community development and economic empowerment through employment (Keyter, 2010, p. 14).

The waste workers interviewed in Windhoek were employed by the Extreme Cleaning Services, operating in the informal settlements. Most respondents were happy with their working conditions, although there was general agreement that the income is not high enough. The Ward Contractor owner is responsible, through the service level agreement, to provide security clothing, health and safety training and annual medical check-ups.
For the respondents working the streets the job can be difficult for two reasons. First, they must clean inaccessible areas on foot, which may include deep riverbeds where snakes or criminals can be hiding. Second, residents generally have a hostile approach to Ward Contractor employees, blaming them for the bad waste situation and resist to comply with their demands. When Ward Contractor respondents contact residents concerning waste, they often hear that “you are lucky I am throwing garbage or you wouldn´t have a job…” and the

like. Accounts given by respondents include yelling and name calling referring to their low status as waste workers. However most employees are positive and like their job because they can make a difference in their neighbourhood. One respondent from Ombili and Hakahana express gratitude for being able to get educated and to improve her neighbourhood through the job by keeping the local environment clean, healthy and hygienic. All over, the respondents complain that their work is not recognised and restricted by lack of resources, capacity and that they are far away from the ones in charge. One respondent from Okahandja Park said that if the decision-makers could come and see what they experience first-hand they would give more money to waste management.

It is important to emphasise that the SWD have acknowledged that there is not **one** solution for everyone in the CW, because the residents and the areas are so different. Van de Klundert and Anschutz point to the fact that integration and sustainability relies on a waste system which is adapted to local physical, economic and social conditions (1999, p. 3). This is reflected by the wide scope and varied expectations of the Ward Contractor depending on where in the CW they operate. However, it is important to add that this flexibility is good, but must be recognised and supported by the CW, both politically and financially. An important part of a sustainable SWM system is integration, which also means inclusion of all stakeholders, and the issues of participation will be addressed in Objective 8 below.

Financial resources

The Policy states that the finances for the SWD must be "revised" and additional funds are needed to handle the waste situation. It is not clear if this has been followed through in recent budgets. Interviews with SWD Officials reveal a great frustration over limited budgets, mainly because the challenge of SWM in the informal settlements is growing too fast for the SWD to follow. One SWD employee points out that this development has been underway for at least 20 years, since Independence in 1990. And he asks: How could it possibly be realistic for the CW to start catching up now, when the problem was already out of hand so many years ago? This view permeates the SWD to the extent that the notion of realising the SWDs full responsibility seems abandoned. Instead there is a realistic and open admittance to the overwhelming vastness of the challenge on the one side, and a contentment and belief in the system they have created and manage on the other side. The idea that "the system is perfect, people only need to learn how to use it" is mentioned repeatedly at all levels of the SWM system, although not among the residents. The residents hold the CW responsible for all basic service delivery, SWM included. Empowerment of all stakeholders is also included in the financial resources, as the Policy states that edcation and awareness building, in particular, must receive additional financial funds.

Furthermore, the Waste Management Regulations and Objective 3 in the Policy, all SWM activities should be run at cost recovery, due to SWMs substantial volume in the CW budget (City of Windhoek, 2009, p. 8). The SWM system should be run on a cost efficient basis, which is hard to achieve when 1/3 of CW, namely the residents in informal settlements, does

not pay for services. Simultaneously, the CW refrains from engaging in the recycling business, which could secure long-term income for the SWD.

5.4.4 Objective 8: Community Participation

Information and education are the preconditions for awareness and participation. The SWD cannot expect residents to utilise the SWM system correctly if they are not informed and educated first.

Expectations of responsibility

As indicated in the sections above, the view most commonly held within the SWD and Ward Contractor is that problems of waste in CW stem from lacking information and education, which is needed to achieve awareness and participation from the residents. According to SWD respondents, the SWD have done what they can; the SWM system and policies are good, they only need to be utilised - it is up to the residents to complete the system.

This presents a gap in expectations between the municipality and the residents. On the one hand the SWD views the residents as ignorant and expect them to get educated and utilise the SWM system, while on the other hand the residents are in a marginalised situation where it is hard to get informed and educated without external assistance. A paradox arises when looking at the legislative background and the institutional implementation; poor residents in informal settlements are not mentioned specifically in the Policy or in SWD waste and livelihoods efforts. The SWD are more or less happy with how the SWM system is working in the middle- and high income areas. In these areas people are in a position to get information, education and resources to utilise the SWM system. The SWM system does not work very well in the poor-income informal settlement areas, and even if residents there have less resources and opportunities the SWD still demand that they should get informed and educated in order to utilise the SWM system. Especially new immigrants and village people are expected to learn the modern and urban ways.

First, the active participation expected by the residents is countered by framing the residents as passive receivers of information and education, before they can become active participants. Second, the idea of the informal residents from rural areas, carrying a "village mentality" contradicting urban and modern rules of living contributes to exclude the informal residents. Third, leaving the final responsibility of SWM to residents that are poor, excluded and marginalised could seem irresponsible by the municipality who have the power and the resources.

Information

The Education Section at the SWD is responsible for creating and spreading information and education through three Education officers, as well as through the Ward Contractor and various partnerships with schools and organisations.

Market vendors and residents in formal settlements respond that they receive information from the municipality, and are relatively satisfied with the information, even if they are satisfied with the general waste situation. All the respondents in the informal settlements answer that they do not receive information of any kind. When probing, it becomes clear that there are community meetings, but none of the respondents have attended because they view this as a waste of time. The reason given for generally low attendance at community meetings is explained by the fact that complaints and questions are brought upwards in the system, but rarely or never answered or improved. Written information material like flyers is dismissed by the SWD and Ward Contractor employees alike. The literacy rate in Namibia as a whole is around 90 % (CIA, 2014), so most residents would be able to read the material. However, the Ward Contractor employees report that most resident would also throw it away after reading and create more waste. This is inconsistent with the service level agreement and the services rendered list, where the Ward Contractor are expected to distribute brochures and material for the SWD. During observation I did not observe information of any kind in the informal settlements. Brochures are found at the SWD head office, and sign-posts are scattered throughout the formal settlement areas. Mr Kasoma, owner of a Ward Contractor called Extreme Cleaning Services, can confirm this and states that he has not, more than one year after getting the tender, distributed any information. He points out that the coordination of information and education must come from the SWD.

A study of rural SWM found that inadequate SWM came from lacking communication between local government, health officials and residents (Dorenfeld et al., 2012, p. 19). As previously mentioned, both the internal coordination between division of the CW and external cooperation with the private sector has potential for improvement in CW. If information dissemination does not reach the residents in the communities, any positive change or impact of SWM will be hard to find.

Educational partnerships

After pressing the SWD Marketing and Education section I received a name of a partnership school, where the SWD are doing education and information work. I visited this school and it was confirmed that they were currently part of a waste project. The science teacher who seemed to be closest to the waste project at the school had no knowledge of a “partnership” with the SWD and no written agreement or statement concerning the waste project. He could, however, confirm that Rent-a-drum was maintaining the waste project, through recycling competitions between the schools in Windhoek. Rent-a-drum supply recycling containers, collect and weigh the waste, and also donate cash prizes to the best recycling school. SWM information or education is not part of the curriculum at this or any school as far as he knows. However, the recycling competition was education through practice, and thus the school did take responsibility for the SWM education. Likewise, he argued that the municipal clean-up campaigns where the mayor and other high ranking officials participate is education in practice, showing the young people good role models.

Participation

Participation in itself, or rather the integration of all affected stakeholders, increases the level of sustainability of a system, simply because participation attaches the system to the grassroots and makes it able to maintain itself. This is linked to the fact that stakeholders who feel ownership to a system will work harder to make it work, especially if their political, economic or social interests are served by the system (van de Klundert and Anschutz, 1999, p. 3).

Community leaders are elected through the Community Development Division in CW to facilitate communication between the residents and the local government. Mr Fillemon Tshigweda is one of 68 neighbourhood leaders in the informal settlement of Havana Extension 1 (there are 7 extensions with app. 16 000 residents in total). The community organise to clean their neighbourhoods two to three times a week, in addition to Ward Contractor cleaning services. Many people participate because they understand the negative impact of waste, and the SWD supply gloves and black bags for the clean-up. Even if this is a very good initiative it shows that the SWD and Ward Contractor do not do an adequate job. There are clean-up competitions among the 68 neighbourhoods in Havana Extension 1, organised by the SWD, where the winner gets a diploma.

There are regular community meetings about concerns in the neighbourhoods that could also include waste problems. The residents/neighbourhood leaders must let the community leader know so that he/she can inform SWM and maybe get an Education Officer to come to the meeting. There are no written accounts from these meetings, no formal agreements or routines, plan of action, experiences or information material available from the Community leaders or the SWD. Leaders and residents are given the responsibility for executing local participation and it can be interpreted as a big reliance on people's agency and capacity for change and participation.

There is only one skip container for rubble and garden refuse in Havana Ext. 1, and Mr Tshigweda states that this is not enough and "it is better to burn the waste that is left although the smoke is bad". He states that most residents know that dumping and burning is bad, but they feel like it is the healthiest choice.

5.5. Socio-Economic and Environmental Aspects

The connection between SWM systems and livelihoods has been assessed through Legal and Policy aspects as well as Institutional and Operational aspects, focusing on the SWD and the Ward Contractor system. The livelihood perspectives of the residents will be presented below. The level of participation and awareness will be used as starting points, as most residents have no knowledge of the legislation or organisation of the SWD or the Ward Contractors in CW.

The infrastructural foundations of CW characterize the lives and livelihoods opportunities of residents in the informal settlements. The starting point will be the organisation of the city,

which determines the types of *arrangements* citizens can enter into. Freedom of choice is determined by the level of social justice, which in turn determines the residents' level of *awareness*, *health*, and finally *participation* of livelihoods impact of SWM.

5.5.1 Livelihood as arrangements

Conceptualising livelihoods as arrangements means looking beyond the 'condition' of lacking capital, onto the 'relation' of lacking entitlements (van Dijk, 2011, p. 101). Entitlements can also be understood as basic rights, power or privileges, all of which are determined by established structures and power relations. Cole elaborate on this by pointing to the necessity of transparent and democratically accountable authorities, allowing people to participate in the political control of their social existence (2005, p.48). The organisation of an urban space can in this way convey information on entitlements of various citizens, both as practical infrastructure, but also by the level of service delivery and level of participation throughout the city. The issue of 'social self' as well as social justice will be reflected in the analysis of livelihood as arrangements.

Population

The Khomas region, where Windhoek is located, has 32 informal settlements, and only 2 reported illegal or Not Declared Settlements, with a total population of approximately 120 000 in 2008 (CLIP, 2009, p. 8). During fieldwork, many informal settlements were encountered whose names are not in the 2009 CLIP profile, illustrating how rapidly the areas are growing and changing. Examples of this are Ontevrede, Onglungnbahe and Havana Extension 6 and 7. More than 600 immigrants settle on the northern boundaries of the north-western informal areas, each month, forming huge illegal shack areas (Windhoek Municipality in Müller-Friedman, 2006, p. 22).

According to a 2002 World Bank Country Assessment approximately 30 % of the population in Windhoek lives in shacks and shanties (in Müller-Friedman, 2006, p. 22). Edith Mbanga from SDFN supports this by estimating that approximately 1/3 of Windhoek´s 350 000 residents live in informal areas, including illegal settlers.

Urban migration

Almost all the 175 000 immigrants to CW between 1975 and 2002 were black or coloureds settling on the outskirts of the informal areas in the north-west (Müller-Friedman, 2006, p. 38). These areas are still a predominantly black and coloured, with a mix of poor- to middle income population in mostly formal areas. The informal settlements were established, and are continually growing, on the outskirts of these areas. The south and east are still primarily white and middle- to high- income areas. The service and amenities delivery is markedly different in the various areas. This is visible through the public cleanliness of the richer and whiter areas, pointing to the fact that they have property rights and are therefore entitled to

full service delivery. In addition to this the residents of the richer areas have resources to handle their waste independently, something that the poorer residents of the informal areas do not have. As an example, owning a car allows residents to transport their waste to transfer stations. Most of the population of Windhoek does not have this option. In addition to this the immigrants to Windhoek usually settle illegally within and around the informal areas. As they do not have property rights their service delivery is inadequate or non-existent, affecting the environment of the already established informal settlers.

Organisation of the City of Windhoek

Windhoek contains geographical and spatial divisions of the population into areas along historical lines of apartheid and these lines are recognised in or emphasised by the contemporary socio-economic divisions of the city. CW was built after the US and UK suburban ideals; "cellular, mono-functional, low-density developments". Development of public transport systems was not prioritized because the white residents had access to cars (Müller-Friedman, 2006, p. 38). Due to the city layout the residents in the informal settlements were cut off from access to infrastructural services and amnesties. The black and coloured settlements were originally placed 5-15 km from the city centre, which was reserved for the rich, white and modern residents (Müller-Friedman, 2006, p. 38). The ruling white population of CW established the townships of Katutura and Wanaheda for resettlement of the black and coloured populations to the north and west of the city, as part of the 1961 apartheid laws. In the Otjiherero language Katutura means "The place where people do not want to live". Approximately 80 % of the coloured and black population of CW lives in or around the former apartheid townships of Katutura and Wanaheda (Müller-Friedman, 2006, p. 42).

