



(Howard College Campus)

School of Built Environment and Development Studies

**An investigation into the environmental impacts of informal settlements on water: a case of Kennedy Road informal settlement in Durban, KwaZulu Natal.**

Submitted in partial fulfilment of the academic requirements for the degree of Master of Town and Regional Planning in the School of Built Environment and Development Studies at the University of KwaZulu-Natal, Durban.

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## **Abstract**

The fast growth of urban areas has resulted in the continuous formation and growth of informal settlements. This increase of informal settlements has further resulted in the deterioration of the environment, especially water in rivers, lakes and streams due to the lack of infrastructural services such as tap water; sanitation; solid waste management and storm-water drainage systems. It is therefore vital to note how the absence of such services in informal settlements can be a negative factor towards achieving a good and sustainable livelihood. The aim of this research is to investigate the environmental impact of informal settlements on water and how they contribute to water pollution and environmental unsustainability in the Kennedy Road informal settlement. The modernisation and urbanisation school of thought were theories used as a knowledge base for the phenomenon researched. This study has argued and provided theoretical and practical evidence that the environmental impact of informal settlements on water is an issue that needs attendance in the study area. The study follows both the qualitative and quantitative research approach. A total of 100 households were interviewed, as well as interviews with municipal officials and the development committee of the area. The results obtained reveal that the lack of infrastructural services in Kennedy Road; such as sanitation facilities, solid-waste management and a storm-water drainage system have a negative impact on the environment such that, the environment in the area was degraded and is characterized by pollution. It was evident that these negative environmental impacts were spearheaded mostly by human waste emanating from the lack of the above mentioned infrastructural services which pollutes both surface and underground water. This paper has therefore tackled the issues faced by Kennedy Road informal dwellers which consequently affect the environment, specifically, the water in the stream that flows through the settlement. It has further provided empirical evidence as to how the environmental impact of informal settlements on water can create challenges; not only that which concerns the environment, but also other social factors such as health issues resulting from poor living environments. The study affirms the importance of both community and municipal participation as an initiative to tackle environmental issues in the area. The community needs to be educated about the

importance of a clean and sustainable environment as well as take initiative in taking care of the environment in which they reside; the municipality must provide adequate infrastructural services and/or facilities to minimise pollution.

# Contents

## Chapter One: Introduction

1.1. Introduction .....	1
1.2. Brief Motivation/Background .....	2
1.3. Problem Statement .....	3
1.4. Aim .....	4
1.5. Objectives .....	4
1.6. Research Questions.....	5
1.7. Chapter Outline .....	5
1.8. Summary of Chapter .....	6

## Chapter Two: Methodology

2.1. Introduction.....	8
2.2. Location of the Study Area.....	8
2.3. Research Design .....	9
2.4. Secondary Data .....	9
2.5. Primary Data.....	10
2.6. Sampling .....	11
2.7. Data Analysis .....	12
2.8. Validity, Reliability and Rigour .....	12
2.9. Limitations of the Study .....	13
2.10. Summary of the Chapter .....	13

## Chapter 3: Theoretical Framework

3.1. Introduction.....	14
3.2. Conceptual Framework .....	14

3.2.1. An Informal Settlement .....	14
3.2.2. Environmental Degradation .....	14
3.2.3. Water and Water Pollution .....	15
3.3. Theoretical Framework .....	15
3.3.1 Modernisation and Urbanisation Theory .....	15
3.3.2. Sustainable Development.....	18
3.3.3. Environmental Justice (EJ) .....	19
3.3.3.1. The Green and Brown Environmental Agendas .....	20
3.4. Literature Review .....	21
3.4.1. What is the Impact of Such Settlements on the Environment and Water Quality? ...	22
3.4.2. Environmental Degradation of the Physical Environment: The Impact of Informal Settlements on Water Sources and the Ground Water Base.....	26
3.5. Health Principles of Housing .....	28
3.5.1. What are the Features of Informal Settlements? .....	28
3.5.2. What are the Consequences of Informal Settlements on Human Health .....	28
3.5.3. What are the Consequences of Informal Settlements on Human Psychological and Social Stresses? .....	30
3.5.4. Ways that Informal Settlements can be Improved .....	32
3.6. The Role of Planning in Addressing Rapid Urbanisation, Urban Poverty and Informal Settlements .....	33
3.7. Impact of Informal Settlements on the Environment.....	34
3.8. Precedent Studies .....	35
3.8.1 Introduction .....	35
3.8.2. Environmental Effects of Informal Settlements: A Case Study of Veracruz in Xalapa City, Mexico .....	35

3.8.3. A Case Study of the Keko Machungwa Informal Settlement in Der es Salaam, Tanzania .....	37
3.8.4. The Keko Machungwa Informal Settlement in Der es Salaam, Tanzania and Veracruz in Xalapa City, Mexico: Case Study Reviews .....	37
3.9. Informal Settlement Challenges.....	39
3.10. South African Policies.....	41
3.10.1. Introduction .....	41
3.11. Access to Services in South African Informal Settlements.....	46
3.12. Conclusion .....	47
<b>Chapter 4: Data Presentation and Analysis</b>	
4.1. Introduction.....	48
4.2. General Overview of Informal Settlements in Durban .....	48
4.3. The Development of the Kennedy Road Informal Settlement .....	50
4.4. Data Presentation .....	51
4.4.1. A: Demographic Profile of Kennedy Road .....	51
4.4.2. Housing .....	55
4.4.3. Infrastructure .....	56
4.4.4. Social Infrastructure.....	63
4.5. Data Analysis .....	64
4.5.1. Introduction .....	64
4.5.2. Illegality.....	67
4.5.3. Responses Pertaining to the Issues Faced by the Residents .....	69
4.5.4. Governance.....	71
4.5.5. Government Participation .....	73



4.6. Conclusion .....	74
<b>Chapter 5: Conclusion and Recommendations</b>	
5.1. Introduction.....	76
5.2. Summary of the Key Findings.....	76
5.3. Recommendations .....	77
5.3.1. Education .....	77
5.3.2. Municipal Participation .....	77
5.3.3. Community Participation.....	79
5.4. Conclusion .....	79
References .....	81

## Plates

- Plate 4.1 Kennedy Road informal settlement pg. 51
- Plate 4.2 Low cost housing in the settlement pg. 56
- Plate 4.3 Informal structures pg. 57
- Plate 4.4 Electricity pg. 57
- Plate 4.5 Resident in the area demonstrating how rain water flows and stands in the low cost housing due to the absence of V-drains pg. 58
- Plate 4.6 Sanitation facilities in the settlement pg. 59
- Plate 4.7 Stream that runs through the settlement pg. 60
- Plate 4.8 Lack of proper solid waste management pg. 60
- Plate 4.9 Grey-water that flows within the settlement pg. 61
- Plate 4.10 Lack of drainage, storm-water channels and waste disposal facilities. pg. 62
- Plate 4.11 Lack of storm water channels in low cost housing pg. 63
- Plate 4.12 The Abahlali Basemjondolo Organisation pg. 72

## Figures

- Figure 2.1 Location of study pg. 9
- Figure 4.1. Gender pg. 52
- Figure 4.2. Age Median pg. 53
- Figure 4.3. Language pg. 54
- Figure 4.5. Nature of Environment pg. 64
- Figure 4.6. Areas that are Environmentally Degraded and Contaminated pg. 69
- Figure 4.7. Gullies in Kennedy Road Informal Settlement pg. 71

## Tables

- Table 1. The Green and Brown Urban Environmental Agendas pg. 20

## Acronyms

- CBD Central Business District
- DESA Department of Economic and Social Affairs
- DEAT Department of Environmental Affairs and Tourism
- DWAF Department of Water Affairs and Forestry
- EAs Enumeration Areas
- EJ Environmental Justice
- HIV Human Immunodeficiency Virus

- HSRC Human Science Research Council
- IDP Integrated Development Plan
- NEMA National Environmental Management
- RDP Reconstruction and Development Programme
- SDF Spatial Development Framework
- SPLUMA Spatial Planning and Land-Use Management
- TB Tuberculosis
- UNCHS United Nations Centre for Human Settlements
- UNEP United Nations Environment Programme
- UN United Nation
- UNW-DPAC UN-Water Decade Programme on Advocacy and Communication
- WHO World Health Organisation

# Chapter One: Introduction

## 1.1. Introduction

Informal settlements are usually established through self-help processes by people who illegally occupy premises and/or land and build their houses on it (World Bank & United Nations Centre for Human Settlements (UNCHS), 2007). An informal settlement can also be defined as illegal development of residential areas without permission from the concerned authorities to build. As a result of their illegal or semi-legal status, infrastructure and services are usually inadequate (Srinivas, 1991). It is clear that residents of informal settlements are regularly exposed to the harsh realities of spatial and environmental marginalisation that comes with living in such settlements (Napier, 2000).

Informal settlements are generally associated with environmental degradation. Bai and Dent (2009:150) state that... *“Land or environmental degradation is a long-term loss in ecosystem function and productivity from which the land cannot recover unaided, requiring progressively greater inputs to repair the damage”*. Economic development, rapidly growing cities, natural population growth, and augmented rural-to-urban migration, contribute to the development of informal settlements, as cities fail to keep up with the pace of urbanisation. Informal settlement developments influence unparalleled land-use changes such that the environment becomes degraded and therefore unsustainable. Moreover, unsustainable land use fosters... *“land degradation: soil erosion, nutrient depletion, salinity, water scarcity, pollution, disruption of biological cycles, and loss of biodiversity”* (Bai and Dent, 2009:150). The UN Convention to Combat Desertification and the Conventions on Biodiversity and Climate Change (1, 2) in Bai and Dent (2009) have recognised this as a global development and environmental issue, yet there are no authoritative measures of land degradation to combat such issues (Bai and Dent, 2009).

## **1.2. Brief Motivation/Background**

According to Srivinas (2003 in Olajide (2010), an informal settlement is characterised by the illegal occupation of private or vacant land, unauthorised subdivision and construction of buildings and structures, reliance on low-cost and locally available scrap construction materials and the absence of restrictive regulations and standards. This often leads to overcrowding and deterioration of the environment, and insufficient basic needs such as water, sanitation and solid waste management, which often endangers residents' health and the environment.

Lohern (2011) concurs with Srivinas (2003 in Olajide (2010) regarding the lack of essential basic services and environmental deterioration, with pollution of the scarce water sources, and adds that informal dwellers are often characterised by poverty, which plays a major role in preventing them from acquiring service delivery so as to improve the environment they reside in. According to the UN-Habitat (2010), over 60% of the urban population in Africa is estimated to reside in informal settlements and these figures were expected to grow.

In South Africa, many informal dwellers are former rural dwellers that have migrated to the city in search of employment due to the fact that the rural areas, formally known as Bantustans, were economically and socially deserted by the Apartheid regime (Lohern, 2011). This has led to housing shortages in cities as the government fails to keep pace with the increasing urban population and the need for adequate service delivery.

The Kennedy Road informal settlement is a shack settlement in Durban characterised by poverty and a lack of infrastructural services. There is inadequate sanitation: no running water, sewage system, refuse removal or water drainage system. As a result, the people have no alternative but to dispose of their waste in the environment, with the result that the land and water sources have become polluted.

### 1.3. Problem Statement

According to Govender et al. (2011:1)... *“South Africa is facing a low-income housing crisis.”* Rapid urbanisation increases the numbers of low-income rural-to-urban migrants, and a significant proportion of these migrants reside in informal settlements. Gangoo (2003) concurs with this statement. It is estimated that 1.38 million South African households reside in informal settlements (Census, 2011). In the city of Durban there are an estimated 350 informal settlements, and they all lack the basic human needs and services such as shelter, access to adequate potable water, and sewerage disposal. Besides the resultant environmental pollution, the environment becomes further degraded as inhabitants remove vegetation cover (Olijide, 2010). This poses a serious developmental challenge.

South Africa is known to be a water scarce country, and population growth places an enormous demand on the country’s diminishing water resources (Gangoo, 2003). Gangoo (2003) adds that man’s activities are noted as the largest cause of deteriorating water quality. Pollution from densely populated and poorly serviced settlements is one of South Africa’s most important and complex water quality problems (Department of Water and Forestry, S.A., 2001). Govender et al. (2011), in a study based on a low-cost housing settlement in Cape Town (South Africa), state that residents of the settlement admitted to the dispersal of human excreta and wastewater into their yards, and ultimately into the streets. This occurred as a result of insufficient solid waste and wastewater management. This has contributed to reservoir pathogens in the environment; the cumulative impact of such activity was evident in the E.coli counts found in the water samples of the area. Runoff water from the settlement made its way into the formal and informal storm water channels, which subsequently polluted nearby rivers (Govender et al, 2011).

Gangoo (2003) argues that without proper management of informal activities, water as a vulnerable resource in South Africa may become over-exploited, at the expense of the environment. The Department of Water Affairs and Forestry (1991), states that domestic activities have the greatest impact on water quality. Informal settlements represent a major challenge to development. The growth of informal settlements places great pressure on already

struggling health, education systems as well as sustainability. According to UN-Habitat (2001), informal settlements place great pressure on the environment and are often highly polluted. They also pose challenges to security and social cohesion.

Informal settlements are usually a staging ground for people moving to the city, a place where they can live cheaply until they establish themselves (UN-Habitat, 2003). Their long term aim is to make some money and find a better place to live. Some succeed, many others do not. Life is particularly hard and usually uncertain particularly for the increasing number of those without stable employment, who usually work in the informal sector (UN-Habitat, 2003). Social exclusion, lack of stable employment, illness or living in a precarious and illegal situation make it very difficult for informal dwellers to live in insecure conditions, characterised by poverty and despair.

This research therefore investigates the environmental impact of informal settlements on water, and how its consequences hinder environmental sustainability.

## **1.4. Aim**

The aim of this research is to investigate the environmental impact of informal settlements on water and how they contribute to water pollution and environmental unsustainability. The study focuses on the Kennedy Road informal settlement in Durban.

## **1.5. Objectives**

- To identify the factors that led to the development of the Kennedy Road informal settlements;
- To identify the different factors that negatively impact on water in the area;
- To analyse the existing policy framework that regulates housing development;
- To examine the effects of environmental issues on Kennedy Road residents; and
- To identify mitigation measures in place to safe-guard against water pollution in informal settlements.

## **1.6. Research Questions**

### **1.6.1. Main Research Question:**

How do informal settlements impact on water and what consequences do they manifest?

### **1.6.2. Sub-Questions:**

- How do informal settlements impact on the environment?
- How do informal settlements impact on water in the area?
- What characterises the environment and infrastructure in informal settlements?
- How do informal settlements contribute to water pollution?
- What mitigation measures can be employed to reduce water pollution in the area?
- What environmental challenges are faced by dwellers in the study area?
- How can the negative effects on the physical environment be minimised?
- What coping strategies and/or mechanisms do these dwellers and the municipality employ to address water pollution in the area?
- How can the environment in informal settlements be improved in order to provide a good, liveable and sustainable environment?

## **1.7. Chapter Outline**

This dissertation is structured into 5 chapters as outlined below:

Chapter One: Introductory Chapter

Chapter one comprises of the introductory chapter, which briefly introduces the study area (Kennedy Road informal settlement). It gives the background of the study, the problem statement and outlines the specific aims and objectives of the research, supported by research questions. In addition, it outlines the structure of the study.

Chapter Two: Research Methodology

Chapter two discusses the research methodology to be employed: It comprises of the research design, indicating the type of tools and techniques that were used to conduct this research. It



also provides the sampling that was used, as well as methods that were used for data analysis. The limitations of this study are also outlined in this chapter.

### Chapter Three: Theoretical Framework

Chapter three provides the framework for the analysis, and it is divided into three sections, as follows: Section A incorporates the conceptual and theoretical framework of the research, which provides a presentation of theories that explain the research, and the literature review section. Key conceptual and theoretical issues focus on the urbanisation and modernisation theory, sustainable development and environmental justice. The literature review provided focuses on South Africa and on other developing regions around the globe with similar environmental problems emanating from informal settlements.

Section B will introduce and discuss the precedent studies which focussed on the environmental effects of informal settlements, looking specifically at the case of Veracruz in Xalapa City, Mexico (Benitez et al, 2012); and the Keko Machungwa informal settlement in Der es Salaam, Tanzania (Sakijeje et al, 2012)

Section C will focus on the overview of informal settlements in South Africa, as well as look into South African policies such the Constitution, the National Environment (NEMA) Act No. 62 of 2008; and the Spatial Planning and Land Use Management (SPLUMA) Act No. 16 of 2013.

### Chapter Four: Data Presentation and Analysis

This chapter will present the research results and findings from the Kennedy Road informal settlement in Durban. It also analyses the data collected from the field.

### Chapter Five: Conclusion and Recommendations

Chapter five is the concluding chapter. It consists of a summary, the major findings of the research, the recommendations, as well as the conclusions.

## **1.8. Summary of Chapter**

This chapter has covered the introductory part of the research, which encompassed the background of the study, the problem statement, the research aim, objectives, research

questions and chapter outlines. By doing so this chapter has discussed the overall purpose of this research.

