



**UNIVERSITY of the  
WESTERN CAPE**

**FACULTY OF ARTS**

**Experiences of Social Vulnerability in Indigent Households  
related to Water Service Delivery in Kayamandi,  
Stellenbosch**



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## Declaration

I, Winston J. Harris, declare that “Experiences of Social Vulnerability in Indigent Households related to Water Service Delivery in Kayamandi, Stellenbosch” is my own work, that it has not been submitted before for any degree or examination in any other university, and that all sources used or quoted have been indicated and acknowledged by complete references.

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Date



## **Abstract**

The extent of a community experiencing social vulnerability depends on the community's ability to access resources that may contribute to coping mechanisms (either within the household or provided externally by a responsible authority) that decrease the impacts and effects of a disaster. Therefore, the purpose of this research was to identify the existence of social and institutional mechanisms that aim to reduce experiences of water inaccessibility and the causes of social vulnerability, and increase coping mechanisms within Kayamandi. Kayamandi is a low income residential community on the north-westerly periphery of the greater Stellenbosch town in the Western Cape.

The research attained responses through questionnaires and surveys from residents, community organisations and responsible personnel. These surveys allowed the researcher to produce raw attribute data for each household that assisted in spatially representing vulnerable households and informing the five priority areas of the Hyogo Framework for Action. Contributing to this method of attaining information, secondary geographic data collection was obtained through the Stellenbosch Local Municipality, the National Geospatial Information Directorate and the National Demarcation Board.

The findings of this thesis established that household and public water infrastructure contribute to the risk of experiencing social vulnerability that affects economic standings and quality of health within the community. Contributing to this and due to Kayamandi's politically sensitive and historically fractioned community, social cohesion has also been noted as an area of vulnerability. Although these vulnerabilities are experienced, residents are able to implement technical, social and municipal reliant coping mechanisms. However, although efforts from Stellenbosch Local Municipality do respond to most of the key indicators within the Hyogo Framework for Action, the study found no concrete efforts within the Stellenbosch Local Municipality that illustrate integrated mechanisms to reduce the impacts of disasters and compound effects.

## **Key Words**

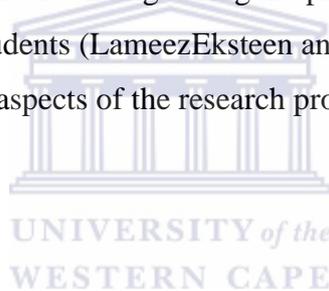
Social vulnerability, water accessibility, disaster management, coping mechanism, indigent household, Stellenbosch, Kayamandi, local municipality

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## Abbreviations

ANC	African National Congress
CoSS	Centre of Safety Sites
CPUT	Cape Peninsula University of Technology
CWDM	Cape Winelands District Municipality
DBMS	Database Management System
DCG&TA	Department of Cooperative Governance and Trading Affairs
DM	Disaster Management
DMC	Disaster Management Centre
DME	Department of Minerals and Energy
DPLG	Department of Provincial and Local Government
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DWA	Department of Water Affairs
FBW	Free Basic Water
GIS	Geographic Information System
GNDR	Global Network of Civil Society for Disaster Reduction
HFA	Hyogo Framework for Action
HIV	Human Immunodeficiency Virus
IDP	Integrated Development Plan
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
UNISDR	International Strategy for Disaster Reduction
IWRM	Integrated Water Resource Management
KPA	Key Performance Areas
MDG	Millennium Development Goals
NDMC	National Disaster Management Centre
NDMC	National Disaster Management Centre
NWA	National Water Act
O&M	Operations and Maintenance
OCHA	Office for the Coordination of Humanitarian Affairs
PGWC	Provincial Government of the Western Cape
RDP	Reconstruction and Development Programme
RADAR	Risk and Development Annual Review
SLM	Stellenbosch Local Municipality
SLM	Stellenbosch Local Municipality
SSA	Sub-Saharan Africa
SU	Stellenbosch University
UCT	University of Cape Town
UN	United Nation
UN/WHO	United Nations/World Health Organisation
UNDP	United Nations Development Programme
VFL	Views from the Front Line
WS NIS	Water Services National Information System
WSA	Water Service Authority
WSDP	Water Service Development Plan

# Chapter 1

## Introduction

### 1.1 Study Background and Rationale

Vulnerability is location and situation specific and not all people experience vulnerability and hazards in the same manner (Blaikie et al., 2003; Morrow, 1999). In saying this it is possible to identify that, when considering the “location specific” character of vulnerability, factors which influence vulnerability are not necessarily just the natural hazards that occur but there are also social, economic and political factors that influence vulnerability. Through this we can no longer consider that to understand vulnerability we can single out and study the natural hazards that can affect a population’s livelihoods, but should aim to understand the multifaceted relationships between the natural and anthropogenic hazards and the social context of an affected population.

A strategic framework known as the International Strategy for Disaster Reduction was adopted by the United Nations (UNISDR, 2011) in 2000. It aims to guide and coordinate the efforts of a wide range of partners to achieve substantive reduction in disaster losses and build resilient nations and communities as an essential condition for sustainable development (UNISDR, 2011). The framework states that a reduction of vulnerability will be accomplished through creating awareness about disaster. This allows for interaction to take place between responsible authorities (government institutions), other organizations that have a part in disaster management and local communities. In order to reduce vulnerability and its effects on society an outcome of the World Conference on Disaster Reduction, which was held in Hyogo, Japan in 2005, was the “Hyogo Framework for Action (HFA) 2005 – 2015” (UNISDR, 2005). This framework establishes the ways in which United Nations International Strategy for Disaster Reduction (UNISDR) will be able to reduce vulnerability caused by natural and anthropogenic hazards, if adopted.