The Western Bypass is by some seen as an affirmation of the historical division of CW into the black and coloured areas in the north-west, and the white areas in the south-east (see Figure 22). Although the settlement politics of CW today is open, and the city has many mixed neighbourhoods, both economically and ethnically, the Western Bypass can still be seen as a division in a city with vast socio-economic differences.

Figure 22: The Western Bypass cutting across Windhoek from north to south.

Source: bing.com (2011)

Land tenure

The authorities are not allowed to sell land for residential purposes unless it has been subdivided, proclaimed and fully serviced (CLIP, 2009, p. 5). Development of such areas is expensive and the cost is usually too high for most of the urban immigrants living in informal areas. The structures in the informal settlements are mostly constructed from corrugated iron and traditional building materials, while the roads are usually unpaved and not well maintained (CLIP, 2009, p. 8). The local authorities are facing grave challenges in developing sufficient low-price plots for informal settlers, leaving the informal residents without secure tenure (CLIP, 2009, p. 5). As the informal settlers do not own their land they rarely pay for municipal services, even so they are all entitled to receive SWM services from the CW (SWD). It should however be noted that through the investigation of the Ward Contractor agreements in relation to Institutional and organisational aspects, it became clear that the service delivery varies depending on infrastructure and needs between areas in CW.

Informal settlements

Municipal officials (Mr. Haindongo) report in interviews that the security guards set out along the outer rim of the new informal (illegal) settlements to prevent further settlement are easily bribed to move the border further out and allowing new immigrants to settle. The border between informal and illegal settlements is constantly moving and hard to pin down due to rapid expansion of the already existing informal settlements into new, and illegal, areas which in time will change status to informal. In addition to this much of the illegal settlements happen within the informal areas, in yards and other available spaces which are rented out by informal settlers. The process of immigration, registration and formalisation is continual in the north-eastern side of the city making it hard to distinguish clearly between informal and illegal. This is also the case for the SWM and Ward Contractors, although the shacks marked with numbers have been registered by the CW and are thus informal, not illegal. However, this hardly makes any difference as the SWM are responsible for providing all areas with

waste management services, even if this is not always a reality. Due to the difficulties in distinguishing the informal and illegal settlers, both physically and legally, the term informal will be used for all settlements.

A post- apartheid society

Former president of Namibia, Dr Sam Nujoma, expressed concern for the country´s heritage of inequality in the Vision 2030 by stating that "Over a decade after Independence, Namibia is yet to overcome the legacy of extreme inequalities based on race and left behind by the 'apartheid' regime" (2004).

In the post-apartheid and post-independence era the black and coloured townships has been officially renamed as the "north-western" suburbs, contextualising them as "normal" suburbs, similar to the south-western white areas. This renaming diverts from the reality that these areas are informal and illegal; poor and un-serviced areas in need of specific attention (Müller-Friedman, 2006, p. *14*). However, the residents in and around the former apartheid townships would not like to move to other areas in fear of losing their family history, African cultural roots and social security, as well as their pride and integrity as black or coloured Namibians (Müller-Friedman, 2006, p. 50). So despite low service delivery they would not want to move to areas where they are not close to their own people. Showing also a sign of ethnic segregation as the various population groups settle within their own neighbourhoods.

The historical determinants of migration and settlement in CW have practical consequences for the resident's livelihoods today. Sibley states that "the built environment [is] an integral element in the production of social life, conditioning activities and creating opportunities according to the distribution of power in the socio-spatial system" (in Müller-Friedman, 2006, p. 76). Livelihood opportunities are determined by the ability to produce a healthy "social self" where participation in and power over the available arrangements is important aspects. The physical organisation of CW as a post-apartheid society is visible through settlement patterns, infrastructure developments and service delivery.

Waste in public

The central areas of the City of Windhoek is remarkably clean, with minimal street waste and only occasional garbage heaps in the city centre. Formal residential areas in all parts of CW are also relatively clean, although the amount of waste in public areas increases towards the outskirts and informal settlements. Waste in public areas is usually in heaps along the streets and roads or beside permanent waste skips.

All over central Windhoek signs refer to waste awareness in terms of disposing of waste properly. These signs link waste to a clean environment, and also reuse and recycling. Framing waste as an environmental threat is chosen by the SWD, although the underlying issues of health and livelihoods are valid, they may be more complicated to convey. Officials at SWD state that the environmental angle is working well, with no need to change.

The informal areas are carpeted with broken glass, plastic bags of waste is left along the roads or gathered in unofficial dumping sites where occasional burning takes place. Yards around the individual shack in informal settlement areas are most often very clean. Although waste is gathered on the streets, open spaces or in riverbeds close by, the impression is that residents, on the whole, keep their immediate surroundings clean. This shows an innate awareness of the negative impacts of waste on their family health. It also shows a high level of integrity; even if they are poor and assigned to live in an area of low priority to the CW, they keep it clean.

Waste collection

Most residents report that waste is collected in their area, although frequency and method varies. In some, especially inaccessible, areas the Ward Contractor employees collect bags and scattered waste on foot. In areas with gravel roads the bags are along the road for collection by Ward Contractor pick-up trucks (see Figure 23). The frequency reported varies from twice a week to once every two weeks. Some residents, predominantly from the newly established settlement areas, report that their waste is never collected. They gather and burn their waste in improvised places, for instance in riverbeds. SWD Officials explain the lack of collection with inaccessible roads in these areas. Furthermore, the SWD Officials emphasise that the residents have no right to live there in the first place and should not expect to get municipal services, which they do not pay for anyway.

Figure 23: Waste bags ready for collection along the road in Babilon.

Source: Author (2014)

When the effectiveness of waste collection is limited to the city centre, like tourist areas or business districts, the overall SWM system is not complete. The less visible parts of the city are as important as, sometimes more important than, the visible ones (van de Klundert and Anschutz, 2001, p. 11).

5.5.2 Livelihood through participation

Within ISWM stakeholder participation and integration is vital, highlighting the need for cooperation between the many types of stakeholders in SWM. The stakeholders can be divided into three main groups of the government, private business and residents, where all groups have various roles and responsibilities (van de Klundert and Anschutz, 1999 p. 8). Residents can be defined as individuals or as part of households or communities. Households are often used as a methodological entity and represent the largest category of stakeholders in waste management. This is especially interesting because they have a complex relationship to SWM activities: as generators, service clients, receivers of information and participants in mobilising SWM efforts (Joseph, 2006, p. 865). Households engage in storage, separation at source, disposal, re-use and community participation in the local environment. Having such a central part in SWM makes the households powerful as the biggest stakeholder group, but also vulnerable to the economic, political, social and infrastructural organisation of a municipality. Participation can only happen if facilitated properly and with sufficient political will and resources.

The City of Windhoek states that they will ensure the implementation of the Policy by relying on the participation of local communities. CW "commits itself to on-going community participation" and recognises the value of involving the local community in the development and implementation of waste management projects (City of Windhoek, 2009).

In 2009 the Shack Dwellers Federation Namibia (SDFN) and Namibian Housing Action Group (NHAG) supported informal communities throughout Namibia in profiling their own communities. During the process the residents themselves became aware that they are not merely passive bystanders waiting for development. They have the potential of becoming actors in their own development and decision making process (CLIP, 2009, p. 7). Building participation on awareness is paramount and underscores the importance of information and education as a first step towards achieving local participation.

This corresponds with the responses from informal settlers in Windhoek. Respondents in the informal settlements view themselves as passive objects to whatever the municipality decide. In relation to the SWM situation it comes across through blaming the municipality for faulty service delivery, and for not "caring" or "providing". Respondents show different levels of mistrust towards the municipality, with the illegal settlers as the most discontent with the municipal actions. The circumstances for many of the households in the informal areas might be economically challenging to the extent that it is difficult for them to imagine how to create change for and by themselves.

The systems and efforts by the CW are spread out and diverse and the responsibilities are often crossing, informal and ad-hoc. There are many municipal institutions working with different aspects of the informal situation. A lot of the responsibility for improving their livelihoods and waste situation seems to be left to the residents themselves. They are expected to initiate and engage in participation themselves to improve their life. This can be difficult when they are poor and feel excluded from decision-making processes.

Information and education

Only one of the fifteen residents interviewed reported on receiving information on SWM. On the other hand, all vendors report that they receive adequate information. Similarly all Ward Contractor employees, community leaders and school teachers report on adequate information received and dispersed, mostly through meetings. However, community leaders and SWD officials alike, point out that the information and education work initiated by the SWD (CW) in the local communities has incomplete routines for formalisation, control and report. Tracking efforts and progress may be hard, when documentation is lacking. Multiple municipal sections working on various challenges in the informal settlements add to this already complicated situation.

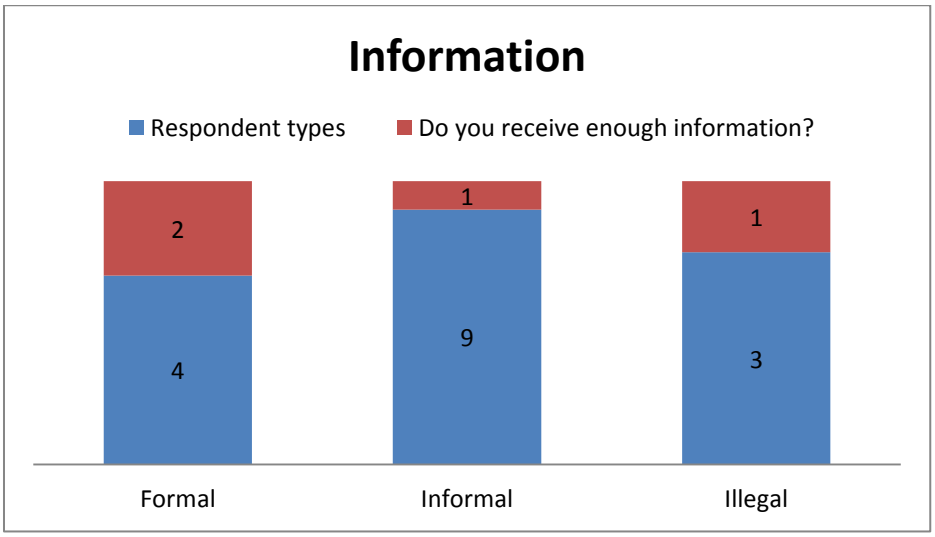

Figure 24: Information flow pr. respondent type

Source: Fieldwork 2014

Most respondents state that they do not get enough, if any information and they would like more. When probed about what kind of information they need, the respondents are uncertain. This could be interpreted as a general feeling of being left out, and a general wish to be included so that they can participate, contribute and ultimately influence their own life. The statements below illustrate this sentiment:

"…we have nothing and the councillor only talks and do nothing" and "It [waste] is the municipality's responsibility, but they don't care about us."

Woman, illegal settlement of Untevrede

Throughout the fieldwork I encountered no information material and only distant recounts of community meetings where the respondents did not bother to go. Limiting information to voluntary meetings leaves the initiative to acquire information to the residents themselves. If residents do not receive information, for whatever reason, it would be doubly hard to initiate

participation and change. This may point to the fact that improving the SWM system depends more on community leaders and change agents than on municipality or government, simply because the former are closer to the people than the latter.

Mchombu argues that residents in the informal areas see information and education as vital in improving their livelihood opportunities, although due to poverty it is hard to get information, and also to know how to do it (2010, p. 83). Also, after the information and education is given it must be utilised to create awareness of their situation and contribute to development. Achieving this demands a healthy democracy, which is transparent and accountable on all levels, where residents can actively participate.

"Social privatisation"

The term social privatisation refers to how residents in poor areas might become small-time stakeholders in the SWM system, by contributing out of social concern *and* profit motives (van de Klundert and Anschutz, 1999, p. 8). The kind of social privatisation occurring in CW is non-profit community based clean-up campaigns and competitions, complementing the existing SWM system and headed by volunteer community leaders. Data was collected on clean-up campaigns by SWD and local clean-up competitions in schools by Rent-a-drum (referred to in *Institutional and Operational aspects*, Objective 8: Community participation), as well as neighbourhood cleanliness competitions by Community leaders.

A recurring explanation from SWD for the waste problems in the informal settlements is that the people there are new immigrants bringing their traditional village ways of SWM to the city. They do not understand the modern system, leading them to litter and enhance the waste problem. However, Joseph assert that community management is more common in rural areas than in urban settings (2006, p. 865). Community leaders in the informal settlements of CW are known to take responsibility for municipal issues within their areas. Mr Thsigweda, a community leader within Havana Extension 1, state that he is one of 68 community leaders in the informal settlement of Havana (Ext. 1 to 7) with app. 16 000 residents. On a monthly basis the community leaders arrange clean-up competitions among the different neighbourhoods. This is clearly necessary because the SWD does not provide adequate SWM in the area. Furthermore, if this kind of organisation is a rural trait, then the idea purported by the SWD that village ways are counterproductive is dismissed, showing that participation can be expected where services are low.