## **Chapter Two: Methodology**

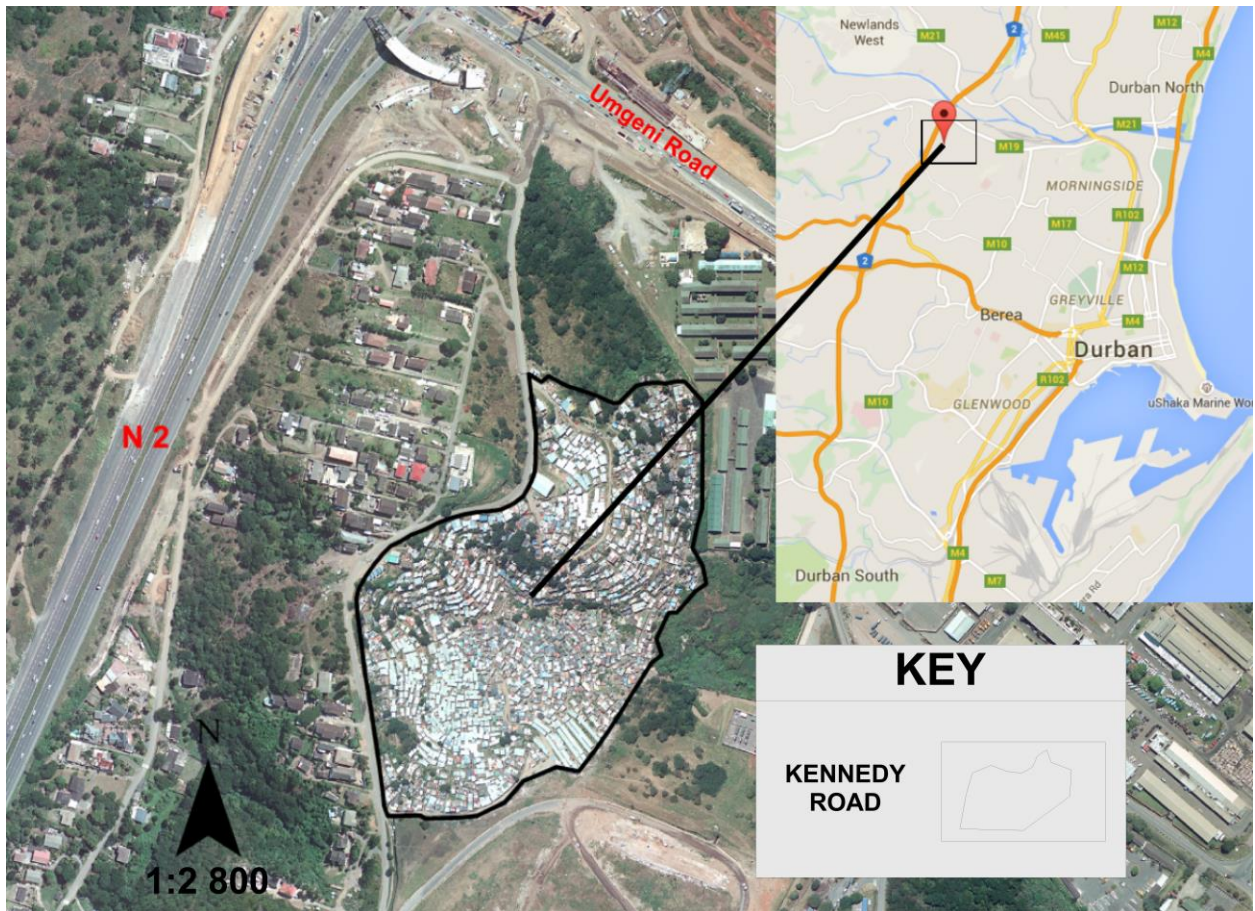
### **2.1. Introduction**

Chapter two discusses the research methodology; which comprises of the research design indicating the type of tools and techniques that will be used to conduct this research, as well as the data type (primary and secondary); the type of sampling that was used, the data analysis, as well as the limitations to this study.

### **2.2. Location of the Study Area**

The study area is located in Kennedy Road, near Clare Water Estate, Kwa-Zulu Natal, in Durban (29°48'41.37"S 30°58'46.71"E) of Durban, a predominately Indian middle class area. The settlement is located in a steep area between the municipal land-fill site and the six-lane Umgeni Road. The Kennedy Road informal settlement is one of the plentiful shack settlements in and around Durban. The area is in close proximity to basic necessities such as schools, clinics, and a railway station essential for commuting to places of work. It is also close to sources of employment such as the land-fill site, the Springfield Industrial area and domestic labour opportunities for woman provided by the Clare Estate suburb.

Figure 2.1: Location of the Kennedy Road Settlement.



Source: (Researcher, 2015).

## 2.3. Research Design

This study investigated the impact of informal settlements on the physical environment and the consequences that they manifest. This research was conducted using both quantitative and qualitative methods. Qualitative research is designed to gather an in-depth understanding of underlying issues, reasons and motivations as well as understanding the phenomena. Some of the findings from the household survey resulted in statistical data which required the use of quantitative research methods for analysis.

## 2.4. Secondary Data

Secondary data is data that has been previously collected and documented. It is utilised by a person other than the one who collected the data (Investorwords, 2015). In this research,

secondary data was obtained from a variety of sources among which are: Census data, organisational records, newspaper articles, historical documents, policies and policy briefs, government legislation, strategic reports, journal articles and books. This data contributed towards the theoretical framework and literature review. This data is used to discuss the study's theoretical, conceptual and analytical framework. It helped the researcher to collect, sort and interpret a variety of existing data and information about the subject study. This is in line with Strauss and Corbin's (1990) argument that secondary data helps by informing theory that will later assist with inform data analysis and interpretation.

## **2.5. Primary Data**

For a qualitative perspective, this study gathered information by:

- a. Observing the physical environment. This was achieved by doing a transect walk in the area, which allowed the researcher to capture pollution and polluted water sources using a camera. This technique also enabled the researcher to observe a variety of issues such as housing typologies and structures, the nature of the land, vegetation cover, and environmental quality. This was done for the purpose of surveying the physical aspects found in the area, as well as observing pollution that leads to water pollution in the area.
- b. Face-to-face, semi-structured household interviews were conducted, which resulted in a narrative and descriptive account of some activities. It also gave respondents time to freely discuss their views about the environment in which they resided, without being constrained by a structured interview format. Semi-structured interviews were advantageous in that they were a practical way of collecting data about things that could easily be observed, for example the emotions and mind set of the respondents about specific issues.
- c. Face-to-face, semi-structured interviews were conducted with key informants from the eThekweni municipality (looking specifically at the Integrated Development Plan 2013-2014 of the area, its role and how it has been implemented) and key informants from the area such as leaders of the local development committee for the area. Purposive

sampling was used as a tool to select the key informants, which helped to focus on the informants of interest.

- d. Mapping: A land-use map is presented, providing information about the land uses in the area, as well as the nature of the informal settlements and areas where water is polluted.

## **2.6. Sampling**

A sample is a smaller (but hopefully representative) collection of elements from a populace, used to determine facts about that population (Field, 2005). This then gives results with known accuracy that can be calculated mathematically. Sampling can also be described as a subset of the population selected by either probability or non-probability methods.

For this research study, sampling was conducted using both quantitative and qualitative methods, and thus both probability and non-probability sampling methods. Probability sampling is a sampling technique where the samples are gathered in a process that gives all the individuals in the population equal chances of being selected (Babbie, 2001). When performing probability sampling, the simple random sample is the basic sampling method assumed in statistical methods and computations (Babbie, 2001). The researcher utilised the method of simple random sampling to randomly select households to be interviewed.

On the other hand, non-probability sampling is a technique where the samples are gathered in a process that does not give all of the individuals in the population equal chances of being selected. A purposive or judgmental sample was used for the qualitative aspect of this research. A purposive, or judgmental, sample is one that is selected based on the knowledge of a population and the purpose of the study (Babbie, 2001). Here, the researcher chose the sample based on who was thought to be appropriate for the study i.e. the study area's key informants. The research used this form of sample to target specific relevant officials within the eThekweni municipality and within the development committee of the area. An equal number of representatives were selected from the eThekweni municipality and the development committee respectively. This helped prevent dominance of one particular perspective or

opinion on the issues at hand, and thus prevented biasness and distortion of the findings at the end of the research.

The utilisation of both probability and non-probability sampling and both qualitative and quantitative analysis produced specific and precise findings, both numeric and verbal, which signified and strengthened the research. The household survey was based on the interview of 10% of the households in the area. This sample size was determined by the time frame for the completion of this research, travel costs and the number of people who were available and willing to participate in the study. A data collection response rate of 100 % was achieved from the residential participants, but the area councillor did not make himself available to participate in the study.

## **2.7. Data Analysis**

The results of this research study are presented and analysed in the following ways: In a descriptive manner, which compliments the response rate of the participants; by mapping, which indicates the location of the study area; the informal nature/structure of the houses and pictures of the areas that are physically degraded and/or contaminated. Graphs and pie charts created using Microsoft Excel will further depict data from the field. These presentations are accompanied by a brief description of the visual presentation. The findings gathered from the interviews are presented in a descriptive form.

## **2.8. Validity, Reliability and Rigour**

Data obtained from this research was cross-examined in order to evaluate the validity of the information. This, according to Schwandt (1997), is called triangulation. Triangulation helps in obtaining a holistic understanding between the area's local people, the local municipality and other key informants from the municipality and Kennedy Roads development committee. In order to avoid bias the researcher made use of different methods; conducting interviews with different key informants, and using different research tools.

## **2.9. Limitations of the Study**

One of the biggest challenges faced by the researcher while conducting fieldwork was the issue of interviewing the area councillor. The researcher was unable to interview the councillor because of his busy schedule, in fact it was almost impossible to get hold of him. The researcher therefore substituted him with another member of the development committee, who was of great assistance. Another challenge faced while conducting the household interviews was that community members assumed that the researcher was from the municipality and was there to register them for the housing relocation programme that had stalled for several months. This assumption had to be corrected, and the residents were informed that the researcher was student. Many of them were disappointed to learn that there would be no direct benefits from their participation in the study.

## **2.10. Summary of the Chapter**

In this chapter, the research design, methods and location of the study area were discussed and described, with an emphasis placed on data collection, data sampling, data analysis, the validity of the data, as well as the limitations of the study. This was done so as to provide insight and understanding on how the research data was collected and how the overall research was conducted.



## **Chapter 3: Theoretical Framework**

### **3.1. Introduction**

This chapter covers the theoretical and conceptual framework, as well as the literature review section of the research. The conceptual framework of the research sets out the concepts that support and inform the research. The theoretical framework is based on relevant theories underpinning the knowledge base of the phenomenon researched (Sinclair, 2007). The theoretical framework looks into the Urbanisation and Modernisation Theory, which reveals why cities of developing countries are characterised by high numbers of informal settlements and high levels of environmental pollution. The chapter will further discuss the issues of sustainable development and its link with environmental justice and environmental degradation in developing countries and particularly in South Africa. Finally, the literature review section discusses global experiences with respect to the environmental impact of informal settlements on water. Precedent studies from Veracruz in Xalapa City, Mexico (Benitez et al, 2012) and from the Keko Machungwa informal settlement in Der es Salaam, Tanzania (Sakijege et al, 2012) were used to further discuss environmental issues in informal settlements in relation to a lack of services.

### **3.2. Conceptual Framework**

#### **3.2.1. An Informal Settlement**

Based on the United Nations (UN) Habitat Programme (1996:2), “informal settlements can be defined as i) residential areas where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally; and ii) unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorised housing).”

#### **3.2.2. Environmental Degradation**

According to Wisegeek (2014), environmental degradation is the deterioration of the environment through the depletion of resources such as air, water and soil. It is a process

through which the natural environment is compromised, reducing biological diversity and the general health of the environment.

### **3.2.3. Water and Water Pollution**

Water is a transparent, colourless fluid which forms the seas, lakes, rivers and rain. Water is important for all known forms of life and is a major fundamental fluid of living things. Without water there is no life (Shakhashiri, 2011). According to Muturi (2013), water is a finite and life sustaining resource. It covers about 70% of the physical environment and is a source of living for many plants and animals. On the other hand, *water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater)*. Water pollution is one of the major environmental problems worldwide. *“Water pollution results when any input into the water cycle alters water quality to the extent that a legitimate use is impaired or lost”* (Hennigan, 1969: 976). In the context of informal settlements, water pollution occurs as a result of faecal contamination, improper solid waste disposal and waste water from domestic activities.

## **3.3. Theoretical Framework**

### **3.3.1 Modernisation and Urbanisation Theory**

According to the modernisation school of thought, modernisation attracts people to urban areas for industrial employment where they work in sectors that facilitate national economic expansion, facilitating urbanisation and education, especially for women (Martinussen, 1997). This theory argues that there cannot be urbanisation without economic growth. The theory further argues that with modernisation comes urbanisation, which supposedly facilitates economic growth by increasing the ‘modern sector’ output in developing countries; it argues that city life is conducive to the formation of modern ideas necessary for economic growth and overall development; and that increasing industrialisation, education and urbanisation may provide more opportunities for women to advance economically and socially (Martinussen, 1997).

In many developing countries, specifically those in Africa, such growth calls into question the positive features of the modernisation perspective as noted above. The lack of employment opportunities in rural areas of developing countries contributes to urbanisation, as rural inhabitants migrate to cities in search of employment (Olajide, 2010). The cities of developing countries are, however, unable to provide sufficient employment opportunities for the rapidly growing urban populace, adds Olajide (2010), and as a consequence the resultant poverty, combined with a lack of affordable housing, are the major forces behind the formation of informal settlements.

Thus with modernisation, economic development and economic growth have a restricted meaning on social structures. With modernisation, people shift from simple to complex technology. There is a change from subsistence to cash crops, and a move from animal and human power to machine power which at times forces people to move from rural to urban settlements (Rojas, 1996). Urban settlements, however, fail to accommodate such change in terms of planning (especially housing) and the availability of employment. Subsequently these changes have detrimental effects on African countries that are still developing. These changes lead to people residing in informal settlements because the changes are happening at a faster pace than planning. This crucially affects the pattern of development. According to Cohen (2006: 65), *“rapid urban growth throughout the developing world is seriously exceeding the capacity of most cities to provide adequate services for their citizens.”*

Classical economists note that rural inhabitants are pulled to urban areas by high industrial wages (industrialisation). Industrialisation has been one of the most noticeable drivers of urbanisation in many developing countries. Hence rapid industrialisation in many developing countries has been accompanied by high levels of concentration of the urban population residing in cities. The cost of such changes is accompanied by high traffic accidents; poverty, as resources are limited; and air, water and environmental pollution which stem from underdeveloped institutions and human resources for urban planning and management (Rojas, 1996).

According to Cohen (2006: 64), in Africa, *“the proportion of urban poor is increasing faster than the overall rate of the urban population growth.”* This leads to the expansion of informal settlements which exacerbate the problems of urban congestion and sprawl, hence hindering local authorities’ attempts to improve basic infrastructure and services. Cohen (2006: 64) further views cities as *“centres of modern living, where indicators of general health and well-being, literacy, women’s status, and social mobility are typically highest”*. The management of rapid urbanisation, when accompanied by high population density, becomes increasingly complex. This results in a low per capita cost of providing infrastructure and basic services (Cohen, 2006).

Weber and Puissant (2003) assert that continuous rural-urban migration largely contributes to an increase in built-up areas, thus accelerating land cover changes and increasing environmental issues. A significant portion of these built-up areas take the form of informal settlements which are without legal access to city services and without environmental conservation rules. According to Baharoglu and Kessides (2004 in Olajide, 2010); informal dwellers not only face challenges such as inadequate and insecure housing and services, limited access to employment opportunities and income, but also violent and unhealthy environments, with little or no social protection mechanisms, and limited access to adequate health and education opportunities.

Cohen (2006) argues that many developing countries’ major environmental crises stem from the cities’ ever increasing waste, disposed of into the air or into freshwater bodies, thus threatening water quality and aquatic ecosystems. Rapid urbanisation has led to poor urban governance, poor critical assumptions of urban population projections and the inability of urban plans to be adjusted and refined in light of invasion and settling on unused public space. Cohen (2006) further argues that planners and policy makers’ largest challenges in the cities are devising equitable land development policies.

Martinussen (1997) proposes that urbanisation, industrialisation and development are connected processes. The process of urbanisation is influenced by the levels of development in a country. This is noted in the state of the world population (2009) that developed countries are

highly urbanised and the least developed countries are low on urbanisation. Studies of urbanisation in less developed countries contradict this, however. These studies argue that less developed countries are more urbanised, but are not at the same level of development as the more developed countries, hence the lifestyle quality of the urban population in developing countries is very poor (Martinussen, 1997). Due to uncontrolled urbanisation, environmental degradation has been occurring rapidly, causing problems like land insecurity, worsening water quality, excessive air and noise pollution, and problems of waste disposal (Ali and Sulaiman, 2006).

### **3.3.2. Sustainable Development**

Local Agenda 21, which is the United Nations initiative on Environment and Development has been at the forefront in terms of guiding the formulation of strategies for sustainable development (Mporetji, 2008). According to the Brundland Commission (1987 in Estes, 1993), sustainable development is development that uses the present resources to meet the needs of the population, without compromising the resources for future generations. Sustainability creates and maintains the conditions under which humans and nature can exist in harmony ecologically, economically and socially.

The Brundland Report (1987 in Estes, 1993) states that sustainable development acknowledges:

- The interconnectedness of social and environmental problems;
- That environmental strains do not only have an impact on one particular locale or within certain geographic precincts;
- That environmental destruction experienced in one world region affects the well-being of people in other regions; and
- That through sustainable development methods, the planets' delicate ecosystems can be protected.

Sustainable development embraces allied concerns for environmental degradation, poverty, and exclusion (Elliott, 2012). It covers the concepts of society-environment relationships. The concept of sustainable development has been a challenge in many developing countries, in that the populations of developing countries find it difficult to implement measures of sustainability

while they are still in the process of development, especially in urban environments where the majority reside in poor environments. This reveals that, with respect to sustainability, there is a lack of balance between economic, social and environmental priorities (Pacione, 2007).

Sustainable development promotes the:

1. Eradication of poverty and extreme income and wealth inequalities;
2. Goal of full employment;
3. Provision of and access to quality and affordable basic services, and
4. Fostering of a stable, safe and just society as well as providing good environmental services to the people (Pacione, 2007).