The HFA cannot be implemented independently but has to be adopted and integrated into development practices at national and local levels in order to generate viable mitigation procedures that will thus achieve sustainable development post disaster. Such adaptation should take place within development policies (e.g. the Water Supply and Sanitation Policy White Paper, 1994) and legislation (e.g. the National Water Act 36 of 1998 and the National

Disaster Management Act No. 57 of 2002) that concentrate on water resource management and disaster management, which have a strong focus on community development.

What we should recognise as well is that there are discrepancies between the coping capacities that are managed between indigent and wealthier households. Low and no income households are largely vulnerable to external shocks (hazards) that create disturbances to their livelihoods as these households are less likely to gather and access resources that may cushion the effects of disaster and decrease their vulnerability post disaster (Drimie and van Zyl, 2005).

The case study for this research is Kayamandi, Stellenbosch, which is situated within the Boland District Municipality in the Western Cape. This location was chosen as the researcher was part of a relationship between the University of the Western Cape and Umvoto Africa working on a project entitled: *Investigating the Social Vulnerability of People and their Livelihoods and their Responses to Water Infrastructure*, for the Water Research Commission. The researcher retained the case study area as many of the households could be considered to be socially vulnerable. However, this study is based on my own conceptualisation of the research question and research, although the area of Kayamandi was a case study for the larger project.

The study considers the institutionalised mitigation policies, plans and processes that are prepared for water related disaster management strategies in relation to low income and indigent<sup>1</sup> households. The investigation explores the measures that need to take place in order to successfully implement coping capacities at micro-level by analysing indigent household's vulnerability towards hazards that affect their water accessibility. As water is an essential resource to all human livelihoods, it would be necessary to inspect avenues of water resource management research and study to achieve methods of sustaining such an essential resource. The researcher finds that concentrating on a local community as a case study (at the micro-level) allows for such an investigation to take place.

## 1.2 Research Question

The study aims to answer the question: What are the existing social and institutional disaster management and risk reduction mechanisms that aim to reduce experiences of water

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<sup>1</sup> The term indigent is used in this thesis to describe poor and low income households and includes those who would be classified as indigent by the state, but is not limited to the latter

inaccessibility and the causes of social vulnerability to water, and increase coping capacities, within households of Kayamandi and the community of Kayamandi, Stellenbosch?

### **1.2.1 Aims of the Study**

For the purpose of this study and to attain an answer to the research question above, the following aims of the study were identified:

- To identify coping mechanisms that urban indigent households in Kayamandi use to reduce their vulnerability to risks associated with water inaccessibility.
- To identify coping mechanisms that the responsible authority (Stellenbosch Local Municipality) has put in place for the reduction of vulnerability with associated risks, to water, experienced within Kayamandi.
- To investigate the role of public participation within Kayamandi in relation to disaster risk management (DRM).
- To analyse the extent of reconstruction, rehabilitation and relief capacities post disaster in Kayamandi.
- To assess the extent of social vulnerability of Kayamandi towards disasters using the Hyogo Framework of Action.
- To geographically represent and describe situations of the most vulnerable households of the sample.

### **1.3 Outline of Thesis**

This chapter has provided a brief background and rationale to the study. It has also outlined the research question and identified the aims of the study. Chapter two of the thesis broadens the context of social vulnerability by discussing literature that is considered relevant within the field of vulnerability, disaster risk reduction and management and the geographical context of the study. The chapter therefore situates the study in the literature which contributes to an understanding of social vulnerability with regards to water accessibility by discussing topics such as the state of water infrastructure, urban indigence, water accessibility and urban water services.

Chapter three outlines the reasons for choosing the type of methodology that was applied and outlines the methods used to gather and analyse data. Also, this chapter identifies the further possibilities and limitations of using the HFA as a tool to assess vulnerability at a micro level.

The chapter also identifies the indicators used to quantify qualitative findings within the questionnaires for the urban indigent households of the study area.

Within Chapter four, the researcher disseminates the findings of the investigation in relation to the study area and indicates the level of household vulnerability with regards to indigent households' access to water services and the coping mechanisms that are in place. This chapter also indicates the level of awareness and exposure the community has with regards to coping capacities.

Chapter five draws from the experiences and findings that the researcher has attained throughout the study. Recommendations will be made by reviewing best practices and case studies where the facilitation of water accessibility decreased social vulnerability and increased the coping capacity of vulnerable groups. The researcher understands that the findings of this study may not capture all potential conclusions for this field of study, therefore attention will be given to areas where further research could possibly be undertaken to increase understanding of social vulnerability within indigent households of South Africa.

#### **1.4 Conclusion**

The introductory chapter of this study has thus given insight to the background of the study. It has identified the research question, the overall aims and objectives of the study, and the rationale. Finally, the outline of the thesis provides basic outlook within the following chapters. The following chapter will concentrate on the literature that the researcher considered and reviewed within this study.

## Chapter 2

### Literature Review

The literature reviewed below identifies the background of disaster management within South Africa and the legislative frameworks that are set in place. Definitions of concepts and key terms are given. Furthermore, a brief discussion about South Africa's water resources assists in establishing a context for the field of study. Importantly, as the research is intended to take place within an indigent and informal community, the literature reviewed attempts to define indigence within a local context that considers the fulfilment of certain identified criteria. The relevance of the Hyogo Framework for Action and its key indicators are discussed.