5.5.3 Livelihood impacts

Environmental health is closely related to social equality within a community, through municipal organisation, as well as individual ability to stay healthy. van de Klundert and Anschutz highlights how pollution is never confined to one part of a city, but 'travels' in the form of communicable diseases and ultimately affects the entire city (van de Klundert and Anschutz, 2001, p. 11). The notion urban 'contagion' could be thought to extended to include other collective issues like economy and politics.

There is no doubt that proper waste management is a matter of importance for protection of public health (Joseph, 2006, p. 870). Local environmental conditions are connected to public health level, which has implications for the resident's livelihood opportunities. These implications can be seen as specific physical manifestations through illness, or as general concerns for living conditions, through low standards and connected hazard. This research has no scope for covering physical illness related to waste, while the general concerns and hazards are captured through interviews with residents. Finding the links between health and livelihoods connected to waste, demands a number of interconnected questions. The respondents' answers to questions on practical issues such as of waste disposal and collection have been presented above in connection to the SWD and Ward Contractors. Questions on the related nuisance and hazards associated with dumping and burning of waste will be presented below.

A case study from 2010 undertaken in the informal settlement of Greenwell Matongo will be presented below to illustrate that a wider awareness of waste impacts is possible. Residents of the informal area Greenwell Matongo on the northern border of Katutura identify a connection between poverty and bad hygiene and sanitation (Mchombu, 2010, p. 75). Residents point towards better public services and amenities as an aid out of poverty and for getting better livelihoods opportunities. This could also be related to the fact that poverty leaves people powerless and passive, and unable to actively participate or get educated on vital issues in their neighbourhood (Mchombu, 2010, p. 82). This could explain the discrepancy between the consciousness of negative impacts of waste, but the inability to seek out information or participate in pressing the municipality for delivering the services they are entitled to. Environmental conditions are related to lacking livelihoods opportunities, for example "the garbage collection is not effective, creating problems of cleanliness and littering and poor hygiene" (Mchombu, 2010, p. 91).

Figure 25: Children playing by a skip container in Katutura.

Source: Author (2014)

Waste disposal and collection

None of the residents had wheelie bins, only black bags with no option for recycling. Many of the respondents live in areas that experience infrequent waste collection and/or a lack of black bags, both of which lead to uncontrolled dumping of waste in public (see Figure 26). In inaccessible areas, where the SWD tipper truck team cannot reach, the waste is eventually set on fire. The burning of waste dumps is viewed by residents, SWM and Ward Contractors alike, as a necessity to keep neighbourhoods clean and hygienic. If waste is not collected for some reason this solution is acceptable, although illegal. According to Sakai, the traditional way to prevent spreading of disease is incineration of waste (Sakai et al, 1996, p. 346). Smoke from burning is hazardous to health, but the awareness of this is variable. When respondents were probed on this issue some articulated concern for the dangerous components of smoke from burning waste, while others did not mind the smoke at all.

Figure 26: Mixed waste between shacks in Okahandja Park.

Source: Author (2014)

As mentioned in relation to sanitation and public toilets, faecal matter is sometimes disposed of together with general household waste. The mixing of wastes present a specific health hazard when waste collection coverage or frequency is not optimal. The risk of contamination of ground water is also a possibility, especially in the new settlements where water, sanitation and waste services does not exist or is not functioning.

The main question on this topic was “Does dumping or burning of waste in public places affect you or your surroundings?” and “If yes, how?”. A few respondents saw no negative or positive impacts of waste. The rest mentioned negative impacts related to health and spreading of disease, and/or environment and the nuisance of smoke (see Figure 27). As expected no respondents mentioned their economic situation as related to waste. Probing into income or the connection between poverty and general state of affairs was most often met with a shrug indicating their surroundings, and comments such as “Look around, you can see we are poor”. The respondents’ negative accounts of lacking livelihood opportunities must be contextualised by the relational livelihoods approach of ‘social self’ and lacking entitlements.

Respondent refer to the impacts of waste in public as very practical; it smells bad, looks bad, scatters in the wind and spread disease when it rains. Also children play close to, and in, the waste which can be dangerous because of broken glass etc. but also linked to disease. Probing into health, environment or economy does bring vague, if any answers. As one illegal settler in One Nation put it "Everything here is a problem, waste is only one thing."

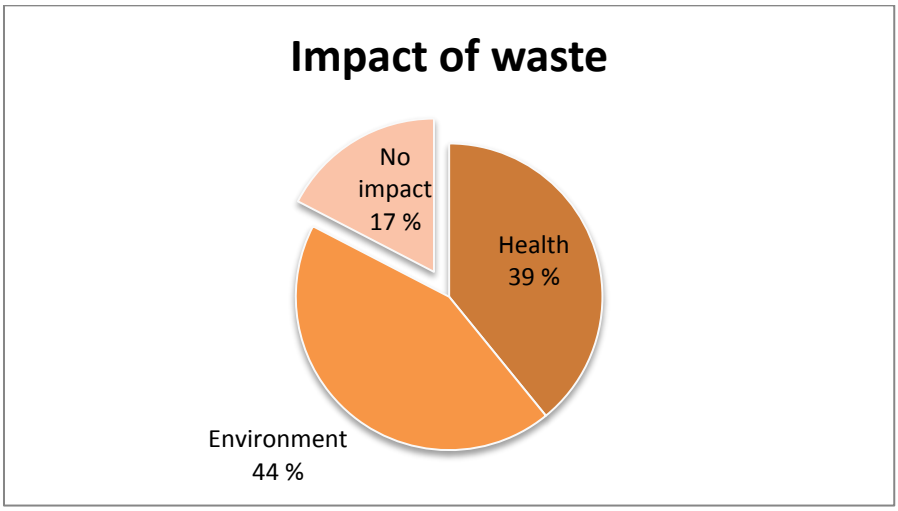

Figure 27: Impacts of waste.

Source: Fieldwork 2014

The residents may not always present a clear articulation of their complex situations in terms of conscious interconnections. The residents see their own livelihoods detached from the full SWM situation and organisation of CW. There are however a strong consciousness of the municipal service delivery on the one side, and their general adversity as informal settlers on the other side. Most residents have a consciousness of the practical implications of inadequate SWM, while they are also conscious of their low status in society as poor, marginalised, informal settlers; living as far removed from decision-making, as they are removed from the city centre itself. Impacts of SWM on livelihoods are the main research objective, and although the residents are aware of the dots, a wider analysis is required to connect them.

None of the respondents linked the general SWM situation with economic impacts, whereas the physical environmental and health impacts are frequently mentioned. Likewise, when asked about negative impacts of waste, the respondents mention practical problems (smoke, smell), but no conscious link between poverty and the waste situation is mentioned. The low service-level is in itself proof of their low standing in society. A woman running a volunteer soup kitchen for children in the informal area Goerangab Dam expressed strong awareness of what she wants: "I have lived here for 10 years and nothing is improving. We should have brick houses, with separate water and toilet, and then the neighbourhood would be cleaner."

5.6. Main stakeholders

Through the research and data collection in CW the main stakeholders within the SWM system have been identified, as well as the relationship between them. Stakeholders can be divided into three: community, private sector and local government (van de Klundert and Anschutz, 1999, p. 7). In CW the private sector is represented by two different actors with different roles. The Ward Contractors are part of a long-standing PPP on SWM controlled by the SWD through mutually binding service level agreements. Rent-a-drum is a nation-wide waste company who are almost exclusive in recycling handling and export, while they also deliver many of the same services as the SWD. The Solid Waste Management Division (SWD) represents the local government, while the residents are often represented by neighbourhood leaders or and ward leaders (see Figure 28).

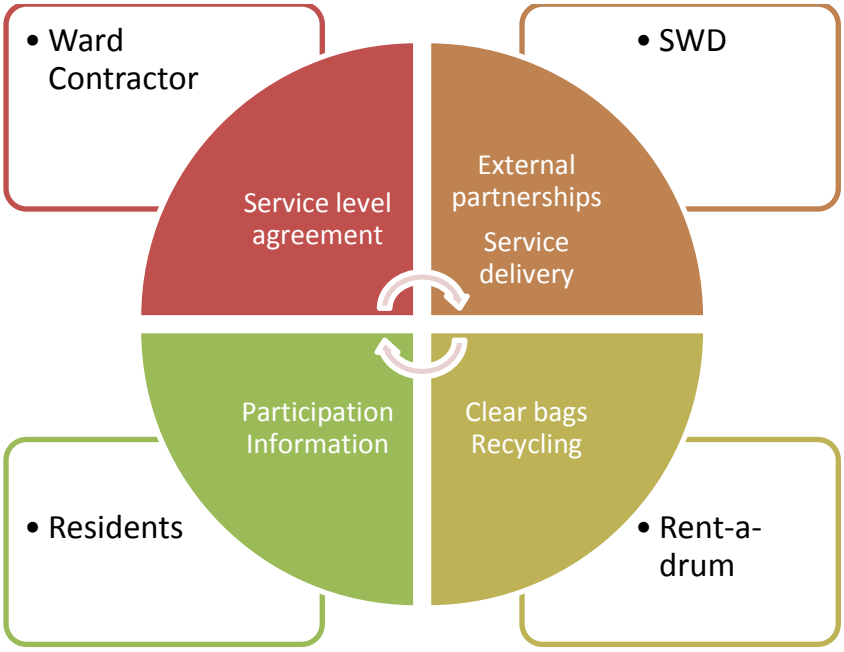

Figure 28: Main relationships within SWM system of Windhoek.

Source: Author (2014)

Chapter 6: Analysis

The analysis will utilise the theoretical framework to identify how the SWM system of CW is impacting on the livelihoods of the residents in the informal settlements. The findings identified connections and discrepancies in issues relating to the impact of waste on livelihoods, following the aspects of ISWM. The main principles behind ISWM; e*quity, effectiveness, efficiency and sustainability* are used to contextualise the findings of the SWM system and identify strengths and weaknesses.

6.1 Effectiveness

Effectiveness in SWM means that all waste is removed safely. Waste removal is a key factor in this research and includes the participation of all Stakeholders and Elements (WMH) within the SWM system. Effectiveness within SWM is the prime objective for the SWD as well as the Ward Contractors, and is of major concern to the residents of informal settlements.

First, the effectiveness of waste removal will be assessed through looking at Disposal and collection, before the issues of safety is evaluated through Dumping and burning.

6.1.1 Disposal and collection

Modes of waste disposal and collection vary across the city and within the informal settlements, depending on infrastructure, accessibility and property status of the residents. The municipality exhibits a great deal of flexibility in delivering their services, using various administrative, organisational and practical tools. This is good because one solution is rarely appropriate for all areas in a city. On the other hand, it could seem like the city centre and middle- and high- income wards receive the bigger part of the SWM budget, as these areas are a lot cleaner than the poor and informal settlement areas. The SWD explanation for this is twofold. First; the residents in richer wards are more educated about the SWM system and they also have individual resources to dispose of their waste properly. Second; the informal settlements are unclean due to a constant influx of uneducated illegal settlers with *village ways* which lead to infrastructural and participatory challenges.

SWD officials express a concern with keeping the most visible parts of CW clean as they attract economic investments and tourism. The fact that CW is concerned with their image can be positive if coupled with a concerted effort of keeping the entire population environmentally healthy, especially the less visible part of the population- namely the informal settlers. !

Informal settlers do not pay the municipality for SWM services. Most respondents are dissatisfied with some part of the municipal service delivery (see Figure 14). Identified areas of improvement among the residents include; receiving more information, opportunity to participate in decision-making, more formalised services by upgrading their disposal options (to black bags or wheelie bins), and more frequent collection. The strong demands for a more inclusive municipal service delivery can be interpreted as a wish to be treated as full citizens, and relate to the need to establish a healthy ‘social self’ that entails social justice and equity. Consequently, an inadequate SWM situation may lead to declining integrity for individuals and neighbourhoods, linking human integrity to ecological integrity (Costanza, Norton and Haskell, 1992, p. 236).

6.1.2 Dumping and burning

Inadequate removal of waste leads to dumping of waste in open spaces and public places, often in riverbeds and in or close to skip containers. Uncontrolled dumping of waste can be directly related to the spreading of illness and vector-borne diseases (Jäger and Kok, 2007, p. 321). Residents gather uncollected waste and it is burned by them or by the Ward Contractor employees. SWD refer to this as village ways of waste management and criticise it because it includes illegal practices of dumping and burning. However, burning of waste is accepted by the SWD and Ward Contractors, as well as the residents themselves as the healthiest option because it is cleaner than leaving the waste out in the open. It would seem like the village practice of waste management is functional because it provides clean surroundings. Unfortunately it does not ensure environmental health due to the smoke, which contains pollutants. Smoke does not bother the majority of respondents; only three of 19 respondents mention smoke specifically as a negative impact. This may be because they are used to it from the village, and accept it as a part of waste management. Burning is illegal, but also widely accepted on all levels of the SWM system as more healthy than leaving the waste to rot and scatter, as this would increase the risk of spreading disease.