According to the Department of economic and Social Affairs (DESA) (2013), for effective and sustainable cities, the policy framework for the sustainable development of urban areas requires multi-level cooperation among local, national and global communities. This requires environmental management, social development and urban governance synergies to address land-use issues, food security, biodiversity conservation, renewable energy sources, employment creation, recycling management, and the provision of education, health care and housing.

### **3.3.3. Environmental Justice (EJ)**

According to Elliott (2012), environmental justice is an urban-based movement that focuses on environmental dangers that are spatially concentrated in poor and minority neighbourhoods, such as injustices to the people, pollution and hazardous waste. This movement challenges major environmental organisations to expand their agendas into issues of community health and urban community development, and to be more responsible towards poorer communities (Elliott, 2012). Environmental justice is concerned with the analysis and placement of active waste facilities in minority and poor areas (Stretesky and Hogan, 1998). Pacione (2007: 251) adds that... *“environmental justice exists when environmental risks and hazards (such as pollution, crime) and benefits (e.g. clean air and waste, and health-care) are distributed equitably among social groups”*. No community should therefore be deprived of good environmental considerations resulting from public or private activities. Evidently,

environmental inequality is distinguishable mostly in informal settlements, with deprived communities experiencing the poorest quality living environments (Pacione, 2007).

### ***3.3.3.1 The Green and Brown Environmental Agendas***

Elliott (2012) explains that the Green Environmental Agenda is concerned with issues such as the depletion of water and forest resources, which are relevant to cities of the more developed worlds, to future generations and natural ecological systems. On the other hand, the Brown Environmental Agenda is concerned with issues of access to basic water supplies, sanitation and housing, the pollution created by poor urban residents of today and human health.

Table 3.1: The Green and Brown Urban Environmental Agendas.

<b>Features of Problems on the Agenda</b>	<b>The Brown Agenda</b>	<b>The Green Agenda</b>
Water	Inadequate access and poor quality	Overuse; need to protect water sources
Air	High human exposure to hazardous pollutants	Acid precipitation and greenhouse gas emissions
Solid Waste	Inadequate provision for waste collection and removal	Excessive generation of waste
Land	Inadequate access to housing for low-income groups	Loss of natural habitats and agricultural land to urban development
Human Waste	Inadequate provision for safely removing faecal material (and water) from the living environment	Loss of nutrients in sewerage and damage to water bodies from the release of sewage into waterways

Source: (Elliot, 2012).

Cities are central to attempts at meeting the goals of sustainable development because this is where the majority of the world's population is located, and their location is often accompanied by physical demands (housing) and the impacts involved in meeting such demands (Elliott, 2012).

### **3.4. Literature Review**

According to the Global Report on Human Settlements (2009), in the year 2008, over half of the world's population resided in urban areas and according to projections by the World Health Organisation (WHO) (2014); the urban population is expected to increase to 70% by the year 2050. This growth is predicted for developing regions between the years 2007 to 2025. The annual urban population increase in developing regions is anticipated to be 53 million (or 2.27%), compared to 3 million (or 0.49%) in developed regions. The major challenge of the rapid urban growth is the fact that it is taking place in countries where the governments are the least able to cope with or facilitate the provision of the required urban infrastructural services, and where the residents are the least able to pay for such services. This has led to the inevitable result of rapid growth of urban informal settlements. Subsequently, over 32% of the world's urban population resides in informal settlements with inequitable and life-threatening conditions, and which are directly affected by both environmental disasters and social crises (Global Report on Human Settlements 2009).

Sakijegge et al. (2012) asserts that housing poverty in developing countries is characterised by the mushrooming of slums. The UN-HABITAT (1996: 109) defines housing poverty as the *“the individuals and households, who lack safe, secure and healthy shelter with basic infrastructure such as piped water and adequate provision for sanitation, drainage and the removal of household waste.”* Factors such as climate change that perpetuate the risk of flooding, water pollution and high temperatures are increasingly making life in these settlements difficult (Satijegge et al., 2012), and according to Satterthwaite et al. (2007), very little attention has been paid to the vulnerability of climate change in urban low-income populations.

Satterthwaite (2003) contends that Africa, Asia and Latin America have the fastest growing cities, thus implying that these areas are challenged by high levels of informal settlements.



Weber and Puissant (2003) state that a significant portion of the growth in urban areas takes the form of informal settlements. These are a result of imperative need for shelter by the less-favoured urban population. Perlman (1976) asserts that the phenomenon of urbanisation is inextricably linked to an expansion of informal settlements, and Mporetji (2008) expands further to state that the extent of the challenge of informal settlements is seen in the backlogs of service provision in urban centres, which perpetuates problems of pollution.

Sub-Saharan Africa's high rates of urbanisation have led to the formation of mega cities in Africa, demanding expansion in terms of infrastructure and service provision, as well as management systems, in order to maintain the desired standard of urban life (Demanya, 2006 cited in Mporetji, 2008). Thus *"rapid urbanisation leads to impediments in respect of formal management and results in environmental harm"* (Mporetji, 2008: 2), which contributes towards environmental degradation.

Satterthwaite (2003) also highlights that the urban areas of developing countries are challenged by an inadequate supply of services such as water, poor or inadequate sanitation and drainage systems, and minimal or no garbage collection, all of which lead to water and soil contamination. Hence informal settlements reflect a situation of enduring environmental harm. Mporetji (2008) articulates that in developing countries where informal settlements are largely found, the cost of not taking action regarding pollution minimisation could outweigh the cost of developing and implementing environmental management strategies and programmes. There is therefore a vital need to find solutions for the adequate collection of solid wastes in informal settlements, to reduce the reliance on non-renewable energy sources, and to put an end to unsustainable practices and activities that damage the environment.

#### **3.4.1. What is the Impact of Such Settlements on the Environment and Water Quality?**

During the 1960s and 1970s following the end of colonial rule in most African countries, cities began to grow, mainly through rural-to-urban migration (United Nations Centre for Human Settlements (UNCHS), 1996; Mabogunje, 1999). This rapid growth of cities led to the formation of informal housing. Cities continued to rapidly grow during the 1980s and 1990s, but this time natural population increase had become the main factor (Mabogunje, 1999). The UNCHS (1996:

86) reported that this expansion was accompanied by a... *“deterioration in physical infrastructure and services as the extension of urban services failed to keep pace with growth in demand”*. Such rapid growth led to fragile economies which meant that only a small minority was accommodated, both residentially and in terms of employment opportunities, and the majority had to reside in informal settlements while working in the informal economy, in order to sustain a living. The UN-Habitat (2010) states that 828 million people reside in informal settlements around the world’s cities, lacking adequate provision of water and sanitation facilities. The UN-Water Decade Programme on Advocacy and Communication (UNW-DPAC) (2010) estimates that the urban population is expected to double between the years 2000 and 2030 in Africa and Asia. In Africa, 38% of the population is urban and the rate is expected to increase to 50% by 2050.

Mitlin and Satterthwaite (2013) expand further on what the UN terms as the less developed region and/or global South, estimated to have about 2.7 billion urban dwellers, which is close to three quarters of its urban populace and about two fifths of the world’s total population. The majority of these urban dwellers live in poverty (i.e. in poor quality, overcrowded conditions and often with apprehensive housing lacking adequate provision for sanitation facilities, safe drinking water, drainage, etc.) which greatly exposes them to environmental health risks. Most informal inhabitants reside in risky areas, such as at the precincts or flood plains of small streams, below transition lines or along recently constructed highways, according to Zeilhofer and Topanotti (2008). The dwellers’ initial infrastructure are constructed using inadequate materials such as cardboard, old wood, plastic films and is implemented without any planning; (Zeilhofer and Topanotti, 2008).

Environmental stress resulting from appalling informal settlement conditions and minimal service delivery aggravates the already poor living conditions of the inhabitants (Mporetji, 2008); and the Department of Water Affairs and Forestry’s (DWAF) (2002) recognises that densely populated settlements create severe pollution as waste matter (human faecal matter and both solid and liquid waste) contaminates water sources.

Water is a vital substance on earth as all plants and animals must have water in order to survive. The UNEP (2000) highlights the global water shortage and scarcity crisis in Africa and India, and affirms that the water crisis is amplified by water pollution in informal settlements, as a result of sewage contamination and poor drainage systems which tend to discharge waste water into roads, open spaces and streams, which eventually flows into rivers during the rainy seasons.

Water is essential for sustainable development and environmental sustainability, therefore water quality has become a global concern as the risks of degradation transform directly into social economic impacts (UN-Water, 2012). According to the UN-Water report (2012), water quality is as important as water quantity for satisfying basic human and environmental needs. This is mainly because poor water quality impacts water quantity in a number of ways i.e. polluted water cannot be used for domestic activities, industry and agriculture, which inevitably reduces water availability in an area.

The World Water Development Report (2012) states that in developing countries, approximately 3.5 million deaths occur each year related to inadequate water supply. Water pollution has many economic costs such as: the degradation of ecosystems; negative impacts on economic activities such as agriculture, industrial production and tourism; health-related costs; and reduced property values, among others (UN-Water, 2012). There is therefore an increased need for cost-effective options for the collection, treatment and disposal of human waste because water contributes to the improvement in social well-being and growth, affecting the livelihoods of billions of people around the world (World Water Development Report, 2015).

According to Davila and Hofman (2006 cited in Mporetji, 2008: 31) *“solid waste from human settlements constitutes one of the most pressing sources of water pollution worldwide.”* Allen, Davila and Hofman (2006, cited in Mporetji, 2008: 40) add that *“water pollution as a result of faecal contamination, solid waste disposed into streams of water, and waste water from domestic use impacts negatively on underground water resources through a process called leaching, which takes water down to underground aquifers. Informal settlements leave no open*

*spaces to absorb runoff water*". Holden (2001) indicates that their establishment directly on the river floodplains greatly increases the pollution of the rivers.

Ali and Sulaiman (2006) attribute informal settlements as the major cause of the pollution of ground water sources. Loss and lack of vegetation cover in informal settlements, which are usually built around water sources, reduces water flow in rivers while the build-up of raw sewerage, together with liquid waste from laundries, kitchens, baths and other domestic uses which is arbitrarily discharged on site, and piles of garbage dispersed in and around residential areas pollute groundwater and then marine environments when the polluted river water enters the sea.

Development on steep slopes which lack botanical cover is one of the important physical factors which can negatively affect the environment. It can lead to the creation of landslides, soil erosion and damaging inundations. Mitlin and Satterthwaite (2013) agree that the poor quality of informal settlements is as a result of overcrowded housing with inadequate or no basic infrastructure of piped water, sewers, or drains; but they include paved roads and footpaths, and electricity among the scant infrastructure. These researchers (Mitlin and Satterthwaite, 2013) cite the lack of health-care as problematic, and include the lack of emergency services and provision for children's play among the sub-standard services that informal dwellers are forced to accommodate. Although the pollution and undermining of the stability of the land are recognised as detrimental and damaging to the environment, little attention has been given to addressing these problems.

Mitlin and Satterthwaite (2013) expand further on the issue of environmental pollution and human health hazards. The contamination of water sources and the surrounding land with the various forms of human waste naturally lends itself to an increase in disease, but the extreme concentration of the people in the informal settlements aggravates this by exponentially as all of the waste is also concentrated, making the environment toxic for the inhabitants.

According to Napier (2000) the regional government, as well as decision makers and urban planner's need to address the matter holistically and in a practical manner. Environmental problems can be addressed by evaluating and improving the public health parameters and

reducing the risks of toxic exposure, and disaster vulnerability. This will shift the ideologies of morality, governance, and belonging that emanate from urban environmental stresses in such areas. This can be achieved by putting in a supply of clean running water, drainage and a sewerage system, the pollution of the water will be stopped. By putting an end to the contamination of the water supply, infections caused by contamination with human waste will be eradicate, thus breaking the cycle between health problems and environmental pollution.

### **3.4.2. Environmental Degradation of the Physical Environment: The Impact of Informal Settlements on Water Sources and the Ground Water Base.**

According to Muturi (2013), the mismanagement and pollution of fresh-water in rivers, lakes and dams has led to the scarcity of this finite and life sustaining resource. Water covers about 70% of the physical environment; 3% of this water is fresh-water and only less than 1% is found and available to humans; the other 2% is locked up in glacial ice at the poles (Muturi, 2013). Hence the pollution of water has become a global endangered resource.

In urban areas, the increase of populations which consequently lead to the rise of informal settlements has led to an increase in the deterioration of many water bodies (Muturi, 2013). Poor control of haphazard growth in informal settlements by the state and related departments has led to health and environmental related issues. Consequently, unrestrained informal settlement development characterised by uneconomic land use, physical disorder and excessive violation of the physical environment has led to higher levels of environmental degradation in many developing countries.

This is due to the fact that informal settlement development is done independently by the residents, does not include any planning and is often erected in regions which are not environmentally suitable for built structures, according to Ameyibor et al. (2003). Informal settlements are human settlements which deny their inhabitants the opportunity of enjoying their right to an adequate standard of living (UN-Habitat, 2007) and are often developed on land that is environmentally conserved or on land not suitable for housing. This has made it rather difficult for the government to refer economic and social infrastructure services to these areas (Ameyibor et al., 2003).

The issue of environmental degradation and pollution, particularly that of the ground water base and the physical water sources, then becomes of concern. As for the fact that informal settlements are commonly erected in regions near small streams and wet jagged lands, the environment degrades as a consequence of excessive land violation and loss of vegetation cover. The loss of vegetation around water sources reduces water flow, while the disposal of liquid and solid wastes results in water pollution (Cole, 1995). As a result, during rainy season's water borne diseases such as rashes and dysentery frequently spread.

The most fundamental issue faced by the informal settlers is the absence of a proper system for waste management. As a result of the lack of waste collection points; garbage is scattered in and around the settlements, consequently leading to health and environmental degradation (Ameyibor et al., 2003) Due to the absence of a centralised sewage disposal method, liquid waste, including water from laundry washing, baths, kitchens and other domestic uses are chaotically discharged on the premises. This dumping practice contaminates the ground water and this becomes a major role player in excessive environmental degradation and a source of water borne diseases (Ameyibor et al, 2003).

The disorganisation of informal settlement construction has congested many natural water ways and as a result, has led to recurrent floods, especially during the rainy seasons. Frequent floods result in intense soil erosion. Vigorous soil erosion results in destruction in the settlements, and of unpaved roads and foot paths, state Ameyibor et al. (2003). These researchers expound further, stating that flooding during the rainy seasons washes away houses and other forms of shelter, resulting in inhabitants having to either clean up and rebuild (an enormous task) or move to other vacant sites of the same regional density to re-establish their communities. Another problem attributable to the absence of water drainage systems is that storm waters gather and establish extensive pools which not only damage the land, but provide an ideal breeding ground for flying and crawling insects that spread disease among the inhabitants. (Ameyibor et al, 2003).

## **3.5. Health Principles of Housing**

### **3.5.1. What are the Features of Informal Settlements?**

Sverdlik (2011) reports that informal settlements house a significant proportion of the world's population. According to Sverdlik (2011), the households of informal settlements are more likely to experience diseases, ill-health, injury and premature death throughout their life-course. This stems from poverty; poor-quality housing; a lack of essential infrastructure with minimal access to refuse collection, running water, toilets, drainage systems etc.; and a lack of access to health care. Sverdlik (2011) links this ill-health with the lack of essential services in the communities and the resultant environmental hazards, high levels of expenditure and inadequate health care.

There is a strong relationship between housing and human health, according to the World Health Organisation (WHO) (1989), which argues that the location, structure, facilities, the environment and the uses of human shelter have a resilient impact on the state of mental, physical and social well-being of individuals. Sufficient and suitable housing conditions not merely protect people against health hazards but also help to promote strong physical health, economic productivity, psychological well-being and social vigour (WHO, 1989). On the contrary, poor housing environments and uses may provide weak defences against health issues, diseases, death, and injury, or even increase vulnerability to them (WHO, 1989).

### **3.5.2. What are the Consequences of Informal Settlements on Human Health**

Urban areas are known as centres for good medical facilities, infrastructure and health personnel; and economies of scale and proximity can facilitate the provision of good quality water, sanitation, drainage systems and health care at lower costs (Sverdlik, 2011). Where the local government is unresponsive to the needs of the population, however, essential services such as health-related infrastructure for areas populated by low-income residents, particularly informal settlements, are often minimal.

In most developing countries, in which a high majority of people reside in informal housing and settlements, communicable diseases continue to cause an excessive number of illnesses and

deaths, especially in infants and young children (WHO, 1989). Sverdlik (2011) recognises this but adds that communicable diseases, although a real threat, are not the only diseases that low-income urban residents suffer from. Non-communicable diseases such as diabetes, strokes and cancer are also very prevalent, but go largely ignored by the health care services in favour of the communicable diseases. Added to this is the fact that health literature provided is often misunderstood by the residents of the informal settlements, thus creating even more of a burden for them.

People are exposed to communicable diseases primarily because of an inadequate supply of safe water; unsanitary disposal of excreta; inadequate disposal of solid waste; inadequate drainage of surface water; improper domestic and personal hygiene; unsafe food preparation and; structural safeguards against disease transmission. Hence, the domestic setting is seen as a crucial battlefield for reducing contact to disease pathogens, as immunisation is limited to certain diseases and may be further constrained by inadequate monetary and technical resources, as well as by problems in distribution (WHO, 1989). Significant improvements to health care provision in informal settlements is radically needed, but Sverdlik (2011) cautions that these improvements must be guided by a holistic understanding of the health issues in these settlements.