#### 2.1. International Goals and Standards

As we know it, various degrees of human health are linked to the state of water conditions that a human population utilizes. Threats to health include inability to access potable drinking water, degrading levels of sanitation and unhealthy environments. Approximately two million children in the developing world die from not having access to potable water and proper levels of sanitation (World Bank, 2010:3). With improved conditions it would be possible to minimize the probabilities of water related illnesses and diseases. Inadvertently, poor water and sanitation may have adverse effects for those that do not suffer from water related illnesses but diseases such as HIV/Aids and tuberculosis, as potable water quality and quantity is essential for persons whose health is compromised by a lowered immune system.

The World Bank (2010:2) also indicates that poorly planned patterns of development, population growth and its associated pressures and the demand for better livelihoods contribute to global water crises. Not only are there anthropogenic activities that contribute to the water crises but also natural events such as flooding, heavy rains and tropical storms (World Bank, 2010:2).

Within the 7<sup>th</sup> Millennium Development Goal (MDG) that focuses on ensuring environmental sustainability, it is intended to halve the amount of people without access to a sustainable source of safe drinking water by the year 2015 (UNDP, 2011:53). The MDG report also indicates that it is possible to achieve the goal of providing a sustainable source of water with the current trends and sustainable progress to meet and surpass the target of 89% of the world's population with access to potable water by 2015 (UNDP, 2011:53). It was shown that through multilateral efforts, regions such as Latin America, the Caribbean, Eastern Asia and

South-Eastern Asia met the potable drinking water target. Eastern Asia received the largest increase of drinking water coverage within the region with 86% of its population having access to potable water in 2008 (UNDP, 2011:4).

A report released in 2012 about the state of global water and sanitation access, entitled “Progress on Drinking Water and Sanitation: 2012” (UNICEF/WHO, 2012), states that the MDG goals of reducing the amount of people without proper access to water to half was met. According to a UN News online article, “At the end of 2010, some 89 per cent of the world’s population, or 6.1 billion people used improved drinking water sources... The report estimates that by 2015, some 92 per cent of the global population will have access to improved drinking water” (UN News Centre, 6 March 2012: “World meets goals of boosting access to clean water but lags on better sanitation – UN”).

Although targets with regards to water accessibility have been met in some regions, there are still large discrepancies when considering the contrast between urban and rural populations. So, urban dwellers within sub-Saharan Africa are 1.8 times more likely to receive and utilize improved water services than persons living in rural communities. Without institutional assistance, it would have been a much more difficult task to reach the targets set out by the MDG’s. Institutions such as the World Bank assist in creating a platform by which initiatives are aided and developed in order to achieve sustainable growth. The World Bank created a Water Resource Management Policy Paper in 1993 which was geared towards a multi-sectoral approach that embraced Integrated Water Resource Management (IWRM) (World Bank, 2004). This allowed for coordinated management between land, water and related resources where the sustainability of vital ecosystems would not be compromised.

In 2001, the World Bank Group shifted their focus towards achieving the MDG’s by promoting and establishing policies and plans that aim to balance infrastructure and management-focused investment. Through this focus it was possible for the World Bank Group to develop a number of strategies to address the issues (World Bank, 2010:4). These include the Environmental Strategy (2001) which outlines how the Bank will align their projects and programmes to integrate principles of environmental sustainability; an Infrastructure Action Plan (2003) which provides an overview of the plan and the management structure to be involved in providing assistance; the Water Supply and Sanitation Business Strategy (2003) which outlines how the Bank will assist and implement business strategies for water and sanitation; and the Water Resource Sector Strategy

(2004) which outlines the importance of water resource management and development (World Bank, 2010:4).

Internationally, it is possible to identify certain role players and stakeholders (such as Global Water, Clear Water Initiative, Healing Waters International) that have had an influence with regards to the increase of potable water accessibility in order to achieve targets that were agreed upon by South Africa and other nation states. It is vitally important that service delivery aims to increase access to potable water, decent sanitation services and hygiene so that the health of communities and municipal inhabitants and their development is not compromised.

## **2.2. Legal Framework surrounding Disaster Mitigation and Water Accessibility**

Within South Africa, there is a variety of legislation and policies that have some focus on disaster management. The inclusion of disaster management by other legislation and policies indicates that there is consensus about the importance of understanding the impacts of disasters (and inherent vulnerabilities) and need to incorporate them in all focus areas of the legislation. The relevant legislation and policies within the national, provincial and local tiers of government within South Africa are discussed below.

### **2.2.1. National Government Level Legislation on Disaster Management**

The primary legislation in South Africa that promotes disaster management and provides a platform for the implementation of other programmes and policies to take effect once a national disaster has been declared is the National Disaster Management Act (Act No. 57 of 2002). The Act supports the establishment of national platforms that have a responsibility towards disaster risk reduction and management, such as the National Disaster Management Advisory Forum and the National Disaster Management Framework (Sections 5(1) and 6(1) in Act No. 57 of 2002 respectively) and a National Disaster Management Centre (NDMC) (Section 8(1) of Act No. 57 of 2002).

The main objective of the National Disaster Management Centre “is to promote an integrated and co-ordinated system of disaster management, with special emphasis on prevention and mitigation, by national, provincial and municipal organs of state, statutory functionaries, other role players involved in disaster management and communities” (Section 9 of Act No. 57 of 2002). Through such an objective we can see that the Act (No. 57 of 2002) concentrates on integrating disaster management protocol throughout all spheres of responsible authorities; be it national, provincial or local government organs. It also offers to integrate existing

areas and communities where disaster management may be a priority. Furthermore, the Act (No. 57 of 2002) under Sections 17 and 18 states that the NDMC is allowed to request, gather and maintain information of other government organs. The aim is to enable coordination through the information gathered within a centralised information system that would allow for the processing and analysis of such information.