Concerns of waste fires turning into house fires spreading through the neighbourhoods have been expressed by SWD and Ward Contractors, but it does not seem to impact on the practice of burning waste, maybe because it is seen as a necessity. Burning of waste is, the traditional, *village way*, of preventing spreading of disease (Sakai, 1996, p. 346). Controlled burning of waste in areas where collection is infrequent or lacking does seem to present a solution to the immediate health threats. The SWD could consider establishing official incinerators that are operated by the Ward Contractors out in the informal neighbourhoods.

6.2 Efficiency

Efficiency points to how the SWM system should strive to maximise benefits, minimise costs and optimise resource use. That is to say, managing waste in a way that is consistent with the economic, political and institutional framework of the specific location. Efficiency is important to maintain sustainability in a SWM system, as resources of any kind needs to be managed carefully to ensure long-term operation.

6.2.1 Resource optimisation

The SWD does not fully promote their central role within SWM, which opens for financial opportunities, for instance in recyclables. So far it seems as if CW has relinquished most of the entrepreneurial work of the recycling sector in the hands of private companies. SWD facilitates household recycling for Rent-a-drum through the already existing municipal waste

infrastructure in the formal areas. Rent-a drum makes a profit from collecting, handling and exporting recyclables to South-Africa. Although the government's role is not primarily to make money, a greater focus on recyclables could both minimise waste and increase revenue.

In a cost recovery perspective the informal settlements would be a new and untapped market for recyclables, as Rent-a-drum has only reached out to the formal households so far. Glass bottles can be highlighted as one of many options to minimise waste while increasing cost recovery rates within the SWM in CW. Due to a large proportion of shebeens (informal bars) in the north-western settlements, the amount of glass bottles is staggering. Large proportions are dumped or disposed of as general waste (see Figure 29).

Figure 29: Bottles dumped at the edge of Havana informal settlement.

Source: Author (2014)

6.2.2 Disposal options

Although most respondents would like to upgrade their waste disposal options to a more formalised level, there are obvious practical constraints. There would be no point for the SWD to issue wheelie bins to residents who live in inaccessible settlement area where the waste collection truck cannot drive. Issuing of black bags, and clear bags, is an investment by the SWD in the cleanliness of the informal settlements. If the black bags are valuable to the residents and used for other purposes, it only highlights the severe socio-economic situation they are in.

The disposal of human (faecal) waste must be mentioned in relation to this, because it is interrelated with the disposal of general waste when the two are mixed, causing waste to function as a cholera vector (Spies, 2010, p. 14). Sanitation is a vital issue to many of the respondents as the lack of proper toilet facilities presents a health hazard. The problems originating from disposal of human waste could be seen as more grave than the problems of disposal of general waste.

An upgrade of disposal options and collection frequency could encourage more sorting and recycling of waste, as the awareness of waste is already high in terms of keeping yards and neighbourhoods clean. Also, the waste competitions arranged by SWD and neighbourhood leaders in the wards demonstrate that the residents participation is important, adding to the SWM efforts of Ward Contractors.

6.2.3 Conflicting views

SWD seem to face an insurmountable challenge in providing SWM to areas that have doubled in size many times over since their establishment over 50 years ago. This could be especially challenging within a budget that does not seem to follow the same growth rate. Despite obvious flaws in the SWM system, the SWD Officials maintain that "the system is perfect; people only need to learn how to use it". This remark does not resonate with the residents who expect the municipality to deliver basic services, even if the residents are not able to pay for them. This dichotomous view, where the situation is viewed as basically hopeless, while the system is perfect creates a gap in understanding of reality between the public and the residents. Both the CW and the residents agree that the SWM challenges are enormous and difficult to solve. However, the CW escapes their responsibility when they claim that their system is perfect, and they transfer the responsibility to the residents by claiming that the real problem is uneducated residents not utilising the system. This could be interpreted as a defence mechanism for the SWD to deal with a problem many times surpassing the amount of resources allocated by the CW. The SWD is squeezed between the expectations of the residents and the limited budget from the CW, only exacerbating the disparity of experienced reality. So, the gap is filled with misplaced expectations, lacking communication, participation, trust and responsibility from both sides. Everyone in the CW is important stakeholders, although one could argue that the local government are in a stronger position than the poor residents of the informal settlements, to create change.

6.3 Equity

Equity means that all residents are entitled to an appropriate waste management system, and can be related to environmental health and pollution, as well as economic development and community sustainability (van de Klundert and Anschutz, 2001, p. 11).

6.3.1 Arrangements

CWs urban planning originates from the country's recent apartheid history. This is visible through the development of low-density suburbs with unequal prioritisation of infrastructure

and service delivery. Each citizens ability to utilise opportunities depends on the arrangements defined by social contexts, material circumstances and physical environment (van Dijk, 2011, p. 102). A city is one whole, where pollution can spread and socio-economic development is based on *all* the citizens' livelihoods, not only the middle- and high- income residents (van de Klundert and Anschutz, 2001, p. 11).

Missed business opportunities are mentioned by many SWD officials as an important consequence of an inadequate SWM system. An unclean city may inhibit economic development and investment (van de Klundert and Anschutz, 2001, p. 11). This argument favours a centrally located segment of the population who are in a position to benefit from foreign investments and tourism. Although there might be a conscious idea of the potential trickle-down effect within this market liberal argument, the perspective is geared towards the interests of the few, not towards the population as a whole. The practical consequences are a limited SWM budget being spread across the city, leaving the city centre spotless and the informal settlements in a dire state. Furthermore, SWD officials imply that the service delivery is kept low in the informal settlement so as not to encourage more illegal migration. This kind of directed and deliberate ineffectiveness of SWM is damaging to a society, because it leaves out a large proportion of the citizens. Even if these areas and citizens might not be the most visible, the magnitude of their livelihoods challenges should make them the centre of municipal attention.

6.3.2 Participation

The SWD holds a strong belief in the current waste management system, and put a lot of responsibility on the residents to follow up and use the system. This reflects the emphasis of the Waste Management Regulations where the responsibilities of the residents where highlighted, while the municipal responsibility was toned down (Windhoek Municipality, 2011). The SWD is aware that increased participation requires a massive information and education effort by the municipality. Most respondents hold the Municipality totally responsible for the SWM system and do not see themselves as important stakeholders in the process of improving the waste situation. Improvement of the SWM situation depends on resident inclusion and participation. Challenging the established power relations would be especially important to include the informal and illegal settlers (White, 1996 in Adams, 2009, p. 130).

6.3.3 Livelihoods impact

The municipal view of waste and livelihood is linked to macro level of economic issues; attracting investments to create economic growth, which will benefit everyone in the city. While the residents on the other hand are concerned with the micro level of physical issues

like smells, smoke, cleanliness and dirt impacting on their integrity, well-being and opportunities.

In general, the residents don't articulate an awareness of livelihood impacts from waste. However, their practical accounts of multiple waste related incidents can be interpreted and connected as livelihood impacts of waste, framed within the ISWM model and the various livelihood perspectives. Attitudes within CW and SWD towards linking waste impacts, livelihoods and awareness, are not clearly articulated in legacy or in practical organisation.

The livelihood perspectives connecting human and ecological integrity with a low 'social self' may explain the acceptance of unhealthy environmental conditions in poor settlement areas. The residents' low self-esteem curbs their expectation of public services, and their belief in participation and contribution to public services.

6.4 Sustainability

Sustainability refers to a SWM system that is suited to local conditions and viable from a technical, environmental, social, economic, financial, institutional and political perspective. It can maintain itself over time without exhausting the resources upon which it relies.

6.4.1 Foundations

The legislative foundations for the SWM system in CW present a solid framework that can serve the interests of various actors across the city. It might be a weakness that the legislation for the SWM systems is founded on the EMA and Waste Regulations, and not so much on the PHA and the Health Regulations. The main focus for the residents in the informal settlements is gaining decent living conditions in which they are capable of leading good lives. This depends on issues connecting health and environment, both of which should be at the centre of a SWM system. Community development through information and participation will enhance the awareness of connections between public health and environmental health (Botta, Comoglio, & Petrosillo, 2013, p. 1073). Strengthening this connection is supported by the link between human integrity and ecological integrity, which is necessary to create a sustainable local community (Costanza, Norton and Haskell, 1992, p. 236). More internal and external coordination could contribute to integration of actors in the SWM system, thus ensuring sustainability.

6.4.2 Internal coordination

For achieving sustainable solutions there must be full consensus among the main stakeholder as to what are the main objectives and (Joseph, 2006, p. 870). However, there might be a crumbling of responsibility of SWM in the informal settlements due to; fragmented areas of expertise visible through a lack of knowledge sharing and cooperation within the municipality and towards external institutions or businesses; responsibilities spread widely across both public and private institutions leading to an unclear division of responsibility; diverging expectations of who should initiate and maintain participation and partnerships; lacking political will through low financial priority; lack of routines and formal agreements between stakeholders and in partnerships.

The SWD claim their budget is too small to provide adequate services to everyone, but this might reflect a political will to decrease the number of immigrants in Windhoek, by keeping service levels low in the informal settlements. Respondents report that CW politicians promise informal settlements better infrastructure and resettlement during election time, only to forget later and not prioritise them in the budget.

SWD do not reach many of the newly established settlement areas through Ward Contractors due to infrastructural inaccessibility. This calls for alternative ways of disposal and collection, both in method, frequency and coverage. People do manage their waste by gathering and burning anyway, so the SWD could attempt to follow the residents' routines and systems to create a SWM system that is sustainable.

6.4.3 External cooperation

SWD is running a strong recycling campaign, but leave much of the actual work (as well as cost and profit) to private recycling firms, most notably Rent-a-drum. SWD officials frequently use the word "partnership", while this can be met with surprise by the "partners". Ahmed and Ali point out that although public-private partnerships may improve the efficiency of a SWM system, the cooperation must be designed to create incentives for both sectors (Ahmed and Ali, 2004, p. 467). As an example, the SWD and Rent-a-drum present widely different numbers in regards to recycling and its growth potential, pointing towards lack of information exchange and cooperative governance.

Although South-Africa may be the big brother in the south, Namibia would benefit from utilising the vast amounts of research on SWM undertaken in South Africa. In particular, the research done by CSIR in cooperation with the IWMSA and SADC could prove useful as it is regional and thus adaptable to the Namibian conditions (CSIR, 2000). Benefits may also be drawn from the former union between the countries through common legislative background, as they shared legislation up to 1989.

6.4.4 Improving SWM

Residents and Ward Contractor employees in the informal settlements express dissatisfaction with the current SWM situation. The residents make do and manage the waste within their possibilities; the yards are clean, and excess waste is gathered and burned to maintain good hygiene. However the respondents have clear ideas on what would improve the cleanliness of their neighbourhood. Wheelie bins are cleaner than the black bags, they also have bigger capacity. More frequent collection and more containers in the neighbourhoods would decrease the need for dumping and burning.

Residents often express there are too few containers in their neighbourhood, and they are right- in Havana of up to 20 000 residents there are only three containers. SWD claims that the need is not big because the containers are for garden refuse and rubble only and that residents in these areas do not have gardens or do much building activity. The residents, on the other hand, report that they dispose of all kinds of waste in the containers even if they might know that it is not for general waste, because the black bags do not cover their needs. When residents leave general waste in or close to skip containers they know that someone will clean it up. In this way the container areas work as an unofficial dumping site, like riverbeds and other open spaces. Although this arrangement does not follow SWD rules, it is functional because the waste disappears. Maybe this is where the SWD can improve; if they can't organise satisfactory collection they can provide more and adequate dumping sites/transfer stations in the informal areas, where people can dispose of their waste and learn about recycling and general waste handling.

Chapter 7: Conclusion

Legal, institutional and socio-economic needs will be identified through a final assessment of the SWM system and situation in CW, according to the ISWM model. A basic insight has followed the literature review, findings and analysis in this thesis- SWM challenges are not necessarily a question of money or technology, and may be related to issues like information and education as well as institutional capacity and political will.

7.1 Legal and policy assessment

The legal framework is securely founded, mostly in the Environmental Management Act (EMA), but also partly in the Public Health Act (PHA). The EMA is important to the regulations and policy concerning waste management, which is predominantly concerned with hazardous waste related to production and business. However, the challenges of general household waste are big in urban areas, and especially in the informal settlements, with more

than 1/3 of CW's population. In this respect the PHA might be more suitable as foundation for policies that centre on the health impacts of waste management than the EMA. Building policy and regulations on the PHA demands a greater focus on equity of service delivery, which will contribute positively to the health of all residents. For a society to develop, the entire population must be able to contribute, meaning that the entire population must be healthy. The Namibian Constitution of 1998 confirms that the State shall actively promote and maintain the welfare of the people by continual improvement of the public health for Namibian citizens (Republic of Namibia, 1998).

As seen in the example of the public toilets, responsibilities are dispersed within the municipality of CW. Although this might not be a problem, the fact that a large share of the toilets are not working points to a need for more internal cooperation. This could be achieved by utilising a balanced policy focus where the EMA and the PHA guide the different types of waste management in CW. The two acts could weigh differently depending on the very diverse needs for economic growth and livelihood opportunities among the residents of CW. The good governance features referred to by UN-Habitat include a clear division of responsibilities and control routines for evaluation, increasing the scope for improvements (UN Habitat: 2010, p. xxiii). Within this scope, the challenge is to further ensure that the national development objectives of job creation, empowerment of disadvantage groups, poverty reduction, local economic development and environmental sustainability can be achieved (Keyter, 2010, p. 6).