The provision of water in a sensible quantity is required for domestic personal and hygiene, as well as for increasing family productivity and the safety of food preparation, according to the WHO (1989). The WHO notes that in informal dwellings, the main source of biological contamination of water, food and soil is from the unsafe disposal of faecal waste. This contamination may occur near houses or river beds when: people defecate on the ground or in areas where food is grown; when pit-latrines are too shallow or improperly located in relation to wells and boreholes; when the latrines are set in soil lacking satisfactory drainage, or; when these latrines are inadequately maintained (WHO, 1989). These conditions encourage protozoal parasites and other pathogenic organisms, and encourages flies as well as smells. Pathogenic organisms can be transmitted to people when untreated excreta are introduced into water sources and then into the food chain. This can affect people at some distance from the original site of contamination (WHO, 1989). According to the WHO (1989: 4), *“these hazards are worse*



*in conditions of overcrowding, whether in informal settlements or temporary camps, where facilities for excreta disposal are absent, insufficient or badly maintained.”*

Solid waste hazards increase with urbanisation. According to the WHO (1989: 5), *“inadequate collection, storage and disposal of solid wastes can generate a number of health hazards, including the spread of gastrointestinal and parasitic diseases, especially when human excrement is mixed with other organic wastes”*. In most developing countries, where cities are growing faster than the ability of local authorities to provide services, the increases in health hazards from solid waste are a major cause of health risks, both human and environmental (WHO, 1989). Inadequate drainage of surface water from stand pipes, pit-latrines and domestic wastewater results in pools or muddy areas that provide breeding places for insect vectors of diseases (mosquitoes and flies) and biological contamination (WHO, 1989).

### **3.5.3. What are the Consequences of Informal Settlements on Human Psychological and Social Stresses?**

According to Marshy (1999), informal settlements are generally overcrowded and this pose both direct and indirect health risks to all segments of the population, particularly the elderly, young children, and the disabled. Overcrowding exacerbate health risks related to insufficient and poor water supply and poor sanitation systems especially in places such as informal settlements. Thus leading to the susceptibility of diseases, the severity of diseases, as well as the spreading of illnesses (Marshy, 1999). For disabled individuals, overcrowding directly impacts on their physical and psychological development and well-being.

These psychological and social stresses are particularly prevalent in urban settlements. These stresses have a greater impact on the rural to urban migrants of developing countries, where the housing situation may not contribute to good health. This is related to the notion of a home as a refuge, and to the socio-cultural functions of space (WHO, 1989). The WHO (1989: 13) states that these migrants *“require adjustments to radically different life styles; occupation; diet; social relationships and social status”*. These lifestyle adjustments are often coupled with the disruption of family interactions and supports, so the migrants lose the social networks which sustain them. The resultant psychological and social stresses thus make them more

vulnerable to diseases (WHO, 1989: 13). Furthermore; overcrowded settlements, the struggle for survival, excessive noise, uncertainty of tenure, and other threats to physical security, discomfort and the ugliness of the surroundings are frequent sources of psychological stress (WHO, 1989). Consequently, overcrowding in communities is linked to substandard education and functional illiteracy and may be related to increase child labor. These effects led to depression and other negative psychological outcomes such as psychological frustrations which in turn, have a bearing on behavioral responses (Marshy, 1999). Hence *“depressing and deficient housing conditions not only fail to provide the refuge required but may also exacerbate the difficulties of adjustment”* (WHO, 1989: 13). In order to reduce unhealthy psychological stresses, settlement environments should:

- Provide adequate living space, properly ventilated and lit, decently equipped and furnished, with a reasonable degree of privacy and comfort;
- Provide a sense of personal and family security, reinforced by the community structure;
- Provide space for children’s play, sports and recreation, with minimum risks of injury and infection;
- Be so sited as to reduce exposure to noise, provide contact with greenery and enable people to have access to community amenities; and
- Be easy to keep clean and in good order (WHO, 1989: 15).

People’s mental health may be improved by sharing activities that serve to diminish the feeling of powerlessness that so often affects the urban poor. In many developing countries, the WHO (1989) notes that most of the existing dwellings in the informal settlements are inadequate to foster optimum health or protect people against avoidable health hazards. Improving the housing situation in developing countries mainly depends on progressive socio-economic development, but this is hindered by:

- *“Inadequate measures to reduce poverty, which limits the material and social means for improvement;*
- *Rapid urbanisation, usually as a result of economic change, which produces problems that local governments are ill equipped to meet;*

- *High population growth rates that outstrip the pace of economic development, and the inequitable distribution of the benefits of development;*
- *Inappropriate policies that may, inter alia, perpetuate unrealistic and obsolete standards that limit access to housing for the poor;*
- *Restrictions to access to land for housing which affects prospects for economic self-sufficiency;*
- *Inadequate attention to social development, as it interacts with economic development or stagnation, and*
- *Unstable political and military conditions that restrict the possibilities of adequate housing” (WHO, 1989: 5).*

Inadequacies in proper housing pose special health risks to women and children, the aged, and the chronically ill, who tend to have special needs that may not be met in poor housing conditions. This is because informal dwellers spend more time at home and are greater exposed to whatever safety deficiencies and health hazards present at home or their surroundings. The safety deficiencies and health hazards arise from the fact that their settlements are often overcrowded and characterized by filth and environmental hazards (WHO, 1989). Sverdlik (2011) reports on studies showing that young children in informal settlements often suffer from diarrhoea due to poor nutritional status, a lack of access to good-quality water and sanitation and other various socio-economic factors; while adults often suffer from Tuberculosis (TB), HIV and violent injuries, especially from fires in the settlements and road accidents.

#### **3.5.4. Ways that Informal Settlements can be Improved**

Populations living in informal settlements are all confronted with the same set of interrelated problems; they have no access or limited access to basic services; and they have no security of tenure (Durand-Lasserve, 2006). Their situation is precarious as they belong to the poorest segment of the urban population. Therefore, it is vital for such populations to have security of tenure. This security may reason them to take care and nurture the environment in which they reside.

Furthermore, people in poor communities need to be educated about the importance of personal hygiene, especially after defecation, states the WHO (1989). This is necessary in breaking the chain of various infections and reducing the incidence of skin complaints such as irritation, sepsis, dermatitis and eczema. This can be fully accomplished once there are adequate supplies of clean water on tap, and with proper disposal of wastewater. This can help reduce direct exposure to micro-organisms and to control insect and rodent pests and disease vectors. According to the WHO (1989), poor, overcrowded settlements, particularly in conjunction with poverty and inadequate facilities, has been shown to increase the transmission rates of communicable diseases such as TB, pneumonia, bronchitis and gastrointestinal infections. This also leads to the exposure and spread of airborne infections, including meningococcal meningitis, rheumatic fever, influenza, colds and measles. Therefore, the health principles of housing not only depend on physical factors such as site, structure and social amenities but also on the uses of which housing is positioned, such as the proper use of hygiene facilities, proper food preparation and appropriate land-use zoning (WHO, 1989). These must be accompanied by good attitudes, aspirations and the knowledge of how to maintain and utilise such amenities by the housing dwellers (WHO, 1989).

Furthermore, the housing environment should not only provide the services required for maintaining health and socio-economic activities; such as clean water, sanitary disposal, the removal of refuse and other wastes, surface water drainage and control of pollution but should also access to places of work, affordable transport services and formal and informal education (WHO, 1989).

### **3.6. The Role of Planning in Addressing Rapid Urbanisation, Urban Poverty and Informal Settlements**

Rapid urbanisation, urban poverty and the growth of informal settlements in developing countries has refocused attention on urban planning. The UN-Habitat report (2014) states that cities in developing countries are experiencing an annual growth rate of more than 4%. This, according to the Global Report on Human Settlements (2009), suggests that significant land and infrastructure development will have to take place to accommodate the ever increasing

population, as a high majority of these new urbanites will be poor and therefore unable to meet their accommodation and service needs through formal mechanisms. Governments will therefore have to take the lead in providing these services for the growing urban population. The failure of governments to lead in providing service delivery in the past has resulted in one billion informal dwellers and the figure is expected to double in the next 30 years. Urban planning is thus essential, given the fact that slum upgrading is a more expensive process than planning ahead of development. Urban planning can play a key role in achieving the Millennium Development Goals, which seek to significantly improve the lives of at least 100 million dwellers by 2020 (Global report on Human Settlements, 2009). Planning will have to play a key role in providing alternatives and preventative measures to the formation of new informal settlements, given the anticipated doubling of the urban population in the next generation. This can be achieved through effective land-use planning, the mobilisation of resources and capacity-building.

### **3.7. Impact of Informal Settlements on the Environment**

Informal development has a detrimental impact on the environment. The settlements lack adequate sanitation for the disposal of human waste, and as a result of this water sources and the ground become contaminated with raw sewage, and thus bacteria, parasites and other infectious organisms. The area will smell bad and be unhealthy for humans. This leads to contamination of rivers, lakes, dams and the sea as a result of water run-off following rain or direct disposal into rivers and streams. The lack of proper drainage systems results in the disposal of dirty water directly into the environment. This water is contaminated to begin with as it is usually drawn from the local stream or river, and then used for laundry, the washing of dishes and bathing. This water, now further contaminated, is then returned to the environment to exacerbate the pollution of the environment.

Clearing of the land and the removal of natural vegetation results in soil erosion, particularly the loss of fertile topsoil, and the loss of flora. This results in the dangerous potential for landslides following heavy rains. The influx of humans into an area has a detrimental impact on the local fauna, as they lose their habitat and source of food and water. Fauna provide a source

of food for the inhabitants of these informal settlements, so those small animals that are not driven out by the arrival of the people are hunted and eaten.

The disposal of refuse creates unsightly and bad smelling piles of refuse, which pose a health hazard for humans and fauna and flora. This refuse contains items like tins and plastics, which are not biodegradable and will thus contaminate the environment for years to come. Some of this refuse may make it into the streams, thus adding to the pollution of the water. Air pollution arises as a result of fires which are used for cooking and warmth. Noise pollution arises from the amount of noise generated by a great number of people located in one area. Such consequences lead to environmental unsustainability and the pollution of the already scarce water resource in South Africa.

## **3.8. Precedent Studies**

### **3.8.1 Introduction**

Informal settlements are characterised globally by poor infrastructural and housing features that impact on the physical environment. Most informal settlements around the world are built on the outskirts of cities, approximately 10-15 kilometres from the Central Business District (CBD). They are usually situated in unsafe environmental conditions (i.e. places that are not approved for housing construction) such as open spaces which are sometimes reserved for forest conservation. This threatens the housing in that the settlements inevitably become prone to development issues (failing infrastructural housing erection), which in turn threatens the physical environment (degradation) (Benitez et al, 2012). The case studies of Veracruz in Xalapa City, Mexico and the Keko Machungwa Informal settlement in Dar es Salaam, Tanzania below will further elaborate specific and similar examples to the issue of improper infrastructural planning, leading to environmental hazards.

### **3.8.2. Environmental Effects of Informal Settlements: A Case Study of Veracruz in Xalapa City, Mexico**

The urban expansion in the city of Xalapa, Mexico in the form of informal dwellings, has created a threat to forest and farmland conservation (Benitez et al, 2012). These authors characterise

informal settlements as the occupation of illegal spaces that are not suitable for housing development. Poverty, the shortage of legitimate, durable housing development and the lack of legally available nearby land for building are promoting the development of informal settlements. The fact that the land is unsuitable makes most of these informal settlements vulnerable to disasters such as landslides and floods (Benitez et al, 2012).

According to these authors, 54% of the unsuitable land in Xalapa City is occupied by informal settlements. This contributes to the degradation of farmland and natural resources, as well as poor living conditions within the urban boundary, threatening the city's environmental sustainability. These settlements are without urban services due to the fact that they were established without formal town planning schemes (Benitez et al, 2012). Although these informal settlements thus have a serious impact on the environment, and Mexico's environmental policies have not been able to prevent their spread.

The pooling effect of rural to urban migration is drowning the already crowded urban areas. Veracruz faces serious problems pertaining to forest conservation on the outskirts of the city. This is a threat to the environment. Spatial analysis data has shown that in the year 2007, 90% of the land in the urban areas of the Xalapa Municipality had been destroyed by human activity. Benitez et al. (2012) point out that current environmental logic was not available when many of these informal settlements were founded.

Omedo (2011) further asserts that the environmental hazards caused by informal settlements on the periphery of the city result in dangerous conditions or events that threaten or have the potential for causing damage to property on the land. General flooding due to heavy rainfall exacerbates the risks as there is no proper drainage system in place to remove water from the environment. Crowded shacks built on unstable land block the rain water, creating damp, saturated soil with great potential for landslides and thus environmental degradation. This consequently damages the poorly constructed houses, and when landslides occur houses (and potentially human lives) are lost.

### **3.8.3. A Case Study of the Keko Machungwa Informal Settlement in Der es Salaam, Tanzania**

According to the UN-Habitat (2010a quoted in Sakijege et al. 2012), Der es Salaam which is the largest commercial city in Tanzania is estimated to have a population of four million, with an estimated 3.2 million residing in about 43 informal settlements. These settlements have limited access to basic infrastructure services such as water supply, sewerage and storm-water drainage systems (Sakijege et al., 2012). Such constraints contribute to flooding, which leads to the destruction of properties, environmental degradation, environmental pollution and disease outbreaks (Lerise and Malele, 2005 in Sakijege et al., 2012).

According to Sakijege et al. (2012), the Keko Machungwa settlement covers an area of 30.95 hectares. With a high water table, the settlement lacks engineering designed storm-water drainage channels, since those that exist are improvised, not coordinated, and individually provided. Several households depend on shallow underground wells since the piped water supply is unreliable. The majority of the settlement dwellers use pit-latrines as the most reliable option for sanitation. It is noted that waste water from pit-latrines becomes a serious health hazard during the rainy seasons, as the majority of the dwellers empty their pit-latrines into the flooding water. This practice pollutes water and air and increases vulnerability to water-borne diseases such as cholera, malaria and bilharzia (Sakijege et al., 2012). Furthermore, the area lacks a proper solid waste management system, resulting in people dumping solid and liquid waste haphazardly in the valleys and natural drains. This water usually flows with a lot of solid waste, which blocks downstream drainage systems. It further decomposes and leaches, eventually ends up mixing with the underground water, thus polluting both surface and underground water sources (Sakijege et al 2012).

### **3.8.4. The Keko Machungwa Informal Settlement in Der es Salaam, Tanzania and Veracruz in Xalapa City, Mexico: Case Study Reviews**

The case studies of the Keko Machungwa Informal Settlement in Der es Salaam and Veracruz in Xalapa City have extensive significance for, and similarities with, the study at hand, in terms of the issues faced in the Kennedy Road informal settlement, namely the impact of the informal



settlement on the physical environment. Although these case studies may differ in study areas and geographies, they provide significant empirical insight. The case of the Veracruz informal settlement in Xalapa City in Mexico relates to the study area in that Xalapa City experiences environmental hazards caused by the informal settlement on the periphery of the city. The resulting dangerous conditions threaten the safety of the inhabitants or have the potential for causing damage to the physical environment and to property. Most informal settlements are increasingly vulnerable to environmental hazards and disasters. General flooding as a result of heavy rainfall causes destruction to the environment, with the loss of topsoil etc. Densely constructed shacks, combined with the lack of a proper drainage system, traps water and intensifies the flooding. Even in the absence of flooding the ground becomes waterlogged during heavy rains, creating the potential for landslides, which can cause severe devastation and even loss of life.

The Keko Machungwa Informal Settlement also has limited access to basic infrastructure services such as a clean water supply, and sewerage and storm-water drainage systems. Such constraints contribute to flooding, which leads to the destruction of properties, environmental degradation, environmental pollution and disease outbreaks. The area lacks a proper solid waste management system, resulting in people dumping solid and liquid waste haphazardly into the environment. Water in and around the settlement usually contains a lot of solid waste which blocks downstream drainage systems. It further decomposes and leaches, and eventually ends up mixing with the underground water, polluting both surface and underground water sources.

The above mentioned reviews corresponds to issues that touch on the proposed study area, in that poor infrastructure generates environmental risks, which threatens urban human settlement and the physical environment. Moreover the impact of informal settlements contributes to failure of sustainable town and regional planning.

### 3.9. Informal Settlement Challenges

According to Pillay and Terry (1991) in a study conducted in Slangspruit, rainfall/runoff monitoring indicates that much of the pollutants that accumulate on land from informal settlements enter the water courses during rainfall events. Pillay and Terry (1991) argue that these sources of pollutants include human (the uncontrolled siting of pit-latrines), livestock and domestic refuse dumped in water courses. They assert that in order to manage this pollution, the upgrading of informal areas and the provision of services is vital.

Ferguson (1996) alleges that informal settlements exact tremendous environmental costs as they often threaten environmentally sensitive areas such as forests, wetlands, aquifers and other bodies of water. Since most informal settlements are built on inappropriate land, mostly steep slopes that greatly increases the cost of infrastructure provision by governments and sometimes threatens residents' safety. Consequently as much as informal settlements serve as solutions of homelessness, they create great environmental impacts and public costs.

Ferguson (1996) argues that the self-help provision of services by informal dwellers impacts negatively on the environment. Ferguson (1996) notes that the lack of roads, which leads to the use of foot-paths that wind in between the houses in the community, makes the provision of urban services which are vital to health and safety difficult and costly. The installation of services such as water and sewer lines, which typically run beneath or along roads, often becomes impossible or excessively expensive. Ferguson (1996) adds that garbage vehicles often do not enter informal settlements due to the lack of roads, which often leads to garbage and waste increasing in the settlement. These pollutants often wash into nearby rivers and streams, thus polluting the water sources.

*"The high densities in informal settlements lacking adequate infrastructure plays a fundamental factor in environmental and health conditions"* (Ferguson, 1996: 180). High density settlement inhabitants make use of non-sewer sanitation, which is unmistakably environmentally hazardous, adds Ferguson (1996). The Department of Environmental Affairs and Tourism (DEAT) (1998) in the White Paper on Integrated Pollution and Waste Management for South Africa states that sewage pollution of water from informal settlements constitutes one of the major

pollution problems in the country. Excessive waste generation and inadequate waste disposal in South Africa's informal settlements can be regarded as threats to South Africa's vision of sustainable development (Mporeji, 2008).