The National Water Act (Act No. 36 of 1998) states that the National Government “must ensure that the water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons and in accordance with the constitutional mandate” (Section 3, subsection 1). The Act (Act No. 36 of 1998) demonstrates within Section 56 – *Pricing strategy for water use charges* – the need to administer a pricing strategy that allows for socially equitable access to water resources that may be differentiated between geographic location, categories of water use and water users. Furthermore, in terms of water users and licensing of such use, Section 43 of the Act (Act No. 36 of 1998) also states that in order for such a license to be granted the application should be reviewed in order to achieve equity in allocations so that beneficial use thereof will be in the public’s best interest. These statements simply that not only does society play a crucial role with the utilization of the nation’s water resources, but also that there are mechanisms in place to within the act to achieve social equity through conservation, strategic planning and licensing.

The relationship between the Disaster Management Act (Act No. 57 of 2002) and the National Water Act (Act No. 36 of 1998) is that, although the Water Act was established before the Disaster Management Act, it provided for an objective of “public safety and disaster management” within the National Information System on water resources (Section 140(c) (iii) of Act No. 36 of 1998). The National Water Act (No. 36 of 1998) also attempts to reduce the impacts of flood disasters through establishing the regulation of township planning. This states that developers should submit a blueprint of the proposed township to the responsible authorities where the lines of floodwater rise are clearly indicated (Section 44 of Act No. 36 of 1998).

The Disaster Management Act (No. 57 of 2002) and the National Water Act (No. 36 of 1998) offer beneficial opportunities that cater towards social assistance. South African legislation has also provided for social support through the Social Assistance Act (No. 13 of 2004). The objective of this act is to provide a platform for the administrative procedures that are needed

to ensure the registration and the fulfilment of the eligibility criteria with regards to persons in need of social assistance from National Government.

The Social Assistance Act (No. 13 of 2004) has established the provision of eight grants, namely:

- Child Support Grant
- Care Dependency Grant
- Foster Child Grant
- Disability Grant
- Older Person's Grant
- War Veterans Grant
- Grant-in-aid
- Social Relief of Distress

All of these grants and forms of social assistance act as safety nets and coping capacities (discussed below) that are set in place for those households that are deemed poor and vulnerable by the state through application for grants/social assistance. A social grant important to this study would be one set in place once a disaster is declared, the Social Relief of Distress grant, which is granted by the minister to persons that are in need of such relief (see Appendix A for grant types and qualifying criteria).

There are various other tools that are utilised within South Africa to reduce instances of water related vulnerability, such as Integrated Water Resource Management (IWRM). Utilising IWRM to ensure added coping capacity within communities and ecosystems produces a tool that can (if implemented correctly) benefit those that require it through its economic, social and environmental aspects. The IWRM is defined as “a process that promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner and without compromising the sustainability of vital ecosystems” (Global Water Partnership, 2000 cited by DWA, 2004a:3). Essentially, the IWRM aims at ensuring that the management of water is more “economically efficient, socially equitable and environmentally sustainable” (Mody, 2004 cited by Nleya, 2005: 15). A means by which these aims could be accomplished would be to incorporate and involve institutional stakeholders and water end users (consumers) – especially those of marginalized groups - into the public participation process.

The vision of the IWRM pertaining to public participation is to empower marginalized groups through allowing them the opportunity to “understand their rights; formulate their demands based on their rights; and articulate these demands effectively through appropriate channels” (DWA2004a:1). Also, through its ‘Principles of Integrated Water Resource Planning’, the IWRM aims towards an approach that meets “the demand for water in a way that ensures that all viable options are properly evaluated and on a common basis, in the best interest of all water users, local communities and the nations” (DWA 2004b:37). The IWRM also emphasises the need for analysis and assessments of available water resources and a reliable/sustainable yield within water management areas so that the provision of such resources to the users may not be compromised due to instances such as drought (DWA 2004b:42). Therefore, evident through the IWRM’s approach of stakeholder participation, and resource planning and assessment it can be identified as a tool that may reduce vulnerability through equitable and sustainable water access. As emphasized by Feldbrügge and von Braun (2002), the need to create “good” institutions is an essential component through which the rights of the people can be taken into consideration. This should then be accompanied by concerted efforts from external agencies and organizations, national government, water service authorities and local communities to reverse the trends of water inaccessibility (Thompson, et al., 2000:38). In turn, marginalised communities then have the ability to act upon these rights.

Public participation alerts stakeholders (end users and institutions) about their actual knowledge and awareness of situations that create social vulnerability. At the same time, communities can understand the need and usages of water and what benefits may come from proper water management activities. These activities may include efforts such as poverty alleviation through agricultural and economic production, and increased health and wellness through proper usage of potable water sources. The process of public participation enables a community to be empowered through exchanging knowledge and experiences, and raises awareness, of instances and situations that create social vulnerability. Therefore, through the public participation process responsible authorities and stakeholders are able to disseminate knowledge and information on equal footing, which is ultimately an addition to the public’s coping mechanisms.

Also, it is possible to utilise the National Municipal Systems Act (Act No. 32 of 2000) to ensure that processes and procedures are followed within a municipality to ensure service delivery, and municipal public participation. It is vitally important for any community to

ensure that they are informed about decisions that occur within their municipality and how these decisions may affect them. Sections 4(2)(c and d) and 16(1)(a)(v) of the Municipal Systems Act (Act No. 32 of 2000) informs the municipality and community that in order to effectively provide services efficiently there should be a platform through which communication between these various entities can be made and to provide such services (as an outcome) “in a financially and environmentally sustainable manner.” Furthermore, Sections 4(2) (f) and 5(1) (g) establish that members of the community of a municipality have the right to access services provided by the municipality in an equitable manner.