7.2 Institutional and operational assessment

All residents seem to manage their waste, one way or another. In formal settlement areas the waste is disposed in wheelie bins; in informal settlement areas black bags are collected at households or along the street. Uncollected waste is gathered and burned by residents or Ward Contractor employees. Skip containers, satellite sites and transfer stations are utilised by the residents depending on their location and circumstances.

The SWD express doubts about their role and responsibility for the waste management situation in the informal settlements due to lacking property rights and land tenure status among many of the residents. Providing services for the entire informal settlement areas and illegal settlers seems almost as hard for the municipality as it is for the informal settlers to move out of poverty and improve their livelihood opportunities. A waste officer stated that if an illegal resident called in a waste related complaint he could only ask where the resident lived and he could send the police there and tear down his house. The communication and trust between the SWD and the residents appear weak and lacking of clear guidelines in all relations- between the SWD and the Ward Contractor, between the SWD and the residents, between the SWD and Rent-a-drum, between the residents and the Ward Contractor. Providing all residents with an effective SWM system which is also resource-efficient would demand a greater emphasis on integration of SWM actors and external coordination. Communication and cooperation relies on professional institutions where trust and

transparency is paramount. External cooperation like public-private partnerships could lead to higher efficiency and effectiveness, which in turn would increase the sustainability of the SWM system.

However, a common understanding of goals within the national and municipal system is of principal concern; an action plan based on community participation, institutional and human resource optimisation, financial support and cost recovery, as well as public-private partnerships, and legislative supporting foundations (Joseph, 2006. p. 869).

7.3 Socio-economic assessment

Waste in itself is not the single largest challenge for residents in the informal settlements; waste is part of a bigger problem. Waste is one of many symptoms pointing towards a basic problem of low livelihood opportunities, exemplified by lacking amenities and services such as sanitation, water and electricity. In addition, issues like public health care, education, public transport and unemployment concern the residents in these areas are. The marginalised situation of the constantly rising numbers of urban poor in informal settlements is often static due to their peripheral position and priority in CW. The growing demand for public services through the continual expansion of the informal settlements seems to leave the CW and SWD, as well as the residents themselves, paralysed. Within this scenario of major livelihood challenges, waste is only one of many shortfalls that need improvement to increase livelihood opportunities.

The level of equity in a city is visible through physical arrangements of urban design which is closely linked to the organisation of service delivery. The arrangements have consequences for people's livelihood opportunities through health, perception of 'social-self' and economic possibilities. This, in turn, has negative impacts for the city's economy as a whole because sustainability of development is hard to achieve without equity.

The visual surroundings are important to the municipality because it makes CW an attractive town for investment and tourism. But a society is never stronger than its weakest links, so the CW should focus on improving the lives of their residents instead of pleasing tourists and foreign investors. Even if the idea of "what is good for business is good for everyone" is strong in CW, there are certain steps that must be taken to ensure the sustainability of all Windhoek´s residents, and their environment.

Due to faulty collection coverage in the informal settlements, dumping and burning is frequent, with consequences for the livelihoods of residents. Decreased livelihood opportunities among residents have negative consequences for the development of a city, region and country. In this way the general importance of proper waste management for development can be illustrated through economy, environment, health and management. This point can also be confirmed by looking at the positive effects of SWM, predominantly in the middle- and high-income areas of CW.

7.4 Recommendations

The recommendations form a concluding remark, summing up the topic, research findings and analysis outcomes.

The residents manage their waste in numerous ways, depending on the nature and coverage of SWM in their neighbourhood. In this way the residents show awareness of the connection between waste and environmental health. The SWD could learn from the respondents' way and use their coping strategies to create local solutions. Sustainability of the SWM system could be enhanced by integrating local solutions into the SWD operations through community participation. This could include knowledge of suitable temporary dump-sites, local incinerators in particularly inaccessible areas and neighbourhood sanitation solutions. Legislative support exists for developing the SWM institutions into more local operations geared towards the poor settlement areas and its residents. A focus on the community level and socio-economic aspects of SWM could secure the four main principles of ISWM: *Effectiveness* through information; residents who know the SWM system is more likely to use it correctly. *Efficiency* through participation; residents could contribute to optimisation of resources through local knowledge. *Equity* by improved 'social self'; residents are encouraged to change their livelihood arrangements. *Sustainability* as an intersection between principles and practice; ensuring that technical, environmental, social, economic, financial, institutional and political perspectives are locally grounded to ensure longevity.

A shift in scope and focus of service delivery from the SWD, where the north-western informal settlement areas are given higher priority within CW, would be advisable. Practically this could include a larger focus on information and education coupled with disposal and recycling options customised to fit the different areas across the city. In this way participation would ensure integration of the system at a local level, creating a sustainable SWM system that can support a range of livelihood opportunities of all residents.

This research contributes to the knowledge and understanding of the impact of municipal service delivery, and specifically waste management, in urban informal settlements of developing countries. Further studies on the role of municipalities as change agents, both in relation to external cooperation with communities and private businesses, as well as good governance features through internal coordination, are recommended.

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Appendices

Appendix A

Interview guide, residents

Part I: Identification data

1. Interview number:
2. Ward name:
3. Type of ward:
    a. Formal
    b. Informal
    c. Illegal
4. Type of respondent:
   Resident
   Business
5. Sex:
6. Education:
   Never been to school
   Primary
   Secondary
   University
7. Employment:
8. Number of people in your household:

Part II: Residents and their waste

9. Do you have wheelie bins at your house/stall?
   Yes No

10. Is any of the waste sorted before disposal?
    Yes No Do not know

11. Is the waste collected?
    Yes No Do not know

    If collected

12. How often is it collected?
    Once a week Twice a week Other
13. Who collects the waste?
    Municipality Private contractor Other

16. Are you happy with the waste collection?
    Yes
    No
    Why not?

Cost/collection frequency/other

If not collected

14. Why is it not collected?
15. How do you throw away your waste?

Container Pit for burning Other Do not know

16. Are you happy with how the waste (in public) is removed?

17. Why/Does dumping and/or burning of waste in public places/open spaces occur in your neighbourhood?

18. Does dumping or burning of waste in public places affect you or your surroundings?

Yes No Do not know

If yes, how? Health/disease Local environment/air Income

If no, why not?

Part III: Awareness and participation

19. Who are responsible for the waste management in your neighbourhood?
    a. Local residents
    b. Municipality
    c. Private contractors
    d. Others

20. Do you receive any information or education on waste management?

Yes No Do not know

If yes: What kind of information do you receive concerning solid waste management?

a. Practical
b. Health
c. Environment
d. General awareness

21. How do you receive this information?
    a. Cell-phone

b. Internet
c. TV or radio
d. In school
e. Public meetings
f. Community leader
g. Other ways

22. Do you feel that you get the information you need?
Yes No Do not know
a. If no, what kind of information do you need?

23. What is your overall impression of the waste management in your neighbourhood?

Good Satisfactory Bad

a. Why?

24. Could something be different in the waste management situation in your neighbourhood?
Yes No Do not know

a. If yes, how?

b. If no, why not?

25. Who should participate in the change?
a. Residents
b. Neighbourhood/community leaders
c. Private Contractor
d. The City of Windhoek

26. Anything else you would like to add?

Appendix B

Interview guide, SWD

Part I: Identification data

1. Name:
2. Sex:
3. Position in Division:
4. Number of employees in Division:

Part II: Residents and their waste

5. What are the main sources and composition of waste in Windhoek?

6. How is the waste management organised in terms of areas, frequency and service-fees?
    a. Collection:

    b. Public places:

    c. Why does illegal dumping and burning of waste occur?

7. How does the City/Division/Ward handle illegal dumping and burning of waste?

8. What impact does illegal dumping or burning have on the residents/the neighbourhood? Health? Income? Environment? Livelihoods?
    a. Are there any connections between the impacts? E.g. health impacts on income impacts on livelihood?

Part III: Awareness and participation

9. Who do you think are the main stakeholders for the City in waste management?
    a. Private entrepreneurs/businesses:
    b. CBOs:
    c. Residents:
    d. Others:

10. How is awareness for waste management in the public addressed by the Division?

    a. What kind of information issued:

    b. How is the information dispersed:

11. What kind of participation is expected/encouraged from the public?

    a. What kind of incentives is given to encourage participation?

12. How is livelihood (health/income/environment) in the Wards addressed by the City/Division?

    a. Legislation/regulation/policy:

    b. Implementation/projects:

Part IIII: The Ward Contractor System

13. How is the Ward Contractor System organised?

    a. Do the WCS function in the same way for the whole city?
       Yes…. No…. Do not know…
    b. If yes, why:
    c. If no, why not:

14. Does the Ward Contractor System encourage local participation and awareness?

15. How do you believe the waste management system in Windhoek can be best improved?

Appendix C

Interview guides, Ward Contractors and employees

Part I: Identification data

16. Ward:
17. Sex:
18. Highest level of education:
    - Never been to school
    - Primary
    - Secondary
    - University
19. Position in WCS:
20. Years of employment in WCS:
21. Number of employees in your company/ward:

Part II: Waste in the Ward

22. Is working with the Ward an attractive job?

    Yes No Do not know

23. Income: Good Satisfactory Bad
    Health: Good Satisfactory Bad
    Working environment: Good Satisfactory Bad

24. Are there local sorting, reusing or recycling options within the ward?

    Yes No Do not know

    a. Do you use clear bags?

25. Does dumping/burning of waste in public places/open spaces occur in the ward?

    Yes No Do not know

    a. Why do you think it occurs?

26. Does dumping or burning of waste in public places affect local residents?

Yes No Do not know

a. Health/illness
b. Income
c. Local environment/smell

Part III: Livelihoods and participation

27. Who do you think has the main responsibility for waste management in Windhoek?
    a. Local residents
    b. Ward Contractors
    c. The City of Windhoek
    d. Others

28. Are residents in the informal settlements aware of the negative consequences of waste?

    Yes No Do not know

29. How can/do residents in the informal settlements participate regarding waste management?

30. Are there incentives for the residents to participate?

    Yes No Do not know

31. How could the waste management be improved and who should participate?

Appendix D

City of Windhoek

SOLID WASTE MANAGEMENT POLICY

THE CITY OF WINDHOEK

SOLID WASTE MANAGEMENT POLICY

TABLE OF CONTENTS

ACRONYMS & ABBREVIATIONS

BPEO	Best Practicable Environmental Options
CP	Cleaner Production
HCRW	Health Care Risk Waste
IWMP	Integrated Waste Management Plan
EA	Environmental Assessment
EIA	Environmental Impact Assessment
SWM	Solid Waste Management
WIS	Waste Information System
WM	Waste Management

DEFINITIONS[1]

Bag	means any bag stipulated or approved by the Council from time to time, whether supplied by the Council or not, made of plastic or any other suitable material for the storage, depositing, collection and disposal of waste;
Builder's waste	means any waste generated during the building, construction, repair, alteration, renovation, excavation or demolition of any road, surface, structure, building or premises, and includes builders rubble, earth, vegetation and rock displaced during such building, construction, repair, alteration, renovation, excavation or demolition;
Bulky waste	means any waste which by virtue of its mass, volume, shape, size, quantity or temporary extraordinary generation cannot be conveniently stored in a refuse container stipulated or approved by the Council or which cannot be conveniently removed or disposed of during the ordinary municipal service;
Business waste	means any waste generated on any premises used for non-residential purposes, but excluding agricultural properties and small holdings, and does not include general waste, household hazardous waste, garden waste, bulky waste, builder's waste, industrial waste, hazardous waste and health care risk waste;
Composting facility	means a facility for the purposes of receiving, processing or composting of garden waste, other organic materials or otherwise compostable waste authorised by the Council, but does not include a satellite centre;
Council	means the Municipal Council of Windhoek and includes any authorised committee, functionary or official;
Council site	means any waste management, collection, processing, satellite or disposal site operated and/or owned by the Council;
Disposal	means the discharge, depositing, dumping, spilling, leaking, placing of waste on or at any premises or place set aside by the Council for such purposes, and "dispose" shall have a similar meaning;
Dump	means to dispose of waste in any manner other than a manner permitted by law and includes, without derogating from the generality of the aforegoing, to deposit, discharge, spill or release waste, whether or not the waste is in a container or receptacle, in or at any place whatsoever, whether publicly or privately owned, including but not limited to vacant land, rivers, waterways, catchments and sewage and stormwater systems. The act of "littering", which retains its ordinary meaning, is excluded from the definition of "dump";
Garden waste	means any waste generated as a result of normal gardening activities and includes plants, leaves, grass cuttings, flowers, weeds, hedges, other small and light organic matter, but does not include branches, stems, trunks or roots having a diameter or length in excess of that stipulated by the Council from time to time;
General waste	means any waste generated on or at any premises used - (a) for residential purposes, and includes agricultural properties and small holdings; or (b) as public and/or private facilities and institutions but does not include garden waste (unless specifically determined or authorised by the Council subject to any conditions or limitations the Council may impose), bulky waste, business waste, builder's waste, industrial waste, hazardous waste and health care risk waste;

1 For a comprehensive set of definitions please read in conjunction with the Draft Solid Waste Management Regulations. The definitions have been kept brief in the Policy document.