Many informal settlement dwellers rely on pit-latrines and septic tank systems, or have no sanitation, and those without sanitation very often resort to disposing their faeces in nearby rivers, streams, gullies or bushes. According to Ferguson (1996), poor sanitation and waste water discharge produces the greatest direct threat to the environment and to human health. Informal settlements represent a large-scale non-point source of water pollution and it is argued that such areas are often underrepresented in water quality monitoring (Pillay and Terry, 1991).

It is noted that in cities of developing countries, the basic service infrastructures for sanitation, drainage, waste water disposal and piped water supply are often inadequate (Taken et al., 2009). This is the case in Cameroon, where as a result of inadequacy of sanitation and water supply, many low-income urban settlements rely on shallow groundwater aquifers for drinking and other domestic purposes (Taken et al., 2009).

Taken et al. (2009), argues that Sub-Saharan Africa has the highest proportion of the world's urban population living in informal settlements, and more than 80% of the sub-urban population uses groundwater for drinking purposes. Considering the ever-increasing population, the quality of groundwater and streams is of greatest concern. This is due to indiscriminate disposal of untreated domestic and industrial wastes. A vast majority of these settlements are located in swampy areas that are often flooded during rainy seasons, at times releasing sewage into shallow aquifers from the pit-latrines (Taken et al., 2009).

A study conducted in Douala, Cameroon's informal settlement, reveals that human activities within semi-urban informal settlements have a significant impact on the quality of shallow alluvial aquifers (Taken et al., 2009). The study also shows that water sources used at times as the only drinking water sources generally do not meet the criteria for drinking, as recommended by the WHO, adds Taken et al. (2009).

## 3.10. South African Policies

### 3.10.1. Introduction

According to Statistics South Africa (2009: 20) *“an informal settlement is an unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwellings (shacks).”* Furthermore the 2009 National Housing Code’s Informal Settlement Upgrading Programme, South Africa identifies informal settlements on the basis of characteristics such as illegality and informality; inappropriate locations; restricted public and private sector investment in terms of; poverty and vulnerability as well as social stress. In South Africa, the formation of informal settlements was influenced by the Apartheid era which discriminated against people of colour (Blacks, Indians, and Coloureds). Strict laws were enforced by the Apartheid government to segregate the Black majority to rural hinterlands, with no access to services and/or opportunities (Tshikotshi, 2009).

According to Maharaj (1997), the geographical landscape in South Africa; the physical, cultural, social and economic has been influenced by the Apartheid regime policy which founded an unequalled socio-spatial structuring. The most powerful tool for state intervention in controlling the use, occupation and ownership of land and buildings on a racial basis was enforced by the Group Areas Act of 1950, which emphasised separate residential areas, educational services, and other amenities for the different race groups (Maharaj, 1997). Because of such policies the Apartheid regime was anti-development. In 1994, the election of a new democratic government with new economic opportunities led to large scale rural-to-urban migration, as people moved to cities in search for employment and better opportunities. The new democratic government was often unable to meet the demands of the migration, leaving many without proper housing, basic water, sanitation and other basic amenities. These people often resided in informal settlements characterised by high population densities and often on land not suitable for development and without any proper town planning measures. However, the new democratic government for the past 21 years has been on a mission to end informal settlements by providing proper housing, water and sanitation to people residing in such settlements, for the improvement of their quality of life and the achievement of social justice. The process however has been slow as more people tend to migrate from rural to urban

environments in search for employment and better opportunities, and these people often reside in the already crowded informal settlements or develop new ones all together.

According to approved architectural plans *“an informal settlement is a makeshift structure not erected”* (South African Research Report, 2012: 6). The 2001 South African census defines an informal settlement as *“an unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwelling (Shacks)”* (South African Research Report, 2012: 6).

The new urban policy in post-Apartheid South Africa, such as, the South African Constitution of 1996; the Housing White Paper of 1994; and the Housing Act of 1997, amongst others, were passed to redress Apartheid injustices and as a result, cities are experiencing high population growth rates, rapid informal settlement development, overcrowding, declining environmental quality, as well as increasing costs of urban services such that the urban poor are constantly exposed to harsh environmental hazards (Tshikotshi, 2009).

According to the Human Science Research Council (HSRC, 2011), the new democratic government implemented the housing subsidy scheme in 1994 which was set to overcome the legacy of Apartheid’s divided cities and Bantustans; to tackle the housing backlog in formal and informal settlements; to find ways that the poor could access affordable housing; and to build sustainable communities where the building of houses went hand in hand with the construction of community facilities such as schools, hospitals, recreation centres and economic development. Since 1994, the scheme has changed the housing landscape and adequately sheltered more than 2.8 million households (HSRC, 2011), it has

- approved housing subsidies for 1.7 million households and constructed over one and a half million housing units;
- provided secure tenure and safe homes to more than six million people;
- taken steps to improve the quality of the houses built;
- provided rental housing for people who do not want to own homes or do not qualify for subsidies;
- assisted over 5000, 000 families to secure titles of old public housing stock;

- established the Public Sector Hostels Redevelopment Programme Policy 1994 to upgrade hostels into family units, single units and rented accommodation; and
- Increased expenditure on housing subsidies from R2.7 million in 1996/7 to approximately R5 billion in 2006/07 (HSRC, 2011).

South Africa has therefore come a long way in terms of rectifying Apartheid injustices, however, there are still more challenges to be met to ensure that all South Africans are fully afforded their constitutional right to safe, secure housing, and for as long as people still reside in informal settlements, social justice and sustainable development for the improvement of their quality of life will not be achieved. Hence the government needs to provide more sustainable housing development, with access to services and opportunities.

According to the National Environment Management Act, South Africa (NEMA) (Act No.107, 1998), 'environment' means the surroundings within which humans exist and that are made up of:

1. The land, water and atmosphere of the earth;
2. Micro-organisms, plants and animal life;
3. Any part or combination of (1) and (2) and the inter-relationship among and between them; and
4. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being

The purpose of the NEMA (Act No. 107, 1998: 1) is to...

*“provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; provide for certain aspects of the administration and enforcement of other environmental management laws; and provide for matters connected therewith.”*

Therefore, environmental management must equitably place people and their needs at the forefront of its concern, be it, physical, psychological, developmental, cultural, and/or social interests. Development must be socially, environmentally and economically sustainable. It is however noted that a vast majority of South Africans in informal settlements live in environments that are harmful to their health and wellbeing.

Furthermore, the National Constitution, Chapter 2 of the Bill of Rights, act 108 of 1996 states that everyone has a right to:

- *An environment that is not harmful to their health or well-being;*
- *To have their environment protected for the benefit of the present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation, secure ecologically sustainable development and the use of resources while promoting justifiable economic and social development.*

This legislation applies to all South Africans. The state should therefore intervene in challenges or problems of pollution and unsustainability in informal settlements. It is noted that a high majority in informal settlements are deprived of the above rights. Furthermore, the Reconstruction and Development Programme (RDP, 1995) which is an integrated, coherent socio-economic policy framework that seeks to mobilise South Africans as well as the country resources towards an integrated and sustainable programme based on the people adheres to:

- *Providing peace and security for all;*
- *building the nation;*
- *Linking reconstruction and development with due environmental consideration;*
- *As well as deepening democracy.*

More recently the Spatial Planning and Land Use Management Act (SPLUMA) Act No. 16 of (2013) which is a plan set to provide a framework for spatial planning and land use

management in the republic was adopted in the republic in order to seek and specify the relationship between the spatial planning and the land use management system and other kinds of planning in the country. The act seeks to provide for inclusive, developmental, equitable and efficient spatial planning at the different spheres of government; the national, provincial and local governments. SPLUMA aims... *“to provide a framework for the monitoring, coordination and review of the spatial planning and land use management system; to provide a framework for policies, principles, norms and standards for spatial development planning and land use management; to address past spatial and regularly imbalances; and to promote greater consistency and uniformity in the applications. It seeks to provide for the establishment, functions and operations of Municipal Planning Tribunals; to provide for the facilitation and enforcement of land use and development measures; and to provide for matters connected therewith.”*

In 1997, the municipality adopted a Spatial Development Framework (SDF). The SDF is a legal document in the Integrated Development Plan (IDP) set to spatially translate the IDP and show how the implementation of the IDP should occur in space (SDF, 2013). It guides the overall spatial distribution of current and desirable land-uses within the municipality, to ensure that the desired spatial form and outcomes of the municipality are achieved.

However, a majority of informal settlements in South Africa lack elements of the above policy framework. Informal dwellers lack an integrated and sustainable programme that provides security and peace, a programme that is people centred and orientated, as well as development with due environmental consideration. It is therefore important and evident to note that South Africa has a long-way to go in order to achieve such commitments, hence town and regional planning cannot be achieved without due consideration of the environment.

Census South Africa noted that 1.11 million households lived in enumeration areas (formal houses built in an informal manner or without town planning regulations) that are characterised as informal settlements, and 1.38 million households lived in an informal dwelling or shack not in a backyard (not in an informal/squatter settlement) in the year 2001 (South



African Research Report, 2012). Furthermore, the 2009 Housing Code's Informal settlement Upgrading Programme identifies informal settlements as per the following characteristics:

- Illegality and informality;
- Inappropriate locations;
- Restricted public and private sector investments;
- Poverty and vulnerability; and
- Social stress

Thus the Upgrading of Informal Settlements Programme applies to all settlements that demonstrate one or more of the above characteristics. Evidently the slow pace of housing delivery in post-Apartheid South Africa has led to an increasing population in existing informal settlements or the creation of entirely new ones. This puts a strain on already over-burdened municipal resources and has led to the adoption of the bull-dozer (led by the Wozani Security Company, commonly known as the red ants approach) which forcibly removes informal settlements. Such approaches have been noted to be the main causes of homelessness, according to the South African Research Report (2012).

### **3.11. Access to Services in South African Informal Settlements**

It was noted in the South African Research Report (2012) that 26% of households living in informal settlements enumeration areas (EAs) had piped water in their yard. Enumeration areas are formal houses built in an informal manner or without town planning regulations and are therefore characterised as informal dwelling and/or settlements. A further 33% could obtain piped water within 200 meters of their dwelling. 32% had access to piped water, but there is no indication of how far away the water source is. A further 9% had no access at all (South African Research Report, 2012: 32). Moreover, 19% of households in informal settlements EAs used flush toilets; an additional 43 percent used pit-latrines while 15% used bucket latrines and 5 percent used chemical toilets. The remaining 19% had no access to toilet facilities (South African Research Report, 2012). *“32% of households in informal settlements EAs used electricity for lighting and 56% had their refuse removed by the local authority”* (South African Research Report, 2012: 32). The South African government currently insufficiently delivers quality

environmental services such as water and sanitation, effective waste collection and disposal systems, good drainage to prevent flooding, safe and convenient transport, parks and other recreation facilities, and effective planning for urban communities to all people, especially those residing in informal settlements.

Lack of the above mentioned services have been noted as one of the major causes of the problem of environmental pollution in informal settlements, especially of water, since most informal settlements are situated in or near water catchment areas. In the absence of sanitation, the disposing of human excreta and waste and the use of low pit-latrines further pollutes the environment.

### **3.12. Conclusion**

This chapter attempted to provide a background understanding with respect to environmental degradation in informal settlements. Both local and international case studies (revealing how the research topic is connected to other related areas) were used to explain the nature of informal settlements and the type of activities that lead to degradation, especially, the contamination and pollution of water sources which lead to environmental degradation and unsustainability.

## Chapter 4: Data Presentation and Analysis

### 4.1. Introduction

In this chapter data from the field work is presented. This data has been collected and processed in response to the problem statement modelled in chapter 1. There are two fundamental goals that drove the collection of this data, these are: finding out to what extent the informal settlement impacts on water and; how its consequences hinder environmental sustainability.

### 4.2. General Overview of Informal Settlements in Durban

According to Fatoki et al. (2001), water resources in South Africa have been under increasing threat of pollution in recent years due to rapid demographic changes, notably, the establishment of densely populated human settlements lacking appropriate sanitary infrastructure and waste management services. The accumulation of waste in informal settlements intensifies as raw sewage and garbage are scattered in the area, creating unpleasant odours and a loss of aesthetic value in public and open spaces (Magalhaes and Eduardo, 2004). This exposes informal dwellers to higher than average health risks. South Africa is facing a crisis in terms of providing communal services such as housing, water, sanitation, and storm and grey water drainage in informal settlements, states Armitage et al. (2009).

Durban is a city characterised by high levels of unemployment and poverty, reports Breetzke (2009). This is due to South Africa's Apartheid legacy of racialised separate development. According to Breetzke (2009), the municipality has built approximately 12, 000 houses per year for the past ten years and the backlog currently is approximately 210, 000 households. The provision of new houses, basic infrastructural services and social facilities is highly influenced by political representatives and is *"facilitated by subsidies from the housing programme, which aims to formalise and service the bulk of informal settlements 'in-situ' in order to retain the social networks which support people's livelihoods"* (Breetzke, 2009: 20).

Armitage et al. (2009), argue that local authorities are generally able to provide potable water from communal taps and/or standpipes dispersed around the settlements, but there is usually

no formal provision for storm water and grey water drainage. According to Armitage et al. (2009: 2342) *“grey water from informal settlements is usually highly polluted as small quantities of water are frequently used for a number of domestic purposes before eventual disposal.”* The water is disposed of on any convenient or open space and is frequently further contaminated by solid waste and faecal waste which is usually dispersed on any given ground. Armitage et al. (2009) further argue that the provided sanitation is dysfunctional and inadequate, and is generally located on the periphery of the site and/or settlement. Many dwellers often resort to using buckets which are emptied at any convenient point on a daily basis. This waste usually flows to nearby water sources during rainy seasons, polluting rivers and streams.

Informal settlements in Durban represent about 75% of the municipality’s gross housing backlog (IDP, 2013-2014). Most informal settlements in Durban have developed in the previous buffer strips within established areas or land that formerly lay beyond the city boundaries under the jurisdiction of “independent states” (Marx and Charlton, 2003). Informal settlements in Durban are often characterised by structures constructed from various materials varying from mud, plastic, corrugated iron, to timber and metal sheeting. Sanitation is often provided by informal pit-latrines and water is gathered from communal taps and occasionally natural sources such as rivers (Marx and Charlton, 2003).

Spatial planning in Durban has a *“legacy within the structure of the local government prior to the formation of a single unitary metropolitan local authority (eThekweni) in the year 2000”* (Breetzke, 2009: 23). However, the metropolitan area still comprises of numerous local authorities, each responsible for planning and delivery. In 1997 the municipality adopted a Spatial Development Framework, which is a legal document in the Integrated Development Plan (IDP) set to spatially translate the IDP and show how the implementation of the IDP should occur in space (SDF, 2013/2014). It guides the overall spatial distribution of current and desirable land-uses within the municipality to ensure that the desired spatial form and outcome of the municipality are achieved (SDF, 2013/2014).

According to Marx and Charlton (2003), Durban’s current pattern of informal settlement is largely influenced by Apartheid factors and its unjust policies. The 1913 Land Act which was

aimed at regulating the procurement of land by natives (Black people), forced the Black majority to largely rely on wage labour for survival. In addition, the creation of independent states adjacent to city boundaries in the 1960s and 1970s prompted the growth of informal settlements along the urban fringes (Marx and Charlton, 2003). These settlements grew as a result of the lack of housing alternatives, as well as devastating droughts in the late 1970s and 1980s, which forced people to seek livelihoods in urban areas (Marx and Charlton, 2003). The number of informal settlements in Durban has grown drastically since, especially after the election of the 1994 democratic government which aimed at rectifying Apartheid's unjust policies. This led to high levels of rural to urban migration, as more people searched for employment, education and health care services.

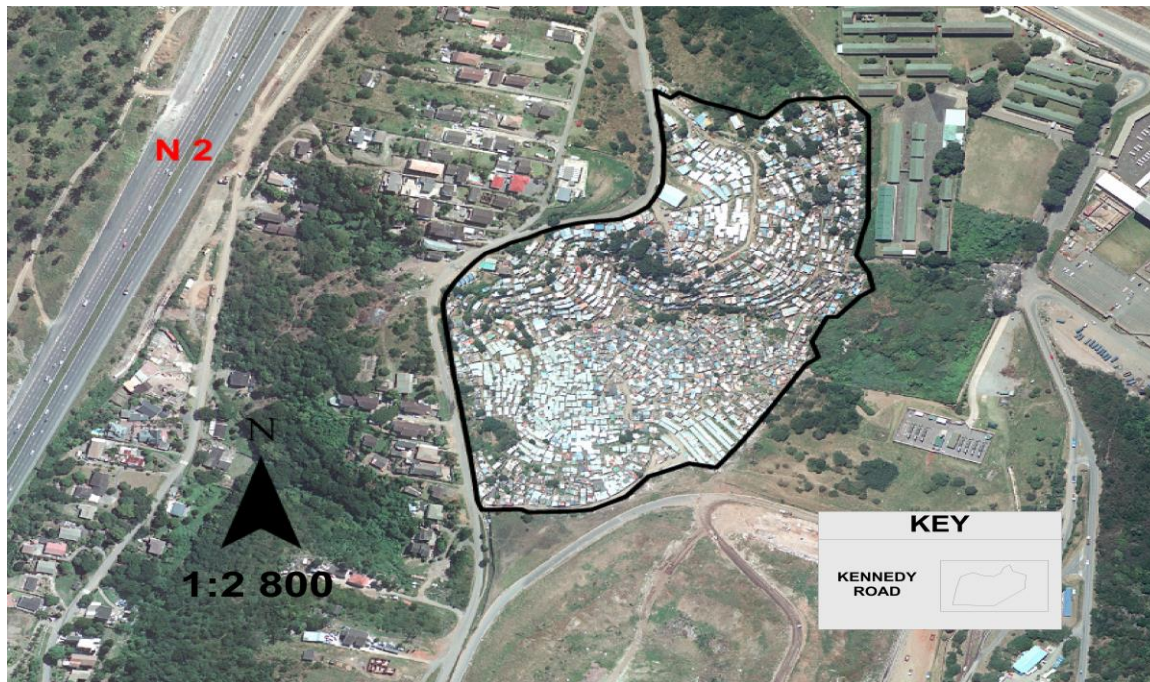
The Umgeni Water for Growth and Sustainable Development (Umgeni Water, 2014) has noted that the constant rise in the number of informal settlements along streams and other water sources in the Durban area have increased pressure on this scarce resource. Lack of access to treated water in some areas result in people using rivers for washing and bathing. The use of latrines which are often placed near river banks results in water contamination, giving rise to water-borne diseases such as gastro-enteritis, cholera, hepatitis, dysentery and typhoid.