### **2.2.1 Local Municipality Level**

The *Disaster Management Guidelines for Municipalities* (NDMC, undated) are set in place to assist municipalities to recognise the possible effects of disastrous events that may take place within their regions. The guidelines contain terms and concepts, with definitions, and examples of scenarios that explain risk, hazard and vulnerability. The purpose of this guideline booklet is to increase awareness within municipalities of possible risks and how to manage such risks by engaging in disaster mitigation activities that may assist in preventing or lessening the effects of disasters.

The National Disaster Management Act (No. 57 of 2002) and the *Disaster Management Guidelines for Municipalities* (NDMC) allow for the implementation of a District Disaster Management Centre. The Cape Winelands Disaster Management Centre (DMC) forms part of the government organs that are overseen by the NDMC. The Cape Winelands DMC ensures that formalized relationships between the District Municipality and its Local Municipalities are established so that each entity may be continuously informed with regards to the situation in a region if a disastrous event occurs.

Fortunately as well, the Cape Winelands District Municipality (CWDM) has established an Advisory Forum (as requested by Section 5(1) of Act No. 57 of 2002) that allows for the consultation and coordination of the CWDM DMC’s actions. At a district level, it was possible for the Cape Winelands DMC to produce a Community Based Risk Assessment (Cape Winelands, 2008:4). This assessment held five lead agency workshops. These workshops assisted in identifying the two most at risk areas within the local municipalities.

As it is required that there be continuous lines of communication between district and local levels of municipalities during disastrous events, the Stellenbosch Local Municipality (SLM) has developed a Disaster Management Plan which is outlined within their Integrated

Development Plan (IDP) (SLM, 2010). It states that the Disaster Management Plan contains a Disaster Response Plan which identifies and responds to those left vulnerable and has provisions to provide temporary shelter. Incorporated into this is the Incident Response Plan which aims to contain the incident, establish a list of responsible authorities and mobilise the required personnel for assisting those that may be in need (SLM, 2010: Ch. 4 p. 16).

A Water Service Development Plan (WSDP) establishes an overview, assessment, detailed information, strategic plans and reporting status within a Water Service Authority (WSA). The WSA that this research focuses on is SLM. The SLM vision and mission statement within their WSDP states the following (SLM, 2011b: iv):

A dynamic, efficient, accountable and caring frontline organisation dedicated to professionalism, excellence, good governance and the pursuit of sustainability in delivering on our Constitutional mandate by fostering social and economic development in viable local economies and creating opportunities for all in Greater Stellenbosch to improve their quality of life in safe, sustainable human settlements.

A vision statement may provide an ideal scenario in which the municipality could provide services, but the reality of their levels of service delivery is embedded in their ability to action legislation, policies and by-laws that are established within the municipality.

### **2.3. South Africa's Urban Water Services**

#### **2.3.1 Enabling Water Services**

The third assessment report of the Intergovernmental Panel on Climate Change (IPCC), states that the impacts of climate change, including variation in precipitation which leads to drought or flooding, largely depend on the ability of water service authorities to be prepared for these threats and to respond within good time (IPCC 2001: 398). They not only need to be prepared for risks associated with climate change but also for other circumstances associated with population growth, fluctuating water demand, social conditions and legislative stances (Mukheiber, 2005:1).

Although South Africa may have legislation, policies, programmes and projects set in place (e.g., the National Water Act, the Water Services Act, Integrated Water Resource Management, new dams, etc.) to manage and coordinate its water resources and to supply demand, it still lacks in the areas of implementation and attaining results. It is noted that not only are positive results of water accessibility hindered by people being unable to pay for the

resource due to their socio-economic settings but also by the lack of public participation that is called for by Integrated Water Resource Management (Dungumaro, 2007). What also makes poor people and communities vulnerable is that their resources, if there are any at hand, are susceptible to greater change than that of persons and communities in more affluent residential areas (Reid and Vogel, 2005). For instance, if households usually obtain water through boreholes and the area experiences a period of drought, the water level of that borehole drops due to lack of water that feeds the aquifer.

It is estimated that “one in four water supply systems in South Africa does not function at any one time and the number of those being abandoned is nearly equal to the number of new ones being commissioned” (Duncker, 2000:2). This estimate shows us that within South Africa, although water service authorities may produce and develop opportunities for communities to access water, for every water supply system that is being utilized, a previous system has the inability to serve a community. Therefore, it should be high priority to reverse these infrastructural defects in order to strengthen the overall coping capacities and decrease vulnerability as experienced at community level.

Within South Africa, in provinces such as the Northern Cape, there are many variables that contribute to water vulnerability and inaccessibility. These are seen to be “increased water use, peak use, seasonal variability, poor demand side manage, poor water use planning, and poor conservation and water losses” (Mukheiber, 2007:1). Mukheiber (2007:3), states that due to the high temperatures that South Africa experiences there may be a decrease of runoff (which is needed to replenish the ground water system) by 10% by the year 2015 in the western regions.

The *Socio Economic Profile: Cape Winelands* (PGWC, 2007) report states that due to climatic change and the current pressures placed on the District by the City of Cape Town (due to the City’s increased urban demand); there will be a certain degree of risk as inter-catchment water transfer occurs. Inter-catchment water transfer is when water is transferred from the Districts supply to the City, which inevitably decreases the available amount of water for the Cape Winelands District’s region.