Hazardous waste means -

(a) any waste containing, or contaminated by, poison;
(b) any corrosive agent;
(c) any flammable substance having an open flash-point of less than 90 degrees Celsius;
(d) an explosive or radioactive material and substance;
(e) any chemical or any other waste that has the potential even in low concentrations to have a significant adverse effect on public health or the environment because of its inherent toxicological, chemical, ignitable, corrosive, carcinogenic, injurious and physical characteristics;
(f) any waste consisting of a liquid, sludge or solid substance, resulting from any manufacturing process, industrial treatment or the pre-treatment for disposal purposes of any industrial or mining liquid waste, which in terms of any law, order or directive relating to drainage and plumbing may not be discharged into any drain or sewer;
(g) the carcass of a dead animal; and
(h) any other waste which may be declared as such by Council or in terms of any other applicable law

but excludes household hazardous waste;

Health care risk waste includes –

(a) any waste, whether infected or not, resulting from a medical, surgical, veterinary or laboratory procedure on humans or animals, such as blood, body fluids, tissue, organs, body parts, extracted teeth, corpses (excluding corpses intended for burial);
(b) used medical equipment and other medical material which is capable or is reasonably likely to be capable of causing or spreading disease or causing or spreading infection, such as used surgical dressings, swabs, blood bags, laboratory waste, blood collection tubes, colostomy- and catheter-bags; gloves, drip bags, administration lines and tongue depressers;
(c) contaminated and uncontaminated sharps, including clinical items which can cause a cut or puncture or injection, such as needles, syringes, blades and microscope slides;
(d) pharmaceutical products which have become outdated or contaminated or have been stored improperly or are no longer required, such as human and animal vaccines, medicines and drugs;
(e) genotoxic chemical waste and radio isotopes from experimental or diagnostic work or any other source;
(f) radioactive material or substances generated at health care facilities provided these are not governed by other applicable legislation;

Household hazardous waste means any waste, excluding garden or bulky waste, generated as a result of housekeeping, maintenance or repair activities on or at any premises, or accumulated, stored or deposited on such premises, used –

(a) for residential purposes, and includes agricultural properties and small holdings; or

(b) as public and/or private facilities and institutions.

which by reason of its nature, composition, toxicity, type, quality, quantity or volume causes or may cause a nuisance, public health risk or pollution;

Industrial waste means any waste generated as a result of business, commerce, trade, wholesale, retail, professional, manufacturing, maintenance, repair, fabricating, processing or dismantling activities, but does not include general waste, garden or bulky waste, builder's waste, business waste, hazardous waste or health care risk waste;

Integrated resource management means the manner and efficiency in which resources such as raw materials, or any other product or material, energy, and water are consumed or used;

Integrated waste management means an holistic and integrated system and process for the generation, storage, sorting, recovering, reuse, recycling, reprocessing, collection, transport, treatment, and disposal of all wastes, aimed at –

(a) compliance with national legislation, policies and guidelines;

(b) waste elimination, prevention and waste minimisation at source;

(c) achieving the objectives of the waste management hierarchy set out in regulation 5;

(d) managing the impact of waste on the receiving environment and remediating damaged environment;

(e) safeguarding principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations; and

(f) ensuring sustainable development;

Litter means any object or matter which is discarded by a person in any place except in an approved refuse container provided for that purpose or at any place or site approved by the Council;

Policies includes any policy, plan, guideline or strategy adopted by the Council from time to time in connection with any municipal service rendered or offered by the Council;

Pollution means any change in the environment caused by –

(a) any waste, substance or matter; or

(b) noise, odour, dust or heat, emitted from or caused by any activity, including the storage or treatment of any waste, substance or matter, building and construction, and the provision of any service, whether engaged in by any person or an organ of state

if that change has an adverse effect on public health or well-being or on the composition, resilience and productivity of a natural or managed ecosystem (both short term and long term), or on material useful to people, or will have such an adverse effect in the future;

Recovery means the process or act of reclaiming or diverting from waste any materials, products or by-products for the purposes of being reused, or collected, processed and used as a raw or other material in the manufacture of a new, recycled or any other product, but excluding the use for purposes of energy generation;

Recyclable waste means waste which has been separated from the waste stream, and set aside for purposes of recovery, reuse or recycling;

Recycling means the process or act of subjecting used or recovered waste materials, products or by-products to a process or treatment of making them suitable for beneficial use and for other purposes, and includes any process or treatment by which waste materials are transformed into new products or base materials in such a manner that the original waste materials, products or by-products may lose their identity, and which may be used as raw materials for the production of other goods or materials, but excluding the use for purposes of energy generation, and "recycle" shall have a similar meaning;

Recycling facility means a facility which receives any waste, materials, products or by-products for the purposes of recovery, reuse or recycling, and includes a buy-back centre;

Reduction means the process or act of reducing the nature, type, quality, quantity, volume or toxicity of any waste generated, and "reduce" shall have a similar meaning;

Refuse container means any receptacle or other container, including a skip, stipulated or approved by the Council from time to time, whether supplied by the Council or not, for the storage, depositing and disposal of waste;

Reuse means the process or act of recovering waste materials intended for the same or different purposes without the alteration of physical and chemical characteristics;

Satellite site means a facility which receives and temporarily stores –

garden waste, but does not include a composting facility;
specified general waste already separated at source which has the potential for recovery, reuse or recycling; and/or
(c) any other waste authorised by Council

for the purposes of recovery, reuse, recycling, composting or final disposal, and which is transported to the satellite centre in a vehicle not exceeding one ton payload, but does not include a transfer station unless the satellite centre is situated on the same premises or land as the transfer station;

Separation means the process or act of sorting and separating, at the point of origin, different materials found in any waste in order to promote and facilitate recovery, reuse and recycling of materials and resources, and "separate" shall have a similar meaning;

Storage means the temporary storage or containment of any waste for a period of less than 90 days after its generation and prior to its collection for recovery, reuse, recycling, treatment or disposal;

Tariff means the tariff, charges, fees or any other monies payable to the Council for the collection, removal and disposal of any waste, or any other aspect of rendering the municipal service, as determined by the Council from time to time;

Transfer station means a permitted facility which –

(a) receives and temporarily stores any waste, and which may include or house separate facilities on the same premises for the sorting, separation, recovery, reuse or recycling of waste;
(b) transfers waste into any other container or receptacle, or into or onto any vehicle or any other means of transport prior to its final disposal;
(c) unless permitted by any other authority, does not include the operations or premises of a waste contractor who receives, temporarily stores, sorts, separates, converts, treats, transfers, handles or otherwise processes waste prior to its final disposal as an activity directly or indirectly related to his business; and
(d) may include a satellite site;

Waste means any substance or matter whether solid, liquid or any combination thereof, irrespective of whether it or any constituents thereof may have value or other use, and includes –

(a) any undesirable, rejected, abandoned or superfluous matter, material, residue of any process or activity, product, by-product;
(b) any matter which is deemed useless and unwanted;
(c) any matter which has been discarded, abandoned, accumulated or stored for the purposes of discarding, abandoning, processing, recovery, reuse, recycling or extracting a usable product from such matter; or
(d) products that may contain or generate a gaseous component

which may originate from residential, gardening, business, commercial, trade, industrial, educational, agricultural, medical, building and demolition activities, and any other activities, and further includes industrial waste, hazardous waste and health care risk waste;

Waste contractor means any person, excluding the Council, required to be licenced in terms of Chapter 6 of the Regulations who collects, stores, transports, deposits, disposes, treats, handles or cleans up any waste generated by any other person, but does not include any person who -

(a) collects, deposits or disposes any garden, bulky, household hazardous and builder's waste, unless such person does so for commercial gain or as core business
(b) subject to the provisions of these Regulations collects, deposits or disposes any waste for the purposes of recovery for reuse or recycling, unless such person does so for commercial gain or as core business
(c) is exempted by Council from obtaining a licence;

Waste disposal site means any facility or site which receives waste for treatment or disposal, and which is authorised to accept such waste, or if such a facility is an incinerator, subject to the provisions of regulation 20, and any possible registration or other permission as may be required by any other applicable law;

Waste generator means any person whose activities produce any waste and, if that person is not known the person who is in possession and/or control of that waste;

Waste information system means an information system that records the manner in which waste is generated, managed, treated and disposed of within the municipal area;

Waste inspector means any official appointed and authorised by the Council in terms of Chapter 7 of the Regulations to administer, implement and enforce the provisions of the Regulations and any other waste management related regulations promulgated by the Council;

Waste management hierarchy means the theoretical framework that acts as a guide and orders the preferred waste management options which should be considered when assessing the Best Practical Environmental Option;

Waste management plan means a structured document that sets out to record/eliminate/reduce/reuse/recycle the amounts and the types of all waste that is generated in an area or facility;

Waste minimisation means any activity, process or act involving the prevention, elimination or reduction of the amount, nature, type, quality, quantity, volume or toxicity of waste that is generated, and in the event where waste is generated, the reduction of the amount, nature, type, quality, quantity, volume or toxicity of waste that is disposed of.

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- Government ministries
- Regional Council

Special thanks also go to the City of Windhoek Councillors and employees in their various capacities for their relentless support in making this Policy a reality.

Lastly, the City would like to thank you, the community of Windhoek, for your support and continued efforts and involvement in solid waste management initiatives.

The City of Windhoek trusts that the participatory approach taken in the development of the Policy will be the spirit in which the Policy is implemented and that it will be used by all as a strategic tool to guide waste management activities in all sectors.

FOREWORD

The city of Windhoek being the capital of Namibia is not only known as the hub of economic activity in Namibia but also as a tourist city which boasts of beautiful infrastructure, people and a clean environment. Windhoek is worldly renowned as one of the cleanest cities in Africa if not the world, a status which the residents of Windhoek carry proudly and seek to protect.

This level of cleanliness has been achieved through cooperative efforts between various tiers of Government, through the support of political leaders and willingness by the residents to maintain the city of Windhoek clean. It does however come at a costs and the City of Windhoek is continually looking at ways to minimise such costs through the optimisation of systems and resources.

Environmental management is fast becoming a central discipline worldwide and concepts such as sustainable development, cleaner production and pollution prevention are continually brought to the attention of us all, over the last few years. The government of Namibia has embraced the importance of environmental conservation through the inclusion of environmental aspects in our legislation, policies and vision 20/30, a decision which will benefit the entire country. The City of Windhoek equally supports all efforts towards environmental conservation and is equally committed towards ensuring that Windhoek be considered not only a clean city, but ultimately a "green" city.

As part of the commitment towards ensuring increased sustainability of the services rendered, the City of Windhoek saw it fit to compile a Solid Waste Management Policy which will provide the foundation for all waste management activities in Windhoek. A regulatory framework in the form of Solid Waste Management regulations will serve to enforce, promote and support the principles within the Policy.

At the heart of this SWM Policy is the Waste Management hierarchy whose principles will direct future waste management activities. The SWM Policy introduces a mind-shift from the conventional pollution control approach to that of waste prevention and minimisation first, followed by reducing, reusing and recycling of waste and disposal only as a last resort. Any waste management activity will henceforth have to implement principles of the waste management hierarchy and any waste generator be it household, industry or institution will similarly have to implement measures to ensure waste prevention and minimisation.

The Policy also recognises the nutrient and market value of waste and how the proper management thereof can produce opportunities for job creation and community empowerment. The City of Windhoek will continually strive towards finding markets and providing streams to allow for the reuse and recycling of recyclable material thus ensuring that, the waste which is generated is harnessed before considered for final disposal. Through the SWM Policy and Regulations, integrated waste management plans and strategies, the City of Windhoek envisages a situation where waste is minimised at source, re-used, recycled and only disposed as a last resort.

The City of Windhoek has since realised that it will not win the war on waste solely by picking up waste and has thus put measures in place to ensure sustainability of all waste management efforts through education and awareness raising.

The City of Windhoek is confident that through the implementation of the SWM Policy, enforcement of regulations, education and awareness raising the mind-shift from pollution control to pollution prevention and minimization will be successfully bridged and foresees a future where waste is seen as a resource rather than a nuisance.

I would hereby appeal to all residents for their continued support in maintaining a clean city and in embracing the principles of the SWM Policy in order to improve the cleanliness of the city.

Councillor M. Shikongo

Mayor: City of Windhoek

1. INTRODUCTION

Namibia, like any developing country, and in particular the city of Windhoek, is characterised by a rapid growth in its population, accelerating urbanisation, increased economic activity, rising living standards and a constant demand for improved services. As a consequence of increased economic growth there is a marked and directly corresponding increase in the amounts and types of waste generated. The City of Windhoek has the responsibility of ensuring that all development that takes place is sustainable and does not negatively affect the environment and human health and well being.

The City of Windhoek is taking a proactive approach to waste management in the development of a Solid Waste Management (SWM) Policy and Regulations. Current waste management practices are well run and organised, however the City of Windhoek has realised that the current system which is mostly focussed on delivering end-of pipe treatment and pollution mitigation services; cannot continue. An alternative, more sustainable and hence resource efficient approach must be adopted in line with the principles of the Integrated Waste Management Hierarchy.