#### **4.3. The Development of the Kennedy Road Informal Settlement**

The Kennedy Road informal settlement was established in the late 1970s. The settlement has then expanded from one household to 7000 households in the year 2010 (Census, 2011). It is one of the several informal settlements in and around Durban that have poor living conditions. The quality of life in this settlement is very poor such that basic services and necessities like water, sanitation, solid waste management and electricity are relentlessly lacking. This places the health of the people as well as the environment at serious risk. This increases the incidence of diseases and environmental degradation. The Kennedy Road informal settlement was founded in the late 1970s and at the time of occupation, it was essentially reserved for the suburbs of Clare Estate under the Apartheid legislation, for the exclusive use of people of Indian descent (Abahlali, 2005). In the 1980s however, informal settlements started to develop along Kennedy Road as more people moved to cities in search of employment and opportunities. The

Kennedy Road informal settlement is located near the Springfield Industrial Park where employment opportunities are plentiful, and along a land-fill site where people can also find employment. This has been the driving force behind the formation and development of the settlement.

Plate 4.1. The Kennedy Road Informal Settlement.



Source: Researcher (2015).

## 4.4. Data Presentation

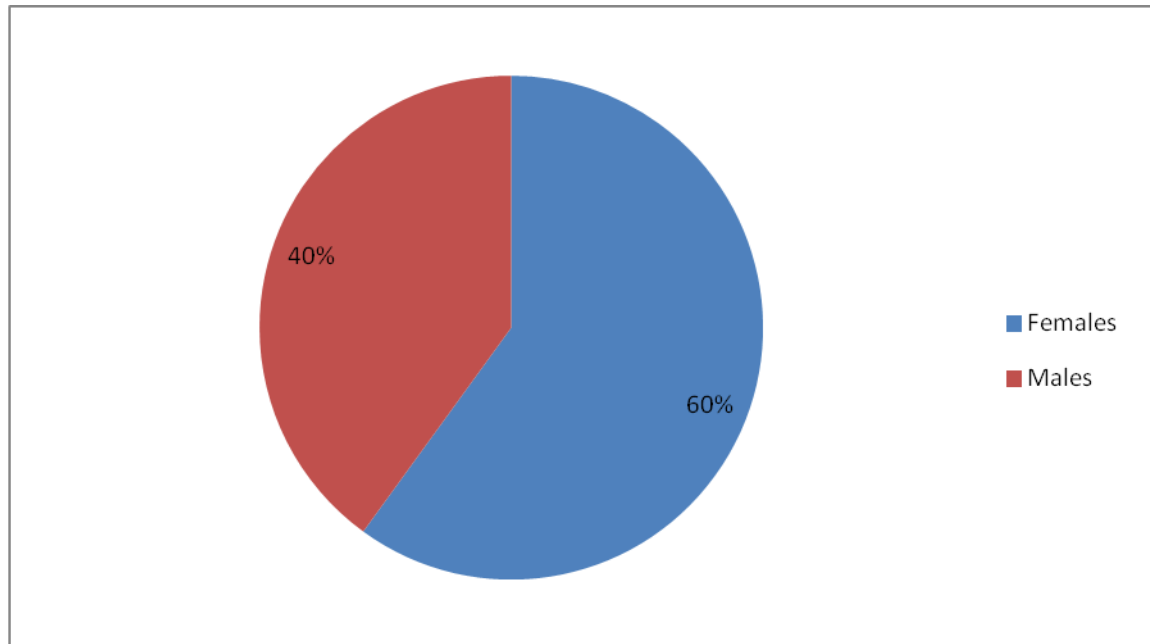
As noted in the research methodology, data will be presented here. The data in this section will be based on specific themes, namely: the Demographic Profile of Kennedy Road; Housing; Municipal Infrastructure and; the Social Infrastructure.

### 4.4.1. A: Demographic Profile of Kennedy Road

In the Kennedy Road informal settlement, of the 100 households that were interviewed 60% of the participants were females and the other 40% were males, as presented in Figure 4.1. This gender balance biased towards female headed households is due to the fact that most men

migrate to Gauteng to work in the mines. Furthermore, Durban's gender statistics cited in the eThekweni Gazette (2014) state that there are more females than males in the city.

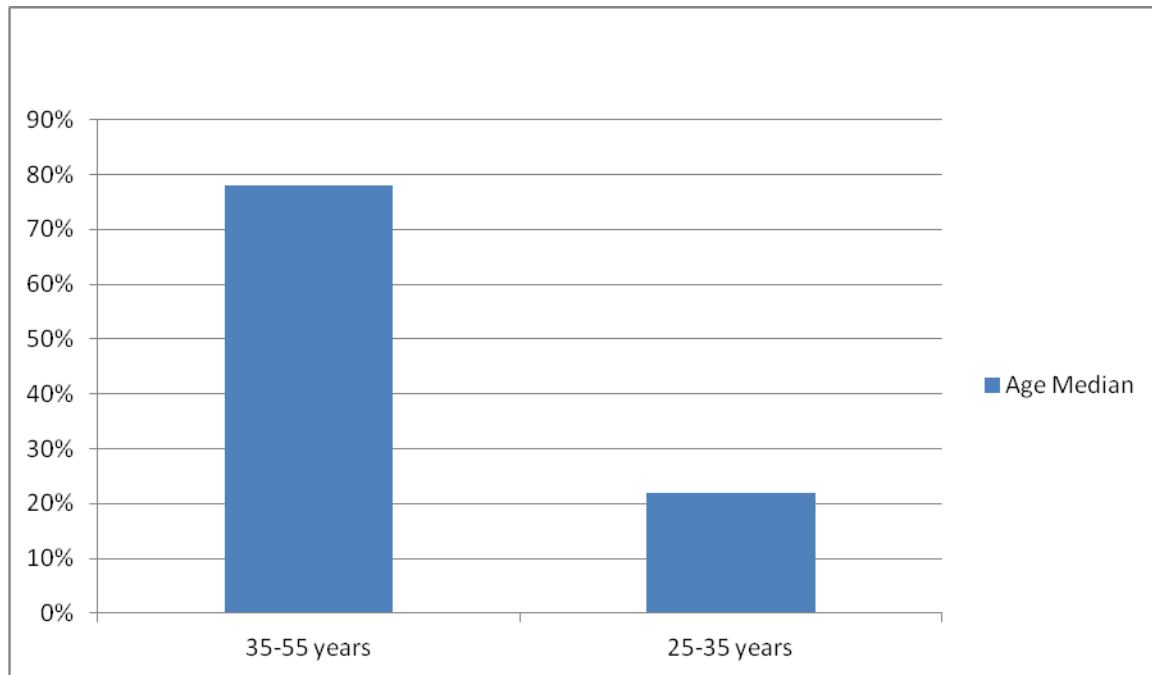
Figure 4.1. Gender.



Source: Researcher (2015).

Most of these participants were owners of their houses in the settlement, and the majority ranged in ages from 35 -55 years (78%), while 22% of the interviewees were aged between 25 to 35 years, as presented in the Figure 4.2. This revealed that the majority of the dwellers were middle aged. Furthermore, 40% of the participants resided in Kennedy Road for better employment opportunities (mostly from the Springfield Industrial Park; the Clare Estate suburb and the from the Land-fill site). Another 40% resided in the area for self-employment opportunities, while 20% of the residents resided in the area because of cheap rent, which was usually R200 to R300 per month depending on the size of the room.

Figure 4.2. Age Median.

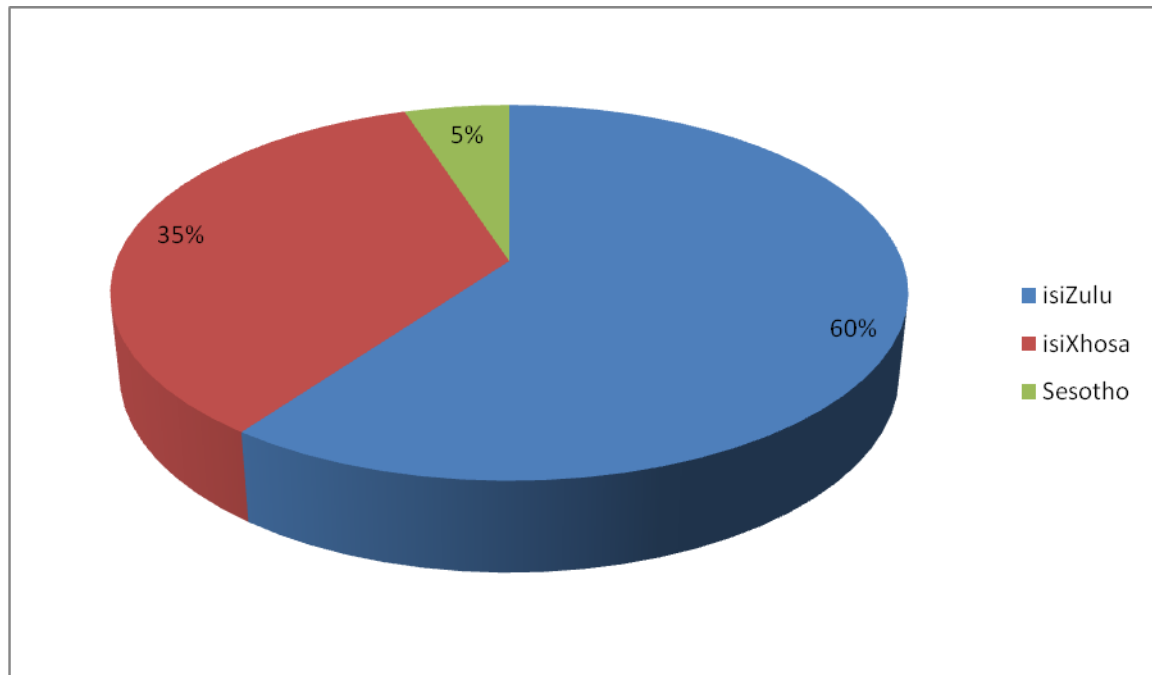


Source: Researcher (2015).

In addition, 60% of the respondents spoke isiZulu; 35% spoke isiXhosa and 5% spoke Sesotho and other languages. This was expected, given that the dominant indigenous group in KwaZulu-Natal are Zulu speaking people.



Figure 4.3. Language.



*Source: Researcher (2015).*

It was also noted that 80% of the population in the study area were unemployed, while 99% of the participants were not married (single). Some of the residents of Kennedy Road worked in the informal sector, while a high majority were unemployed. Those that had employment usually worked as domestic workers and gardeners at the adjacent Clare Estate suburb, while others collected and recycled scrap materials from the adjacent dumpsite for income. As a result of their types of employment, the residents of Kennedy Road generally earned less than R800 per month. Those that were unemployed depended on the child maintenance grant provided for by the South African government for survival, which was roughly R330 to R350 per child. This was the reason why the area was characterised by single (never married) woman. They used the grants provided by the government to support and feed their families. For these reasons the residents of Kennedy Road could neither afford proper and/or formal housing, nor can they afford to live anywhere. They lived in close proximity to their places of work, which saved on travel costs.

#### **4.4.2. Housing**

As per the researcher's observation, the housing typology of Kennedy Road was both formal and informal, but the majority was informal. The houses were free standing structures with usually one to two rooms per unit. The settlement was densely populated with very little space between the structures. The majority of them were constructed from scrap materials such as corrugated iron, plastic and planks, and were without facilities inside the house. This made them non-durable and unsustainable. They were tiny, imbalanced and overcrowded structures that were untidy and filthy. This was due to the fact that Kennedy Road was an informal settlement; therefore, land was obtained illegally by the dwellers who could not afford to purchase proper housing. The area was previously reserved as an open space for the nearby land-fill site and was therefore not zoned for any development. The land was additionally not zoned for housing as most of the land in Kennedy Road was undevelopable.

The formal structures were built by the municipality to temporarily compensate those that had lost their homes during a fire disaster that took place in the area. These were attached housing structures, as seen in Plate 4.2, with one room per household. They were built from non-durable cardboard materials which eliminated neighbouring household privacy because the walls were so thin. These structures were neither sufficient, nor sustainable. They were located within the informal settlement and did not have infrastructural support such as roads, storm-water drains, electricity, sewage disposal, clean running water and sanitation.

Some of the victims of the fire disaster were accommodated in the local hall since only households that were registered for a housing grant were allocated these low-cost structures.

Plate 4.2. Low Cost Housing in the Settlement.



Source: Researcher (2015).

#### **4.4.3. Infrastructure**

The area does not have sufficient infrastructural services. The municipality does not supply electricity to the informal houses in Kennedy Road and the residents have therefore resorted to providing their own electricity connections, termed 'izinyoka' (self-connected electricity). These illegal electricity connections pose threats to the users and have been a major cause of fire disasters in the area. Some of the structures recently (during the third trimester of 2014) burnt down due to illegal and unprofessional electrical wiring. This electricity is paid for by the users in the community to 'illegal electricians', who claim installation fees of approximately R500 and a monthly rent of R150.

Plate 4.3. Informal Structures.



Source: Researcher (2015).

Plate 4.4. Electricity Lines.



Source: Researcher (2015).

Kennedy Road has no sewage pipelines, drainage systems and V-drains; and during the rainy seasons, water flows into the rooms and collect into pools in and around the housing structures. The pools of water thereafter become contaminated and toxic (changes in to a greenly black colour) which breeds pests, contributes to illnesses and the latter degrades the environment. The water also damages the houses, causing structural instability.

Plate 4.5. A Resident in the Area Demonstrating How Rain Water Flows and Collects in the Low Cost Housing Due to the Absence of V-Drains.



Source: Researcher (2015).

Toilets comprise of a row consisting of seven unsanitary portable chemical toilets (see Plate 4.5) situated near the main road and far from most of the population; therefore human waste is sometimes disposed of in and around the settlements as most residents do not have individual toilets. These communal toilets are provided by the municipality and are inadequate and unhygienic. Residents inevitably resort to using the bushes because of the long walking distance to the toilets.

Plate 4.6. Sanitation Facilities in the Settlement.



*Source: Researcher (2015).*

The Kennedy Road informal settlement lacks a proper solid waste management scheme. Waste is only collected along the main road, and those that reside deep within the settlement resort to dumping their waste in and near the stream. This practice has led to the contamination of the environment, especially the pollution of the stream which is now characterised by grey water. This affects the environment and the health of the people in Kennedy Road due to the fact that water and the environment are contaminated by this haphazard disposal of garbage as shown in Plate 4.7 and 4.8.



Plate 4.7. A Stream that Runs Through the Settlement.



*Source: Researcher (2015).*

Plate 4.8. Lack of Proper Solid Waste Management.



*Source: Researcher (2015).*

The stream that runs through the settlement contains nothing but grey water and garbage, accompanied by smells, rats and flying insects. A number of houses in close proximity to the stream are built on the flood plain of the stream. According to the records in the local clinic, inhabitants (80%) are normally prone to water borne illnesses and are affected by sicknesses such as rashes, dysentery, and skin infections. The residents of the area claim that physical contact with water from the stream results in sores developing on the skin. They claim that rats

near the stream are so big that they actually killed and ate a young infant in 2010. Although these claims were not substantiated by the clinic, and could well just have been urban legend, the clinic did however confirm that the residents of the Kennedy Road informal settlement are prone to skin diseases especially in young children.

As far as garbage control in the study area is concerned, the municipality does provide disposable domestic plastic bags, but they are only given to residents closer to the main road. Those who reside deep within the settlement do not have access to this service, thus garbage is scattered in the stream that runs through the settlement. It is also haphazardly disposed of on the premises and around the settlements, and this increases the pollution. It takes months for the garbage contractor to collect the disposed garbage/waste. This waste contaminates the stream, and blocks natural water-ways during the rainy seasons and therefore pollutes water and contributes to environmental degradation.

Plate 4.9. Grey Water that Flows Within the Settlement.



Source: Researcher (2015).

Plates 4.10 and 4.11 show how the absence of storm-water management in Kennedy Road leads to runoff from alleys during the rainy seasons, which is usually contaminated by greywater containing faecal bacteria and garbage. This water flows to the settlement stream, is a source of pests and flies, and is accompanied by foul smells. The stands pipes in the area do



not have any form of drainage system and excess water usually collects around the points and becomes a breeding ground for pests and flies. Some of the excess water collects in alleys containing solid-waste and eventually starts to smell.

Plate 4.10. Lack of Drainage, Storm-Water Channels and Waste Disposal Facilities.



Source: Researcher (2015).

Plate 4.11. Lack of Storm Water Channels in the Low Cost Housing.



Source: Researcher (2015).

There are too many disagreements between the municipality and the community and the photographic evidence revealed by this study proves that; inadequate or no services are provided for the residents in terms of electricity, sanitation and solid waste management. The provision of housing is inadequate, as too is the provision of toilets. Although portable toilets are provided by the municipality, they are unhygienic and greatly insufficient in number for the 7000 households' inhabitants. Water is provided by means of a mere four communal taps.