Another risk factor that is of concern within the Cape Winelands District is the inappropriate utilization of water resources by the agricultural and manufacturing processes. The *Socio Economic Profile: Cape Winelands* (PGWC, 2007:17) report identifies the need for the

integration of coping strategies that involve high level technology that would reduce water usage, and ensure that the District provides efficient and effective water service delivery.

According to the performance log of the DWA Blue Drop Report (2012) it is evident that 12 systems within the Western Cape have yet to meet the Blue Drop Standard of 90% in order to attain a Blue Drop Certificate (DWA, 2012:387). The municipalities with less than a 90% score on the overall Performance Log are (DWA, 2012:387):

- Breede Valley
- Cape Agulhas
- Cederberg
- Hessequa
- Kannaland
- Laingsburg
- Langeberg
- Matzikama
- Oudtshoorn
- Prince Albert
- Swellendam
- Theewaterskloof



It should be noted that the lowest ranked municipalities with a score lower than 50% are Hessequa and Kannaland (that obtained a score of 35.59% and 28.47% respectively). Fortunately, on this log the SLM attained an overall score of 95.56%, making it the 8<sup>th</sup> best Municipality in the Western Cape with regards to municipal drinking water quality management standards.

### **2.3.2. Free Basic Water Service**

Currently every household within South Africa is entitled to receive 6kℓ of water every month for free (Hall et al., 2006:58). This decision was made through the Department of Water Affairs that established the Free Basic Water Policy of 2000. The 6kℓ were calculated on the average of 25 litres of water per day for an average of eight persons within a household (Mukheiber, 2005:8). The Free Basic Water (FBW) Policy (2000) came about through the witnessing of the hardships and struggles of persons within indigent communities

(either urban or rural) not having the ability to afford proper resource amenities even when they are supplied (Smith, 2009:24-26).

Also, other externalities encouraged the establishment of the FBW Policy. It was also encouraged by the South African Constitutional right that everyone has the right to sufficient water. Due to an uproar that began with lawsuits, alleging that this South African constitutional right was not valued, the implementation of the FBW Policy was announced and was perceived as a means to ensure that all South Africans have access to potable water (Stalk and Alexanderson, 2004:27).

It would then be in the interest of inhabitants of South Africa to treasure water resources as the provision of such a resource assists in further development by reducing poverty and disease whilst, concurrently, improving the lifestyle of poor South Africans (Mukheiber, 2005:3). We should also keep in mind that proper water services and mechanisms to engage with those resources decrease the likelihood of contamination, risk of illnesses and overall vulnerability. To reduce the overall vulnerability of poor households, there are mitigating policies in place that will assist poor households to maintain a standard of living that will eventually produce social, economic and environmental sustainability and development. One of these is the Indigent Policy of District Municipalities (which stems from a National Framework for Indigent Policies for Municipalities) which incorporates other policies that provide essential resources and services to indigent households, such as (Dept. of Provincial and Local Govt., 2005a:7):

- Free Basic Water Strategy (DWA)
- Free Basic Sanitations Strategy (DWA)
- Electricity Basic Support Tariff (DME)
- The Property Rates Act (No. 6 of 2004)

Fortunately, the Free Basic Water(FBW) supply aims to address the issues of affordability with regards to poorer communities that may not have the necessary financial resources for the service. However, although the FBW Policy aims increase and enable water accessibility, not everyone has the opportunity of accessing FBW through the essential infrastructure (Kasrils, 2003 cited by Mukheiber, 2005:8).

Although the FBW Policy (2000) aims to provide accessible water services, resources and infrastructure to residents; the National Water Services Act (No. 108 of 1997) does infer that

the water service provider has the ability to (in conjunction with the jurisdiction of the water service authority) implement conditions of services (Act No. 108 of 1997, Section 4(2)(b)), that may include cost-recovery procedures. The Act (No. 108 of 1997) also states that if such a resident is unable to meet the conditions of the water service provider, the provider can implement limitations and discontinuation upon that household that is fair and equitable, up until it is deemed by the service provider that it is no longer necessary for the limitation or discontinuation to be placed upon the household (Act No. 108 of 1997, Section 4(3)(a, b & c)).

Earlier cost recovery processes included monthly registration fees for a yard tap and/or a monthly rate for water usage (McDonald, 2002:16). Unfortunately, the costs of these fees were too high and this encourages households to utilise exposed and unsafe sources of water that caused an outbreak of cholera (McDonald, 2002:16). Recent, cost recovery processes include appropriate tariff pricing by the water services authority, and the installation of (under the supervision of the water service authority) water management devices and pre-paid water meters by the water service provider. The SLM has adjusted their tariff system applicable to indigent households and retained the sentiments of Section 4(3) of the Water Services Act (No. 108 of 1997). This is possible as the tariffs associated with the services are adjusted for low levels of use or consumption and the “tariffs reflect the costs reasonably associated with rendering the service” (Stellenbosch, 2008a:2). It should be stated that Constitutional Court of South Africa has acknowledged and ruled that the implementation of pre-paid water meters coincides with Section 27 of the Constitution and the National Water Services Act (No. 108 of 1997) and thereby makes this cut off after the use of 6kl per month lawful (Constitutional Court of SA, 2009:5-6).