The main objective of this Policy is to provide a framework through which the management of waste, irrespective of the nature, toxicity and quantity, shall be governed in Windhoek. The Policy further aims to ensure that the management of waste is done in such a manner that the risk of the impacts of waste on the residents and the environment is minimised. Through the Policy, strategic objectives have been developed to ensure that there is a paradigm shift from waste generation and disposal to waste minimisation in terms of prevention and increased re-use and recycling.

The objectives contained within the SWM Policy are focussed on decreasing the amount of waste generated per capita in the first place as well as decreasing the amount of waste and its toxicity that is subsequently treated and landfilled. Waste minimisation intervention focussing on preventive measures is required at the industry level through cleaner and more efficient production, and also from the public through more waste-wise product choices. This is also called the combined resource management strategy of Sustainable Consumption and Cleaner Production (SCCP).

This Policy will form the foundation for all SWM activities within the city of Windhoek. The Solid Waste Management Regulations will promote and support the principles within the Policy whilst establishing the necessary regulations on which strategies can be developed.

2. VISION

The vision of the SWM Policy encompasses the concepts of integrating all required waste management activities based on the minimisation of pollution and waste across various sectors, as well as the management of waste activities in accordance with the Principles of the Integrated Waste Management Hierarchy. Through the SWM Policy, the City of Windhoek aims to maintain control over all waste management activities within its area of jurisdiction, including industrial, business, institutional and household levels.

Through education and awareness raising activities sustainable waste management practices will be upheld at all times (including waste minimisation, re-use, recycling and alternative treatment methods) by all relevant public and private stakeholders.

The Policy recognises that sound waste management relies on having efficient and effective organisational structures and must ensure the active participation of all stakeholders throughout the community.

The importance of community participation cannot be overlooked in the successful implementation of any Policy and the exchange of information in particular concerning current identified gaps and empowerment opportunities, through the sharing

of knowledge is encouraged. The Policy calls not only on the utilisation of regulatory tools but also encourages the development of specialised financial regulatory instruments such as powerful economic waste minimisation incentives (or where required penalties and other financial disincentives to curb unnecessary waste generation). This is done in order to better implement the principles that govern it and create a natural drive to readily follow its requirements without the need of extensive enforcement. The Policy therefore encourages an approach of consultation, partnerships and co-operation amongst industry, the public and government.

3. PRINCIPLES GOVERNING THE SWM POLICY

The City of Windhoek is committed to continue providing an efficient waste management service and in order to achieve this, the City of Windhoek has adopted the following principles governing the SWM Policy as stipulated below:

- Integrated Waste Management Hierarchy
- Sustainable Development
- Sustainable Consumption & Cleaner Production (SCCP)
- Polluter Pays Principle
- Duty of Care
- Best Practical Environmental Option (BPEO)

3.1 Integrated Waste Management Hierarchy

The integrated waste management hierarchy is a concept that promotes waste avoidance through prevention and general minimisation ahead of any reuse, recycling, treatment and disposal. Waste avoidance and reduction should be the first option, if waste cannot be avoided, then efforts should be made to minimise the quantities generated. Once all avoidance and minimisation options have been explored then on-site recovery, reuse and recycling should be considered. Only as a last resort should treatment and disposal be considered and accepted in accordance with the ultimate objective of this Policy. The hierarchy will serve as an important corner stone guiding the formulation of further waste related policies, strategies and programs. The emphasis will be placed on gearing all waste management activities in line with the principles of the waste management hierarchy.

Figure 1 provides a graphic illustration of the principles that will be used to promote more sustainable waste management systems within the city of Windhoek.

Figure 1: Principles of the Waste Management Hierarchy

3.2 Sustainable Development

Sustainable development is defined as "development that meets the needs of the current generation without compromising the ability of future generation to meet their needs"[2]. Industrial operations should be more efficient in resource use, generate less and less toxic waste/pollution and where possible make use of renewable resources and minimise effects on human health and the environment. Waste management practices should be such that their impact does not deny future generations their right to a clean and healthy environment.

Sustainable development is a holistic view of development, which can be further divided into more manageable aspects, including cleaner production and sustainable consumption. These

two concepts provide a means to achieving the overall aim of sustainable development.

2 Bruntland, 1987. http://www.un-documents.net/wced-ocf.htm

3.3 Cleaner Production & Sustainable Consumption

3.3.1 Cleaner Production

Cleaner Production is a concept based on the continuous improvement of processes; housekeeping, raw material input and products to increase efficiency, whilst reducing the potential impact to the environment and human health.

The essence of this approach is characterized by a need to avoid, eliminate, prevent or significantly reduce the causes of environmental problems as opposed to managing the impacts, wastes and emissions arising downstream of the product or service life cycle. Cleaner production is encouraged in every industry in terms of the triple bottom line approach; i.e. financial, environmental and social benefits.

Waste minimization is one aspect of cleaner production that involves the avoidance of generating waste in the first instance, and where waste cannot be avoided, it refers to minimizing waste to landfill through alternative methodologies, e.g. recovery, re-use and recycling.

The City of Windhoek embraces the principles of cleaner production and waste minimisation and may require all industrial and manufacturing companies presently and in the future to follow these principles through the SWM Policy and Regulations.

Waste prevention through cleaner production intervention can take place for any process at the levels as shown below in Figure 2:

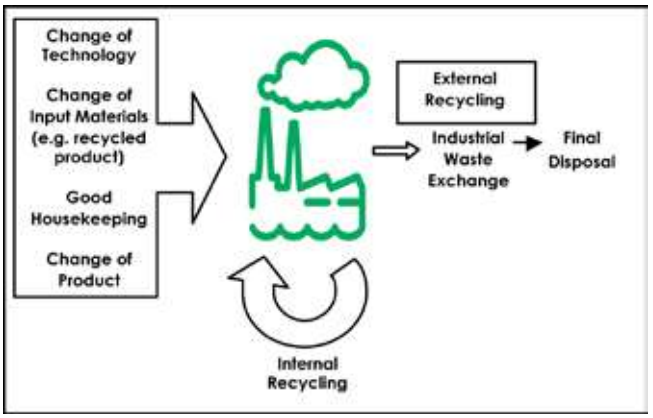

Figure 2: CP Techniques

3.3.2 Sustainable Consumption

Sustainable consumption is a further principle that the City of Windhoek embraces in terms of the holistic approach to waste management.

Sustainable consumption is based on less resource intensive consumption by the public, business & industry that would lead to waste prevention and a dramatic reduction of waste going to landfill. While there is no clear definition found globally on "sustainable consumption" the key features are to:

- Purchase and use only what is required to satisfy human need favouring a good quality of life through decent but not decadent standards of living
- Looking at the "cradle to grave" cycle of a product in terms of performance when purchasing in order to make more "waste-wise" choices

The City of Windhoek will endeavour to raise awareness of both the residents of Windhoek and other tiers of government on the principle of sustainable consumption, whilst not endangering the economic policies of the City of Windhoek, the Region or that of Namibia.

3.4 Polluter Pays Principle

The polluter pays principle transfers the burden of the cost for integrated and therefore environmentally and socially responsible waste management to the polluter in terms of costs associated with the rehabilitation of the natural environment and human health caused by the pollution. Through the polluter-pays principle, waste generators will be encouraged to exercise *duty of care* regarding their

operations, products and services.

The Polluter Pays Principle requires the producer to take responsibility for their product from product inception to final disposal, i.e. Cradle to Grave. It requires the producer to approach the development of new products differently in order to take into account the externalities including final disposal that are usually forgotten. Therefore, product designs need to be assessed as part of the whole life-cycle and should be based on environmental integrity and intelligence exploiting the maximum waste prevention, reuse and recycling potential.

The City of Windhoek will enforce the polluter pays principle by means of incentives for polluters. The SWM Regulations will provide the legal framework necessary to enforce this principle.

3.5 Duty of Care

The duty of care principle requires every generator of waste to be responsible for the fate of their waste as soon as it has been generated. It is therefore only an "end-of-pipe" oriented Policy tool and should be used in conjunction with the waste minimisation initiatives.

The duty of care principle requires that the generator prevents any waste polluting the environment or affecting human health. This requires the generator to have proper planning in place to ensure that the waste is stored safely on site, transported by a responsible, licensed waste contractor, and that waste is well secured and packaged during the transportation; and lastly that its final disposal is done at a licensed waste disposal facility.

The duty of care principle is emphasised for all waste types but especially in terms of Health Care Risk Waste (HCRW) and the management of other hazardous/toxic waste materials.

The City of Windhoek recognises the potential risk involved with the unsafe storage, transportation, treatment and final disposal of hazardous waste, and will enforce the duty of care principle on waste generators and contractors in terms of the SWM Policy and Regulations.

3.6 Best Practical Environmental Option

All waste management activities are to include the Best Practical Environmental Options (BPEO) that provide the most benefit for the least damage to the environment at an acceptable cost both in the long and short term. BPEO can be used as a tool to assist decision makers in terms of choosing appropriate technology in line with legislation, cost implications, human health and the environmental considerations.

The City of Windhoek realises that there are many alternative technologies for the management of the different waste types. However, cognisance must be taken of the site specific nature of the city and the needs and requirements that this presents. Technologies must be assessed in terms of the above requirements as well as:

- Appropriateness of the technology for the city (including local expertise to operate equipment; availability of spare parts etc)
- Future waste management requirements
- Whether a combination of alternative technologies would be more appropriate

The City of Windhoek will take the BPEO into account when assessing any new potential alternative waste management technologies.

4. PRIORITIES

The SWM Policy identified the following priority areas:

- Establish and implement an Integrated SWM System based on the principles of the Integrated Waste Management Hierarchy
- Compile Waste Management Plans and Strategies for priority wastes that include (but are not limited to) HCRW; hazardous waste including electronic waste (e-Waste), waste tyres, and recyclables
- The implementation of a Waste Management Registration and Licensing System based on the 80/20 principle with emphasis on capturing data regarding the largest, most expensive, most toxic waste

streams from the main local waste generators

- Improved control and possibly prevention of illegal dumping and littering
- Ongoing education & awareness programmes towards waste minimisation within government, industry, institutions and the public
- Ring-fencing the Solid Waste Management account in order to cost the exact expenditure for waste management (and in particular waste minimisation measures) and hence develop strategies to align financial expenditure with the principles of the Policy
- Provision of infrastructure that is geared at achieving the goals of the integrated waste management hierarchy
- Research and Investigation into new and existing cleaner production and integrated waste management technologies in order to remain innovative and abreast of latest developments in the waste management discipline

5. OBJECTIVES

The overall objective of the Policy is to provide a framework within which waste can be managed effectively to minimise and avoid adverse impacts brought about by unnecessary waste generated and improper waste management practices, while simultaneously continuing to improve the quality of life for all residents of Windhoek in terms of economic development as envisaged by Vision 2030.

In order to achieve the goal of reducing the amount of waste generated and consequently land filled, and adopting a more sustainable approach, the City of Windhoek has set the following specific objectives to be achieved through the SWM Policy:

- Objective 1: Legislative Framework, Political Will & Cooperative Governance
- Objective 2: Waste Minimisation, Cleaner Production and Sustainable Consumption
- Objective 3: Optimisation of Resources
- Objective 4: Integrated Waste Management Planning
- Objective 5: Integrated Waste Information System (IWIS)
- Objective 6: Health Care Risk Waste Management Strategy & Plan
- Objective 7: Priority Waste
- Objective 8: Capacity Building through Education and Awareness Raising
- Objective 9: Community Participation in Waste management activities
- Objective 10: Research & Development
- Objective 11: Best Practice Guidelines & Standards

5.1 Objective 1: Legislative Framework, Political Will & Cooperative Governance

The City of Windhoek understands that an Integrated Waste Management Plan cannot be implemented without the co-operation of all stakeholders. Thus, the City of Windhoek recognises the need to mobilise political will within all government tiers and to work together in order to ensure that the Best Practicable Environmental Options (BPEO) are implemented.

The City of Windhoek also recognises that for the successful realisation of the vision of this Policy, stringent environmental legislation has to be in place to govern future minimisation based waste management activities. The SWM Regulations will be integrated with existing environmental protection legislation to ensure consistency. The SWM Regulations will provide for controls and where necessary allow for enforcement to avoid or minimise environmental degradation.