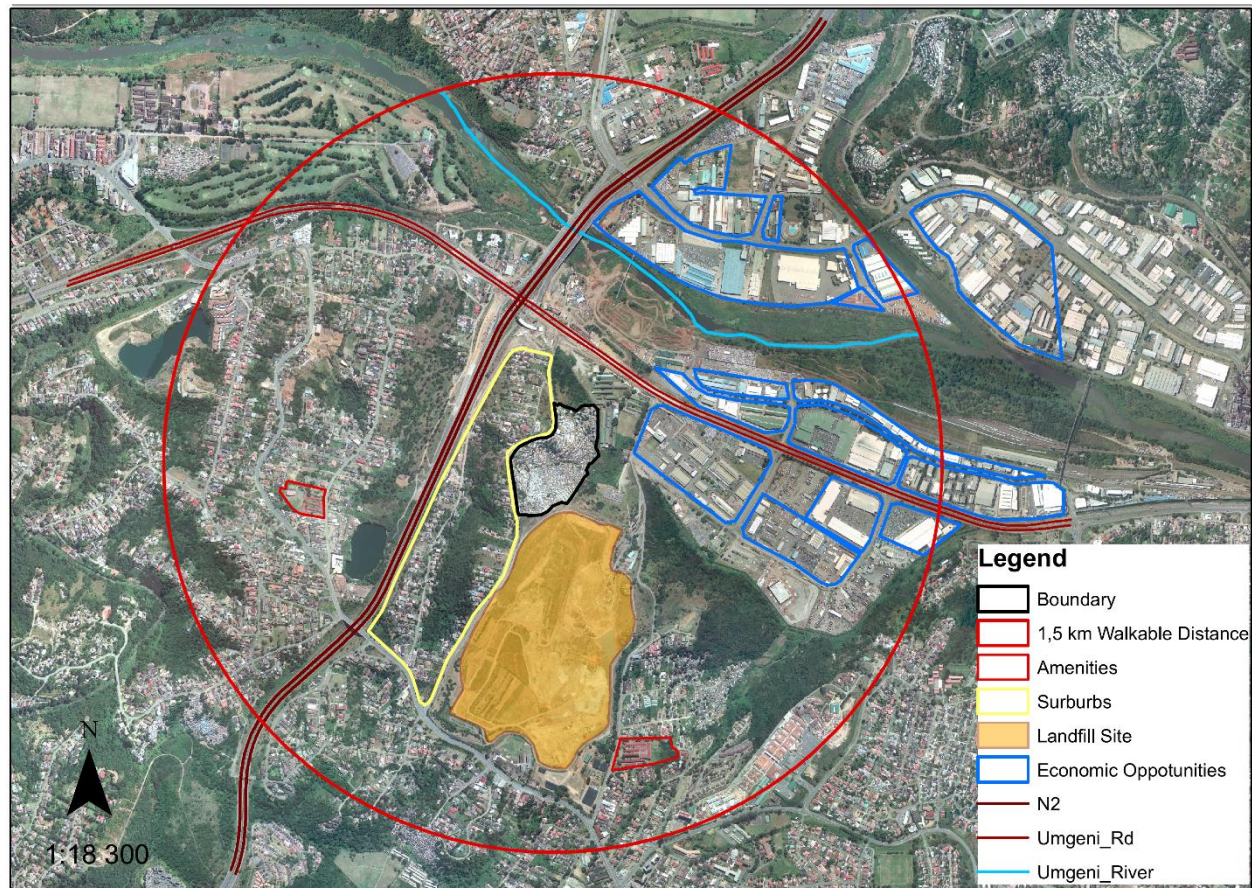
Furthermore; the area lacks roads therefore the residents' resorts to using foot-paths. This is highly due to the fact that Kennedy Road is densely populated and the nature of informality of the area does not leave space for road development and therefore infrastructures' such as electricity; sewerage; water and storm-water become impossible to provide.

#### **4.4.4. Social Infrastructure**

In addition to the lack of infrastructural services in the area, the Kennedy Road settlement lacks any form of social services such as schools, clinics, shops and recreational facilities. The residents of the Kennedy Road settlement resort to utilising these services in the adjacent Clare Estate neighbourhood. This evidence further verifies how the area is neglected in terms of the provision of services.



Figure 4.4. Nature of the Environment.



Source: Researcher (2015).

## 4.5. Data Analysis

### 4.5.1. Introduction

The researcher went into the settlement with the assumption that the residents lacked services, especially housing, because they refused to be relocated to proper developable lands; they wanted RDP houses to be built in the area as they were in close proximity to their places of work. These were claims set out by the Abahlali Basemjondolo organisation to the media (Abahlali, 2005) and the municipality. On the contrary, the government could not provide RDP housing for them because the land that they resided on illegally was undevelopable and in close proximity to a land-fill site. However, when the researcher conducted the research, it was discovered that those were actually false allegations set out by the organisation and did not

represent the needs of the people as the majority of the residents were unemployed. According to the residents interviewed, all they wanted was a better environment with proper housing and services, no matter the location. The majority of the residents wanted to be relocated to an environmentally friendly area with proper infrastructural services as the Kennedy Road area was viewed to be mentally and environmentally unsustainable, and had detrimental effects on their health and well-being.

Furthermore; before the formation of the Kennedy Road informal settlement, the area was zoned as an open space and not for any form of development, especially housing and human settlement. This was the case because of the area's close proximity to a land-fill site, which was acknowledged to be a health hazard (IDP, 2014). In addition; most of the land in Kennedy Road was undevelopable because it had a very steep gradient. To this end, the eThekweni municipality is currently in the process of relocating all of the residents of this informal settlement to RDP houses in Waterloo.

The first sub-questions guiding this study related to the impact of informal settlements on water sources. The case studies and the literature reviewed illustrated these challenges and impacts, including the impact of informal settlements on the physical environment, water sources and water pollution. The second part of the sub-questions focused on how the negative effects on the environment could be minimised, the sub-questions looked at the coping strategies employed by the settlement dwellers and the municipality to reduce water pollution.

The findings of the research showed that most people resided in the settlement as they felt that there were better opportunities for employment in the surrounding areas; some lived there as the rents were cheap and more affordable; others resided there as there were opportunities for self-employment; while a few resided there because it was in close proximity to their places of work. According to the residents participating in the study, there had been minimal development of the settlement since its establishment.

Findings have shown that government or municipal intervention had been too minimal to have had a significant impact on the lives of the people and the environment of the settlement. Although some housing had been provided by the municipality, it had been inadequate to meet

the needs of the people, both in number and in terms of structure and facilities. There had been mismatched placement of the informal dwellers residing in the study area. The lack of infrastructural services in the area has led to the accumulation of waste in the form of garbage and faecal matter, both of which created a foul smell. An adequate system for waste collection was still lacking, there was inadequate sanitation for the number of inhabitants and a sewer system was non-existent. A drainage system to deal with water runoff (both from polluted water discarded by the inhabitants and from storm waters) was still absent. In essence, nothing had been done to help minimise or prevent the degradation of the environment by the inhabitants of the settlement. Pollution of the water sources and the ground was still evident. The polluted stream was further polluted by contaminated water runoff from the ground surrounding the dwellings, which harboured an accumulation of pathogens. This caused outbreaks of disease and various other health issues and promoted the breeding of pests, all of which endangered the residents of the area.

Besides the contamination of the water and the soil, the foul smell from the garbage and excrement created air pollution; the foul smell emanating from the adjacent land-fill site also contributed towards the air pollution. The inhabitants who resided near the stream running through the settlement appeared to be more prone to ill health, as they had the most exposure to the accumulated garbage, rats, foul smells and contaminated grey-water. The inhabitants claimed that the water, soil and air pollution were the major cause of the illnesses suffered by the community, such as tuberculosis, asthma and bronchitis. When approached by the researcher, the staff at the nearest clinic reported that skin rashes were prevalent, although this claim was not substantiated; but these findings substantiated the assertion that pollution was widespread in the settlement. The clinic staff added that another common complaint suffered by the settlement's inhabitants was burns, caused by fires emanating from illegal electricity connections and from candles.

The findings of this study have shown that the high degree of environmental degradation in the area has made it implausible that the millennium development goal and sustainable development in the eThekweni municipality, and in South Africa as a whole, can be achieved. A large number of South Africans still live in poverty characterised by poor, unsustainable

environments. The majority of the residents in the Kennedy Road informal settlement were unemployed and suffered from diseases or mental health issues such as stress and depression. They felt that the government was not doing enough to improve the environment and the conditions they lived under, especially in terms of the provision of housing and sanitation. The quality of the water in the area was very poor, as seen in Plate 4.9. It was not only characterised by grey water and foul smells, but also by filth and pests that caused ill-health to the residents of the area, particularly those living in shacks nearest to the stream. It was therefore evident that the Kennedy Road informal settlement lacked the most basic infrastructure and services, and that this had contributed to the deterioration of the environment. The population was largely excluded and marginalised and but what was most dangerous was the fact that this settlement was situated in water catchment area, thus causing environmental and health problems.

#### **4.5.2. Illegality**

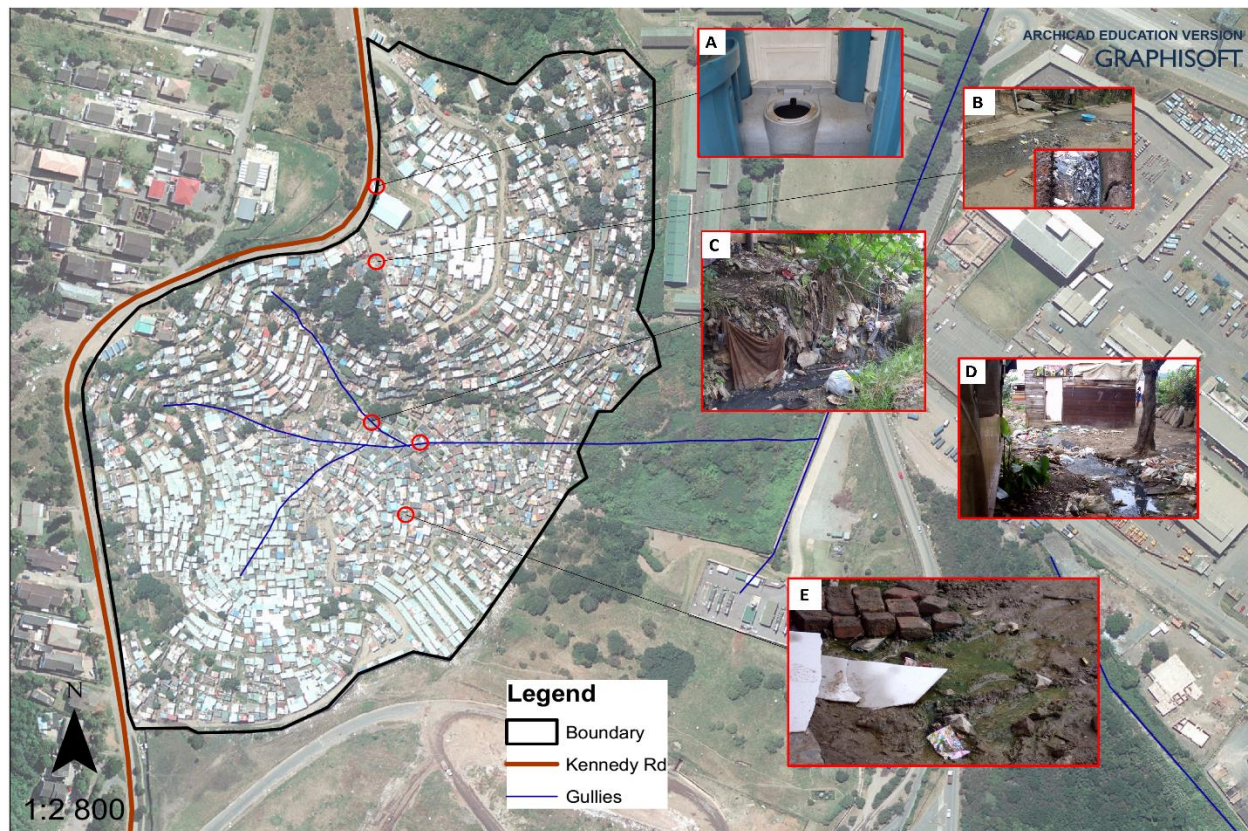
It is argued that illegal settlements in cities not only create problems such as poor living conditions and negative environmental and social impacts for the settlers but for the rest of the urban general public as well, especially those that reside near such settlements (Durand-Lasserve, 2006). In the study area, not only did the pollution, unsightliness and the negative social impacts of the settlement affect the residents of the Kennedy Road informal settlement, but it also affected those in the Clare Estate Suburb, which is adjacent to the informal settlement. As mentioned in the theoretical framework of the research, the case of the Kennedy Road settlement was a good example of a city undergoing urbanisation, whereby people ended up living in places not designated for housing because cities tended to fail to keep pace with the urbanisation rate as more people migrate from rural to urban settlements in search of employment opportunities. The migrants resorted to the illegal acquisition of land. The Kennedy Road area was previously a buffer strip for the land-fill site and was not zoned for development. As per the WHO report (WHO: 1989) mentioned in the literature review; insufficient and unsuitable housing conditions exposed people to health hazards and negatively impacted on their mental, physical and social-wellbeing, as was the case in the Kennedy Road

settlement, where the majority of the inhabitants were socially unstable because of the appalling conditions they lived under.

Figure 4.5 reveals the areas in the Kennedy Road informal settlement that were environmentally degraded. Plate A was an unhygienic sanitation facility placed along the main road of the settlement, and was a breeding ground for pests such as flies and a one of the sources of the foul smells permeating the area. Residents claimed that this facility was not cleaned more than twice a month, thus creating a severe health hazard for the 7000 households that were serviced by this facility. Plate B revealed how the lack of drains and storm water pipes environmentally degraded the environment, as water from stand pipes and rain carried garbage and eventually turned green, providing a breeding ground for pests. Plates C and D showed the stream that flowed through the settlement and which now comprised of grey water, garbage (solid waste) and pests, and was another source of the bad smell in the area. Plate E indicated soil erosion caused by runoff during rainy seasons and from the lack of storm water drains. The soil was eroded by green coloured water.



Figure 4.5. Areas that were Environmentally Degraded and Contaminated.



Source: Researcher (2015).

#### **4.5.3. Responses Pertaining to the Issues Faced by the Residents**

In accordance with the issue of the lack of infrastructure in the study area, mentioned in chapter 1, 77% of the participants thought that the resultant water pollution affected their environment and that this threatened their health, as it was a source of water borne diseases. A further 75% agreed that the settlement inhabitants' habits of haphazard waste disposal impacted negatively on the environment and that they were a major driver of the environmental degradation. Some of the respondents (67%) claimed that water sources were contaminated as a result of the unhealthy disposal of waste around the settlements, and that it was this that blocked the natural water-ways and contributed to the environmental degradation. Informal settlements consequently hindered environmental sustainability. The settlers believed that all of the aforementioned issues were driven by the fact that the municipality is not intervening in social issues that affected their everyday lives and the

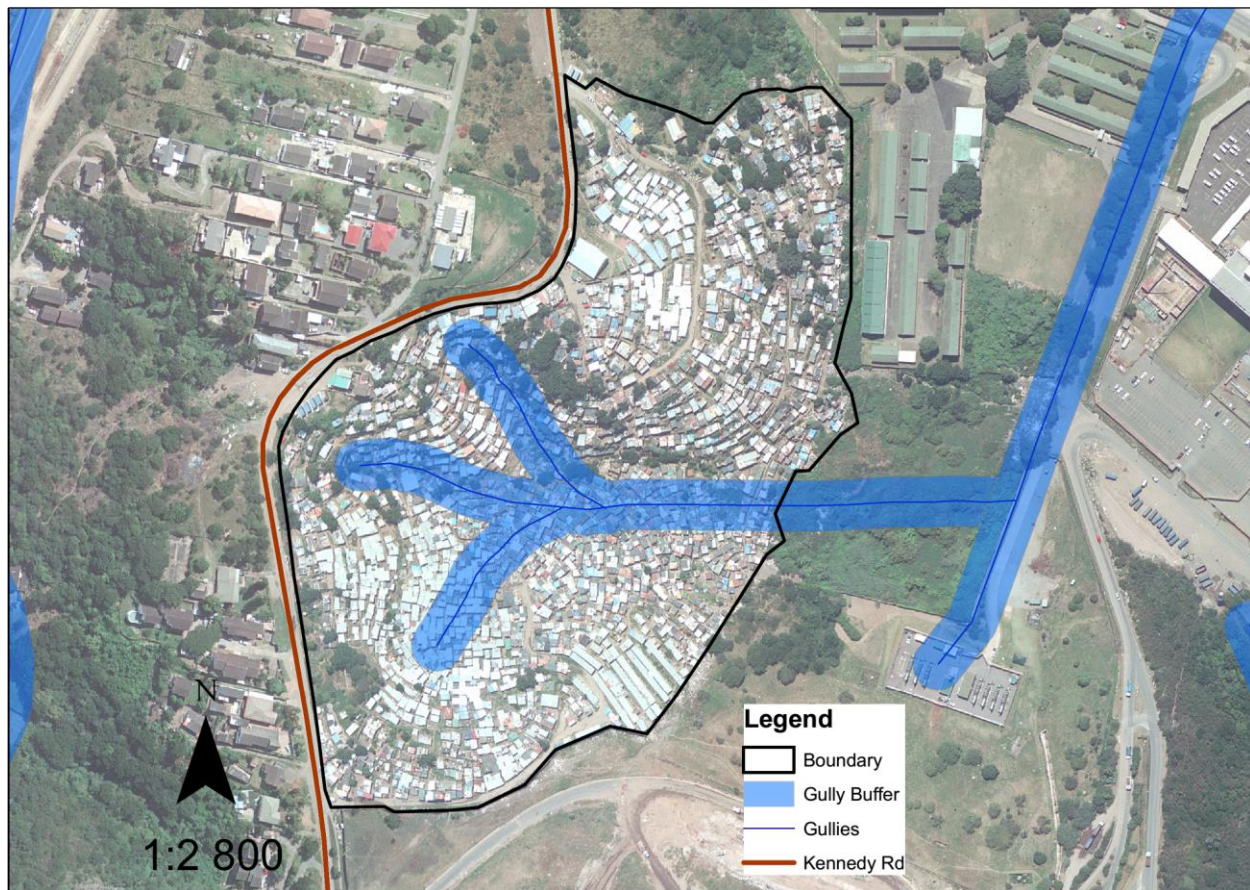


environment they inhabited. 98% of the participants revealed that there were many disagreements between the municipality and the community members, in terms of service delivery, interventions and basic needs. When residents were asked about the relationship between them and the municipality, a common response was that the municipality was unreliable.