As the implementation of cost-recovery processes and application of tariffs are also allocated to households in poor communities above the basic water services and sanitation, poor and indigent households become less capable of making payment for services (Gowlland-Gualtieri, 2007:9). This causes households to enter payment arrears and unfortunately may have their water services cut off for non-payment (McDonald, 2002:18). The action of cutting off services is a possibility within the SLM as it stipulates within its *Credit Control and Debt Policy* (Stellenbosch, 2008b) that services may be disconnected or limited (as there may be instances where legislation does not allow the full termination of services) and then be handed over to an attorney for recovery or further legal action (Stellenbosch, 2008b:4). Furthermore, Gowlland-Gualtieri (2007) state that not only is it possible for a household to be

cut off from water services but also neighbourhoods could be cut off due to non-payment of water services (Gowlland-Gualtieri, 2007:11).

Not only have cost recovery processes had an impact on the economic circumstances within households of the poor and destitute, but there have also been cases where cost recovery impacted on the social fabric of a community. It has been noted by Ruiters (2002:41), that mass disconnections of households have fuelled the hostility and division between communities, ward councillors and politicians and created new social movements. Water resources and services can promote better livelihoods, but if it is not managed accordingly it may cause social division, inequality and further marginalise residents.

### **2.3.3. Water Services in Urban Poor Environments**

Persons that are unable to afford certain resources due to economic constraints are most often found within communities that have a hazardous and unhealthy environment (Stephens et al., 1994 cited by Douglas, et al., 2008:187). Douglas et al. (2008) reiterate that events such as flooding are natural phenomena, but the damage that such an event leaves behind is a result of human action. From this one can identify that a lot of research and planning should take place when identifying a location for human occupancy. If proper planning takes effect disastrous events, such as the floods of December 1999 that killed 30,000 people in Venezuela (OCHA 2000, cited by Sanderson, 2000:93), could have a lesser impact on vulnerable populations.

Human activity, such as urbanization on land surfaces and natural drainage flows, intensifies the impacts that occur on natural water flows. Urban flooding is a result of at least two variables, climate change and local urban change. Climate change to the extent that it may affect storm occurrences and the intensity thereof. Local urban change is considered to be the instance where alterations are done to the urban land surfaces through construction, soil compaction, and drainage to divert natural flow. These factors all contribute to the increased possibility of floods as well as their magnitude and duration (Douglas, et al., 2008:190)

Informal settlements within urban spaces are, at times, beyond the means of municipalities to control and strategically plan such patterns of settlement (UN-HABITAT, 2010:22-25).

Informal settlement developments contribute to a possible increasing amount of those populations that are not able to receive the basic level of water services. If inhabitants of communities are not able to reach this service level they are thus at a greater risk than other residents within the community. Persons for whom risk and disaster reducing information

within an urban area is intended, for may in fact be beyond the reach of efforts of already low funded municipalities.

#### **2.4. Water Accessibility**

Sub-Saharan Africa (SSA) has been identified as a region “whose population has the least access to improved water supply” (Thompson, et al., 2000:37). This lack of access to improved water supply within SSA could be in part due to the ever increasing urban population that places added pressures on municipal services which limit the prospects of improving access to water within the region (Thompson, et al., 2000:38; Crow and McPike, 2009:43-44).

Water accessibility is mainly achieved through water network systems (infrastructure) that function properly and which can be reached by the community, either through communal stand pipes or in-house or in-yard water structures. This means that many inhabitants are dependent on functions of infrastructure to supply water resources to them. In some African countries such as Uganda and Tanzania, functioning piped water systems within households were prevalent within the communities in 1967, when these households were revisited thirty years later the infrastructure was still in existence but the water supply systems were no longer functioning properly (Thompson, et al., 2000:40-41). This then forced the inhabitants of these areas to collect water supplies from sources that provided bad drinking quality or that forced users to purchase water supplies from vendors at very high prices. Structural changes and lack of water supply affect poor urban households the most when they occur as they do not have the means to employ coping capacities.

The aspired basis for proper functioning sanitation for the urban poor has been identified by Joshi et al. (2011:12-13) as having access to “facilities and services that provide personal privacy and dignity and ensure a clean and healthy living environment both at home and in the neighbourhood of users.” This is not the case for most of the urban poor. Informal settlements within urban areas, especially in developing countries, create a plethora of health risks to inhabitants. As informal settlements are unplanned and often congested spaces where new temporary infrastructure (e.g. pit latrines) needing to be installed, cannot be installed because of the congestion. Added to this, general basic services are often not maintained (clean ups, waste disposal, stand pipes, etc.) (Thompson, et al., 2000:43). A decrease in the ability to access fresh potable water and sanitation may lead to an increase of health risks (Hardoy and Schusterman, 2000:64; Thompson, et al., 2000:43).

Indigent households might retain supplies of water, by storing water at home. This reliance on secondary and tertiary water supplies is mainly due to the inability of the primary piped water systems to adequately supply their households with potable water (Thompson, et al., 2000:45; Mitlin, 2008:32). Secondary and tertiary sources of water, as identified by Thompson et al. (2000) and Mitlin, (2008) are tanks which capture rain water, other improved facilities (boreholes), surface sources (rivers) and vendors/kiosks (private providers). These alternatives do not all have the same standard of 'safety' or quality, as rain tanks, boreholes, and, surface sources (if chosen as a secondary source of water) may have health risks and cost impacts attached to them. The only possible safe source of potable drinking water would be to purchase drinking water from vendors. The need of urban indigent households to purchase water from vendors, due to the inability of their WSA to supply an uninterrupted flow of water to households, may have a negative impact on the household's financial resources. These resources could have catered for other amenities that may hold greater coping capabilities.