The City of Windhoek is therefore committed to

developing SWM Regulations within the framework of National Legislation to enable and facilitate cooperative governance. The goals to achieve this are as follows:

- Develop SWM Regulations that will support the SWM Policy and that are in line with the provision of Vision 2030 and the National Development Plans
- Develop guidelines for waste management facilities in terms of operation & monitoring
- Develop SWM Regulations for the establishment of a Waste Information System, licensing and registration systems for both industry, manufacturers as well as those operating within the city as waste management service providers
- Develop regulations for the safe storage, containment, transportation, treatment and disposal of all waste types
- Revise the strategy and develop an Implementation Plan for the effective management of Health Care Risk Waste (HCRW) and other priority waste types identified
- Identify and implement instruments (both legal and economic) as incentives towards waste minimisation (and in particular for prevention) and the systematic reduction of waste to landfill e.g. introducing industrial waste exchange systems, waste re-use and waste recycling activities
- Encourage and promote Public Private Partnerships (PPP's) in a controlled environment and to the benefit of the City of Windhoek, the residents and the environment
- Engage National and Regional government in dialogue and discussion pertaining to measures to ensure the implementation of the integrated waste management hierarchy principles across all levels of government and ultimately beyond the jurisdiction boundaries of Windhoek
- Foster cooperation with other municipalities both locally and internationally on the development of waste management systems at local level
- Ensure cooperation among various departments within the City of Windhoek in order to harmonise information dissemination to and from clients and avoid duplication of systems and functions

5.2 Objective 2: Waste Minimisation & Cleaner Production

Waste minimisation and cleaner production principles will be promoted by the City of Windhoek through the implementation of the SWM Regulations and Policy. Ongoing education and awareness campaigns will re-emphasise the need for an alternative approach to traditional end-of-pipe treatment methodologies in line with the principles of waste minimisation and cleaner production.

The City of Windhoek commits to implement measures to promote waste minimisation and cleaner production in all sectors and spheres and to assist other stakeholders in achieving such through education and awareness raising. The following goals have been identified to achieve this objective:

- Development of a marketing strategy aimed at waste minimisation and awareness raising regarding the concept of waste as a resource rather than a nuisance
- Development of an information sharing forum for industry to access information pertaining to cleaner production and waste minimisation measures
- Call for industry waste management plans to encourage industry to implement cleaner production and waste minimisation measures
- Devise incentives to encourage cleaner production and waste minimisation among various sectors and introduce waste separation at source as an integral part of implementing the waste management hierarchy
- Conduct a resource assessment in order to identify markets for the recyclable products derived from implementing waste separation principles

5.3 Objective 3: Optimisation of Resources

The City of Windhoek realises that the implementation of a new approach to waste management, from end-of-pipe treatment to waste minimisation and cleaner production, may require restructuring and potentially additional resources. Resources that may need to be reviewed include:

- The existing organisational structure of the SWM Division
- The existing fleet of vehicles and equipment
- Financial resources in terms of allocated budgets

5.3.1 Human Resources

The implementation of an integrated waste management system will require the re-organisation of the existing structure in order to achieve the objectives of the Policy. The City of Windhoek recognises that implementation of an integrated waste management system is a process that strives for continual improvement, hence the process should be dynamic and flexible enough to adapt to the City of Windhoek's changing needs. This would not necessarily require an increased resource base rather a restructuring of the existing resource base.

5.3.2 Vehicles and Equipment

The implementation of an integrated waste management system will require an assessment of the fleet currently in operation in order to establish whether the current fleet meets the requirements needed by the implementation of the Policy.

The City of Windhoek will conduct a fleet assessment in collaboration with the future waste planning requirements in order to assess whether the current fleet is suitable or whether alternatives need to be sought.

5.3.3 Finance

The financial resources within the SWM Division will need to be revised in order to meet the demands of the implementation of a waste minimisation approach as opposed to the traditional end-of-pipe methodology.

Additional financial resources will need to be provided for ongoing education and awareness in terms of waste minimisation and cleaner production.

The City of Windhoek acknowledges that waste management activities are costly and form a substantial amount of the City of Windhoek's expenditure budget. All waste management activities shall be run at cost recovery basis except where services are subsidised.

Waste removal and disposal services shall be classified into either remunerative or non-remunerative accounts. The remunerative services shall be recovered through the establishment of tariffs for various types of waste and quantities generated hence ensuring that the polluter pays principle applies.

The costs incurred in the provision of non-remunerative services shall be recovered through a SWM charge to every registered stand/erf.

The City of Windhoek therefore commits itself to:

- Supporting a dynamic organisational structure responsible for solid waste management and the establishment of new positions that are aimed at achieving the objectives of the SWM Policy
- Supporting the concept of continual assessment of vehicles and equipment utilised in the management of waste and the drafting of replacement strategies
- Avail the required funding for the implementation of the waste management hierarchy and the provisions of this Policy
- As part of ring-fencing, the establishment of a SWM development fund contributing to the ongoing development of the integrated waste management discipline
- Assign a financial value to landfill airspace in terms of cost per cubic meter in order to ensure that the tariffs are a reflection of the actual amount of landfill airspace required

- Implement measures to ensure optimisation of all resources used in the management of waste

5.4 Objective 4: Integrated Waste Management Planning

The City of Windhoek has embarked on a journey to develop an Integrated Waste Management Plan (IWMP) in order to facilitate the shift away from end-of-pipe treatment methodologies and prolific landfilling to more progressive approaches including waste minimisation and cleaner production.

The City of Windhoek is committed to, and will implement the following goals to achieve the set objective:

- Registration and licensing of industry, requesting IWMPs from identified industrial activities based on the 80/20 principle. The SWM Division will identify certain industries, businesses or commercial enterprises that will in terms of the SWM Regulations need to compile IWMPs. Information regarding waste types, volumes, storage, transportation, treatment and disposal methods undertaken will also need to be submitted on an agreed timeframe to the City of Windhoek. This information will then be captured on a Waste Information System (WIS) for use in strategic planning of SWM projects and funding
- Implementation of a WIS to ensure ongoing measurement and monitoring of waste management activities
- Revision of the divisional structure to ensure that it supports the implementation of the requirements of an IWMP

5.5 Objective 5: Implementation of a Waste Information System

As commonly known, one cannot manage what has yet to be measured. As part of the improved management of waste activities within the city of Windhoek, a Waste information System (WIS) shall be developed and established.

The SWM Regulations will outline the requirements of the WIS and all identified industries, businesses or commercial enterprises that have approved IWMPs will be required to submit information to the City of Windhoek to be captured in the WIS.

This will place the City of Windhoek in a better position to be able to monitor progress of the waste minimisation and cleaner production approaches required by the SWM Regulations and Policy.

This information will be vital in future planning requirements for integrated waste management in the City of Windhoek. It will also assist the City of Windhoek in identifying priority waste streams as and when new streams present themselves and to address these issues timeously.

The City of Windhoek commits itself to and will embark on the following goals to achieve the set objective:

- Establish, operate, maintain and regularly review the WIS database
- Ensure the provision of appropriate software and equipment and ensure properly trained staff to manage the system
- Enforce the timely submission of information and assess / verify all submitted data
- Disseminate relevant information to various users and provide access to such information for the purposes of waste management development, education and awareness raising and planning

5.6 Objective 6: Health Care Risk Waste Management Strategy & Plan

The City of Windhoek recognises HCRW as a priority waste and takes cognisance of the potential for pollution in the event this waste is not managed optimally.

The development of a HCRW management strategy is vital to the efficient management of this waste stream and shall be developed and implemented. Equally important is ensuring the empowerment of all stakeholders involved; ranging from the original source generators (e.g. clinics) to the transport and disposal service providers, through training and awareness raising. The duty of care principle

will apply and all aspects of segregation at source, storage, packaging and safe handling will be emphasised and enforced.

The City of Windhoek commits itself to the development and implementation of a HCRW strategy & plan and will embark on the following goals to achieve the set objective:

- Revision of the existing HCRW Strategy as well as the development of an Implementation Plan in line with the SWM Policy and Regulations
- Investigation into improved treatment and disposal options bearing the BPEO principles in mind
- Provision of a properly functional HCRW treatment and disposal facility
- Registration and licensing of waste generators, transporters and the operators of treatment and disposal facilities
- Establishment of a waste tracking system in line with other established standards in order to minimise any illegal treatment and disposal of HCRW
- Putting measures in place to ensure that in the event where illegal disposal occurs, the polluter pays for any damage to the environment or public health and any required remediation measures

5.7 Objective 7: Priority Wastes

The City of Windhoek will continually identify priority waste types that pose a detrimental risk to public health and wellbeing or the environment due to the quantity or composition of the waste type as well as to any waste with a high re-use and/ or recycling potential. Priority waste includes (but is not limited to): waste tyres, HCRW, builders' rubble, electronic waste and hazardous waste. The intention of the SWM Regulations is to provide the City of Windhoek with the authoritative power to regulate priority waste streams.

Separate strategies and guidelines shall be drafted by the City of Windhoek for the various priority wastes identified.

The City of Windhoek commits itself to achieving this objective by:

- Developing strategies and guidelines for each priority waste identified
- Maintaining the WIS in order to proactively identify and manage priority waste types as when and where they arise
- Putting measures in place to curb the illegal disposal and dumping of priority waste and where the priority waste has re-use and/or recycling potential, implement measures to harness such

5.8 Objective 8: Capacity Building – Ongoing Education and Awareness

The City of Windhoek is aware and proud of the positive benefits of continual education and awareness campaigns. The City of Windhoek recognises that the current education and awareness raising efforts regarding waste management are a step in the right direction and aims to continually reinforce this concept albeit with a shift towards waste minimisation, re-use and recycling concepts at various points of waste generation.

The concept of educating especially the youngest members of our society aka "catch them young" has been effective and at the heart of waste management education and awareness raising campaigns. This arrangement shall continue as a catalyst for enhanced waste minimisation, re-use and recycling practices.

The implementation of a waste prevention and minimisation approach within the integrated waste management plan will require a revised educational and awareness raising approach in order to assist the residents' of Windhoek to change behaviour from a consumer driven 'throw away' society to a society that is more aware of sustainable consumption.

The City of Windhoek will strive to inform the public, industry and business about the positive benefits of sustainable consumption including the financial and environmental benefits.

The City of Windhoek is committed to training those in its employment to enable them to become specialists in the field of waste management thus improving the human capital of the country.

The City of Windhoek commits itself to ongoing education and awareness raising and will embark on the following goals to achieve the set objective:

- Continued education and awareness raising at educational institutions through the inclusion of waste management education in the school curriculum
- Continued education and awareness raising at the community level
- Education and awareness raising amongst various industries and fostering an interest and regard for the value of waste
- Education and awareness raising among various tiers of both national and local government
- Capacity building through training of waste management officials to enable them to carry out the requirements of the Policy and regulations
- Establishment of a consultative forum for the industry and the City of Windhoek to openly discuss waste management and related matters

5.9 Objective 9: Community Participation

The City of Windhoek commits itself to ongoing community participation and recognises the value of involving the local community in the development and implementation on various waste management systems.

The City of Windhoek will embark on the following goals to achieve the set objective:

- Encourage community participation in waste management through various projects in order to ensure ownership of waste management projects that are implemented at community level
- Initiate community structures to support local waste management programmes
- Provide communities with access to information through various channels to educate and inform of waste management programmes
- Encourage communities to view waste as a resource and so encourage entrepreneurial activities utilising recyclable or re-usable waste products

5.10 Objective 10: Research and Development

The City of Windhoek is committed to ongoing research and development with regards to the principles of the integrated waste management hierarchy and alternative waste management methodologies and treatment systems.

The City of Windhoek commits itself to ongoing research and development and will embark on the following goals to achieve the set objective:

- Research and investigation of new and existing technologies in terms of the BPEO principle
- Study new and improved ways of managing priority wastes and using case studies from other countries as models, implement initiatives that are specific to the Namibian context
- Ongoing research and development in terms of waste minimisation and cleaner production mechanisms

5.11 Objective 11: Best Practice Guidelines & Standards

In the absence of a National standard in terms of minimum requirements to operate waste management facilities; the City of Windhoek will use the South African Department of Water Affairs and Forestry Waste Management Series: Minimum Requirements for Waste Disposal by landfill (1998); Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (1998) and subsequent updates of these documents.

6. CONCLUSION & WAY FORWARD

The objective of the SWM Policy is to provide an overall strategic direction for the management of waste within the city of Windhoek. The City of Windhoek recognises that a clean environment is vital to the wellbeing of its residents as well as to the attraction of economic activity towards Windhoek in the form of visitors and investors and hence is regarded as a priority.

The City of Windhoek has identified certain principles which will govern waste management within the city as well as objectives which will direct waste management activities. The SWM regulations will provide the legal framework to enable the realisation of the objectives within the Policy.

Central to the SWM Policy is the shift from pollution control and end-of-pipe treatment methods towards the implementation of the waste management hierarchy which has waste elimination and prevention first, waste reduction and reuse second and treatment and waste disposal as a last resort. All waste management activities henceforth will be geared towards the principles of the waste management hierarchy.

The City of Windhoek recognises the importance of various stakeholders (both public and private) in the success of any waste management programme initiated and has included these in the compilation of both the Policy and Regulations and aims to continue with a consultative approach with all interested and affected parties.

Subsequent to the Policy, an Integrated Waste Management Plan will be drafted and will contain all the activities and strategies for implementation in order to achieve the objectives of the Policy. Targets and outcomes will be set within the Plan and based on continual improvement will be reviewed annually.

The outcome of the implementation of the SWM Regulations, Policy and gradual implementation of the Plan will result in a City of Windhoek that has shifted from end-of-pipe treatment methodologies to a culture of waste minimisation, local businesses embracing cleaner production technologies and improved housekeeping and communities that are "waste wise" and practice actively sustainable consumerism.

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