The data presented here revealed statistical support in that it has delivered strong evidence to support the problem statement and fulfil the aim of the research. These percentages represented the participant's perspectives and feelings about the study area. It statistically demonstrated an intersection of different social structures and phenomenon which impacted negatively on the health of the people and the environment; the relationship that represented the cause and consequence of the cycle that reproduced the issues mentioned in chapter 1.

The population of the Kennedy Road settlement was divided into two parts; those that resided along the main road (Kennedy Road), and those that resided along the stream. Those that resided along the main road were not affected by water pollution and contamination to the same degree as those that resided beside the stream. This was mainly because the households along the main road had access to sanitation, water from standpipes and solid-waste collection management. The rest of the population resorted to littering and using the stream as their sanitary and solid waste disposal site, which consequently polluted the water, the environment and impacted the health of the residents. It was evident that there was a lot of pollution along the stream that flowed through the settlement. The stream was characterised by erosion, pollution (litter) and faeces. This not only negatively affected the environment but the health and well-being of the residents at large.

Figure 4.6. Map Showing the Streams in the Kennedy Road Informal Settlement.



Source: Researcher (2015).

#### 4.5.4. Governance

The case study of the Kennedy Road informal settlement also revealed problems with community organisation and governance issues. An example of this was the Abahlali Basemjondolo organisation. The Abahlali Basemjondolo organisation was established from 2005 to 2009, as a result of rising frustrations following a series of broken promises from the local authority (Abahlali, 2005). The Abahlali Basemjondolo was an organisation that supposedly aimed at fighting for and representing the rights of the people who resided in the Kennedy Road informal settlement, as well as other informal settlements. Their aim was to help the settlement dwellers to receive essential and proper social benefits. According to a member of the current development committee in the area, the leadership and members of the Abahlali

Basemjondolo organisation failed, as well as misrepresented the needs of the people in the community. The organisation used all of the benefits and money granted by the municipality and sponsors for self-enrichment. Members of the organisation would take photos of the living conditions and the disasters that usually occurred in the area (such as fires) and send them to overseas sponsors, pleading for aid; but once the aid was received they would use it for self-benefit rather than to uplift the community. When the municipality supported the community, the organisation would take photographs and send them to overseas donors claiming that it was the aid received from them that had been used to improve the conditions of the people living in the informal settlement. According to a member of the current development committee that was interviewed, the Abahlali Basemjondolo organisation did not want the informal settlements to improve because the leader of the organisation and his people made money by misrepresenting the needs of the people. The organisation would report to the media and to the municipality that the people of the Kennedy Road settlement did not want to be relocated because they were in close proximity to their places of work. This claim contradicted the inhabitants' expectations of better housing.

Plate 4.12. The Rally Called By Abahlali Basemjondolo



Source: Abahlali, 2005 (Accessed on 4 May 2015).

When the community became aware of this malpractice, they voted to remove the Abahlali Basemjondo organisation and its leadership as their representatives in 2009. The community

then formed their own development committee, which is currently spearheading developments in the area. According to the current committee, the situation in the area has changed slightly since the new leadership was adopted. Since November 2014, the municipality has been moving people from the settlement into new RDP houses in Waterloo, and the project is still ongoing.

A representative (board member) of the newly founded local development and human rights committee of the study area pointed out the relevant issues affecting the physical environment and the residents to the researcher. The board member addressed the matter of the stench of the methane gas that originated from the land-fill site. The land-fill site is located five metres away from the settlement boundary. The residents were bothered by the smell of methane gas, which was particularly prevalent during the hot and rainy seasons, and which was visible in the air above the site. During the discussion, the committee members claimed that the municipality conducted routine checks of the capacity of the gas produced by the waste at the dump; but that not much could be done to alleviate the problem. The committee member further mentioned that not all of the residents could afford to pay rent in the CBD, and that this area was close to their places of work. The member added that the residents of the settlement sustained their livelihoods by acquiring temporary jobs in the Springfield Industrial Park and as domestic workers and gardeners in the Clare Estate suburb. Most of the settlers (60%) were reported to reside in this area as the rentals and building materials were cheaper and more affordable.

#### **4.5.5. Government Participation**

Government intervention was severely shortcoming in the Kennedy Road informal settlement, with little or no service delivery of basic and social resources. A key informant from the Department of Water, Sanitation and Environment in the eThekweni municipality argued, however, that it was entirely the responsibility of the Kennedy Road settlement community to make their community a good, liveable and sustainable environment. He said that the government provided only what it could, due to a lack of funds. When the researcher asked

whether or not the municipality conducted any environmental impact assessments in the area, the committee member admitted that the municipality undertook monthly water quality checks to assess the water quality in the area. From a health point of view, the quality of the water in the area was usually poorer during wet seasons, when compared to the dry seasons. From a chemistry point of view, the water quality improved during the wet season as the grey-water became diluted.

It was further stated by this representative that the municipality had installed more than 200 ablution containers, containing showers and toilets in the area. The ablution facilities were attended to by attenders who were employed by the municipality to clean these facilities. It was further claimed that the municipality had placed stand pipes for fresh water throughout the settlement. According to the municipal informant, these were some of the coping strategies that the municipality had employed to address the environmental issues, but it must be noted that during the researcher's site visits, none of these ablution containers were found at the Kennedy Road site. The municipality representative further added that the government promised the people too much when there was little funding with which to fulfil those promises.

#### **4.6. Conclusion**

The findings revealed in this chapter answered the research objectives and questions. The data has shown that the majority of the Kennedy Road informal settlement dwellers lived in appalling conditions. These conditions not only had a negative impact on their health but also degraded the environment, especially the water sources in the area. Moreover, the municipality failed to respond adequately to the issues raised by the residents of this settlement. This was due to the fact that the settlement was erected without any infrastructural planning, so the municipality was not prepared or financially able to render assistance. The settlement had been erected illegally on a site that was not zoned or suited for any form of development, especially housing and human settlement. The findings have shown that the absence of infrastructural services in an informal settlement; namely adequate housing, a proper sanitation system, solid-waste management, and the lack of a proper

drainage system to deal with water runoff contributed to the pollution of the water sources in the area. The pollution of the streams with garbage and faecal matter inhibited the natural waterways and degraded the environment, thus hindering environmental sustainability.

Given the fact that the area of land involved was steeply sloped, although the costs would have been enormous to install the necessary infrastructure, this could have been undertaken, had the municipality had the will and the funds to do so. The fact that the municipality had originally recognised the need for this land to be kept as a buffer zone between the land-fill site and the local residents, because of the potential health risks associated with proximity to the site, made it unlikely that the municipality would ever invest in the infrastructure. The residents of the Kennedy Road informal settlement had, however, engaged successfully with the municipality and secured new housing in a safer, healthier environment. It remains to be seen whether or not the new settlement would be provided with the adequate infrastructure to protect the health of the residents and maintain the environmental sustainability.

## **Chapter 5: Conclusion and Recommendations**

### **5.1. Introduction**

As stated in the first chapter of the research, this study aimed at investigating the environmental impact that informal settlements posed on the water sources in the Kennedy Road informal settlement. This chapter provides the conclusions of the study and recommendations for the alleviation of the environmental impacts of the Kennedy Road settlement, based on the study findings in relation to the research objectives.

### **5.2. Summary of the Key Findings**

The Kennedy Road informal settlement is in close proximity to a land-fill site which makes the area eminently unsuitable for housing development. The area is characterised by smells from both the land-fill site and the filth of garbage, faeces and grey-water in the settlement. The environment in Kennedy Road is contaminated and degraded, mostly by human waste, which arises from a lack of infrastructural services, domestic waste management and the land-fill site which pollutes both surface and underground water sources. It was established that the poor living conditions in Kennedy Road created higher than average environmental pollution. One of the major causes leading to the water and environmental pollution was the lack of sufficient solid waste management; sanitation facilities and the lack of storm-water drainage systems.

The inadequacy and lack of these essential services lead to residents resorting to using the environment, especially the stream as their waste disposal site and therefore polluted the water. The stream that flows through the settlement is now characterised by garbage in the form of solid waste; faecal contamination and grey water, and is now the breeding ground for pests such as rats, mosquitos and flies, as well as infections. It was further established that this pollution not only affected the environment but had detrimental effects on the health of the residents.

The findings have therefore revealed that informal settlements do contribute substantially to environmental degradation and contamination, and thus have a detrimental impact on water

sources, given the informality of the settlement, the type of activities in the area, and the basic lack of social and infrastructural services in the settlement.

### **5.3. Recommendations**

Due to poor participation of the municipality as well as the community itself, regarding the environmental impact of informal dwellings on water and the consequences that arise, the researcher recommends that issues found in this study area be dealt with in a manner that will encourage both public and municipal participation, so as to improve the living and environmental conditions. The community needs to take the initiative in taking care of their environment. The prevention of water contamination, pollution and the resultant health hazards for residents is a vital issue of concern and should be attended to by taking cognizance of the following recommendations:

#### **5.3.1. Education**

- The community needs to be educated about the importance of a clean and sustainable environment.
- The community needs to be educated about water pollution and the importance of sustainable development.

#### **5.3.2. Municipal Participation**

The municipality should provide infrastructural services for the people of the Kennedy Road informal settlement, especially sanitation, on temporary basis and as an interim measure to improve the quality of the environment. The municipality should intervene and encourage community participation, by deploying qualified environmental officers or counsellors to help in educating people on the effects of informal settlements on the environment, especially on water sources, and the unforeseen hazards that might occur if the status quo remains the same in the long run. This should prepare them for future development and equip these residents with the skills to take care of the environment. The municipality should also provide ways to encourage residents by making sure that waste bags are available to each and every household on a monthly basis and have the garbage removed regularly. Residents could also be encouraged if the municipality made available or constructed water ways and sewerage



systems, and controlled storm water runoff and other unattended grey and polluted water which creates health and environmental hazards. If the municipality created an interim structure to improve conditions in the study area it would, without a doubt, encourage community participation. The municipality should provide the needed resources: for starters, they could provide the community with cleaning aids, proper drainage systems and over time think of future development.

In terms of development and after clear understanding and education of how to take care of the community and the physical environment, the municipality should then place emphasis on sustainable development, in which each and every resident takes part in enforcing the mind-set of healthy living conditions. This joint-venture between the municipality and the community at large will not only be advantageous to the residents' living conditions and health, but to the environment in which they live. This will in turn create a change in the negative perception of residents towards the municipality and make it easier for residents to co-operate and work hand in hand with the municipality in achieving sustainable development.

After the joint venture between the municipality and the community has been successful in finding common ground, and when the community has a clear understanding of how to take care of the environment (after being educated), the municipality should endeavour to eradicate informal settlements and provide low-cost housing units for the residents, preferably in a more suitable area than that of the land in Kennedy Road. Drainage and proper sanitation systems are essential and should be installed as the new houses are built, so as to minimise soil erosion and diseases. The provision of clean running water to each new house will help prevent the formation of grey water, and a formal, structured system for refuse removal should be implemented. The building of roads within the community will allow the garbage trucks to reach all of the residents and help prevent littering. This will also minimise the environmental and hazardous effect of informal settlements on water, as well as minimise the social and environmental stresses in the area.

### **5.3.3. Community Participation**

The community needs to take the initiative in maintaining the cleanliness of the environment they live in, so as to alleviate and prevent the harm that informal settlements cause to water sources. Settlers residing in the study area should take responsibility and come together and engage in discussions regarding cleaning their environment and maintaining a healthy lifestyle in their community. These discussions should emphasise the eradication of the open dumping of solid and faecal waste in and around their residences, as well as in water ways, so as to prevent the creation of grey water and the consequent environmental degradation.

## **5.4. Conclusion**

This research has dealt with informal settlement challenges that have a negative impact on water found in the Kennedy Road area. It has however produced dynamic links between the informal settlements, living conditions, health and social issues. It has also highlighted how the absence of both community and municipal intervention can be a negative factor towards a good and sustainable livelihood.

This research has argued and provided theoretical and practical evidence that environmental impacts of informal settlements on water are an issue that needs attendance in the study area. Sanitation facilities, storm-water drainage systems, and solid waste management are of outmost importance, as they are the contributing factor towards environmental degradation and water pollution. This research has placed an emphasis on how informal settlements create environmental and health issues especially because residents are poor and are not well educated about the importance of environmental sustainability. This makes it very difficult for the settlers of the study area to be able to sustain their community. The stream that scuttle across the settlements is highly polluted therefore creating hazardous environmental effects. This is due to the fact that these water ways collect unattended garbage, which in turn create grey waters and the latter water-borne insects and diseases as well as air-borne diseases and environmental degradation. Therefore, this research has dealt with issues revolving around the key and main factors that negatively affect the area and has however provided empirical

distinctions as to how environmental issues of informal settlement on water can create health issues for the residents of the area.

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## CONSENT

I.....have been informed about the study entitled: **An investigation into the environmental impact of informal settlements on water: a case of Kennedy Road informal Settlement in Durban, KwaZulu-Natal** conducted by Zinhle Mbonambi.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

I have been informed about any available compensation or medical treatment if injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at email: [tracy.enhle@gmail.com](mailto:tracy.enhle@gmail.com) or cell: 0792845224

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

### **HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

Research Office, Westville Campus

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Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion YES / NO

Video-record my interview / focus group discussion YES / NO

Use of my photographs for research purposes YES / NO

\_\_\_\_\_  
**Signature of Participant**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Signature of Witness**  
**(Where applicable)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Signature of Translator**  
**(Where applicable)**

\_\_\_\_\_  
**Date**

## **Questionnaire**

Topic: An investigation into the environmental impacts of informal settlements on water: the case of Kennedy Road informal settlements in Durban, KwaZulu-Natal

### **Interview Information for residents**

Date of interview

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Name of the area or ward

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#### **1. Demographic Details**

##### **1.1 Gender**

- ☐ Male
- ☐ Female

##### **1.2 Age**

- ☐ Under 20 years
- ☐ 25-35 years
- ☐ 36-45 years
- ☐ 46-55 years
- ☐ Over 55 years

##### **1.3 Marital Status**

- ☐ Married
- ☐ Single
- ☐ Divorced
- ☐ Widowed

#### 1.4 Home Language

English	Afrikaans	Sepedi	IsiXhosa
IsiZulu	Sesotho	Tshivenda	Seswati
Xitsonga	IsiNdebele	Setswana	

#### 1.5 Number of people in your household, including you.

- ☐ 1
- ☐ 2-3
- ☐ 4-6
- ☐ Over 6

#### 1.6 Are you employed?

- ☐ Yes
- ☐ No

### 2. Perceived land right and environmental quality

#### 2.1 Why have you chosen to reside in this settlement?

- ☐ Affordable rent
- ☐ Proximity to place of work
- ☐ Self-employment opportunity

Other \_\_\_\_\_

#### 2.2 How long have you resided in this area?

- ☐ 1 year
- ☐ 1-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ 11-20 years
- ☐ 21-30 years
- ☐ Over 30 years

**2.3 Do you own the land on which you reside?**

- ☐ Yes
- ☐ No
- ☐ Neutral

**2.4 If yes, how did you acquire this land?**

- ☐ Traditional Authority
- ☐ Local Municipality
- ☐ District Municipality
- ☐ Inherited
- ☐ Other

If other, please specify \_\_\_\_\_

**2.5 Do you have services (sanitation, water, waste collection)?**

- ☐ Yes
- ☐ No
- ☐ No comment

**2.6 Are the services provided adequate?**

- ☐ Yes
- ☐ No
- ☐ No comment

**2.7 As a resident of this area do you face water pollution?**

- ☐ Yes
- ☐ No
- ☐ No comment

If other, please specify \_\_\_\_\_

**2.8 How do you rate the quality of water in the environment?**

- ☐ Excellent      ☐ Satisfactory      ☐ Very poor

☐ Good      ☐ poor

**2.9 Are there any arrangements of keeping the outdoor space clean?**

- ☐ Yes
- ☐ No
- ☐ No comment

**2.10 Do you feel that the government is doing enough to reduce water pollution in the environment?**

- ☐ Yes
- ☐ No
- ☐ No comment

If other, please specify \_\_\_\_\_

**2.11 Does water pollution in the area affect you?**

- ☐ Yes
- ☐ No

If yes how has it affected your health? \_\_\_\_\_



**Interview information for Kennedy Road Development Committee, and Council and the Municipal Authority**

Date of Interview

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- 1. Since the establishment of the settlement to date, has there been any improvement in the environment?**

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- 2. Does the municipality provide services in this area?**

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- 3. Are the services provided adequate?**

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- 4. What environmental challenges are faced by dwellers in the study area?**

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- 5. Does the municipality conduct any environmental impact assessments in the area?**

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- 6. What coping strategies and/or mechanisms these dwellers and municipality employ to address environmental issues?**

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**7.**

**Ho**

**w can the environment in informal settlements be improved in order to provide a good, liveable and sustainable environment?**

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