The desired manner in which indigent households, especially those within urban areas, should obtain their water supply would be through infrastructural networks that discharge an uninterrupted supply of potable water. The less desirable means of water supply is through vendors, kiosks and the private sector, might be the most practical choice when considering the possible health risks associated with other secondary and tertiary sources of water. The downfall of using these tertiary sources of water would be that their cost per litre of water is considerably higher than that which could have been supplied by the municipality (Thompson, et al., 2000:46).

On the other hand, private sector water supplies are seen in a positive light by many households in East Africa during periods when water is inaccessible. This is due to their reliability, being based at a convenient and central location, and good water quality (Thompson, et al., 2000:46). Although the intention of private water vendors is good – to supply potable water sources to indigent urban households (and to gain a profit) – there are often negative by-products that stem from these developments. These include the accumulation of waste water and faecal matter that needs to be disposed of through proper water and sanitation infrastructure. The concentration on one important service may create a lack of all-round improvements which indirectly cause social and health issues to arise (Hardoy and Schusterman 2000:64). Thus there is a need to concentrate on a multitude of factors that influence urban indigent household water usage and accessibility and safety.

### 2.4.1. South Africa's Current Situation and Promises

The Department of Water Affairs (DWA) has estimated (for 2012 using 2001 data) that there is a national backlog of 256,648 households and 1,152,761 people without access to water supply infrastructure.<sup>2</sup> In order to assist in reducing this backlog, the Dam Safety and Rehabilitation Programme (that commenced in 2005) and similar projects, aim to 'support sustained economic growth and meet growing social water needs' (DWA, 2010:6). DWA is configured of five programme structures that concentrate on ensuring water accessibility in an equitable and sustainable manner. These programmes are as follows (DWA, 2010:10):

- Administration – provides leadership, advice and core support services;
- Water Management – ensures that the country's water resources are used, developed and conserved;
- National Water Resources Infrastructure – ensures a reliable supply of water from bulk raw water resource infrastructure;
- Regional Management - coordinates effective implementation of the Department's strategic priorities and objectives at a regional level;
- Water Sector Regulation – ensures that the country's drinking water is safe, accessible and affordable for all people.

As the residents of South Africa are the end users of water resources, it is imperative that DWA assists in the distribution of information by creating awareness at the local level. The Strategic Plan (2010-2013) (DWA, 2010) listed that improved consideration and appreciation of water resources should be implemented amongst all South Africans. For this, DWA has implemented four public awareness interventions that aim to promote such awareness (DWA, 2010:18)

Census 2001 found that approximately 8.7% of South Africans receive water through infrastructure that is considered to be lower than the expected basic level of service -i.e. water from a community standpipe not more than 200m from the dwelling (Statistics SA, 2001). For further assistance to ensure that the basic level of water services are met, DWA aims to develop their Service Delivery Improvement Plan.

The Service Delivery Improvement Plan highlights key service areas that need to be attended to in order to optimize the performances of DWA (DWA, 2010:30). Some of these service

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<sup>2</sup> DWA – Water Services NIS: [http://www.dwaf.gov.za/dir\\_ws/wsnis](http://www.dwaf.gov.za/dir_ws/wsnis)

areas include supporting local municipalities in case of water related emergency situations – where it is intended to respond to all requests dealing with emergency related incidents within 24 hours. Other key service areas include the improvement and expansion of new water resources that will ensure water security and availability through increased water storage capacity and transforming single dams into multipurpose dams.

Public entities such as the Water Research Commission and the Trans-Caledon Tunnel Authority are set in place to assist with the water research and project financing responsibilities respectively. Other entities that report to DWA are the fourteen appointed Water Boards (that operate as water service providers), Catchment Management Agencies (that essentially aim to involve the public with regards to decision making processes) and Water User Associations (to provide a platform for local users to manage water resources in an integrated manner).

Although there are many capable entities set in place to assist with water provision and sustained utilization within national government, there are still areas where optimal service delivery is hindered by certain obstacles. The DWA Strategic Plan (2010:50-52) points out some of these obstacles which include:

- The appointment and retention of technical professional staff;
- Aging infrastructure which does not guarantee sustainable provision; and,
- The inability to achieve environmental management objectives that ensure energy and water loss savings.

#### **2.4.2. The Stellenbosch Situation**

The water accessed by communities should not be of poor quality as it impacts negatively on the health of those that may drink it and could cause outbreaks of water associated illnesses. The SLM achieves access to potable drinking water through the water resource networks that are in Stellenbosch, which account for 72.4% of the water supplied in Stellenbosch (PGWC, 2007:140). Currently, the water supplied to SLM is from the Idas Valley Dam and it may in future incorporate the Berg River Dam. To accompany or supplement this supply; water is bought from the Theewaterskloof Dam and the Wemmershoek Dam (PGWC, 2007:140). With regards to identified hazards, fire was identified as the likeliest hazard to occur within the SLM. Second to this the Idas Valley Dam has been identified as the second most likely hazard, relating to dam failure, followed by hazards relating to the decay of existing

infrastructure causing problems with running water supplies within the SLM (CPUT, 2008:23-24)

The Department of Water Affairs (DWA), in the Stellenbosch Municipal Profile, stated (using Census data of 2001) that in 2001 there was a total of 986 persons and 261 households that had no access to formal water infrastructure.<sup>3</sup> When considering population growth, urbanization and migration over the years that these numbers increased, by the year 2012, it was calculated that there were 1,590 persons and 418 households without access to formal water infrastructure<sup>4</sup>, an increase to the previous amount of persons with no infrastructure.

The DWA Stellenbosch Municipal Water Profile<sup>5</sup> also assists with an indication of households that receive baseline standard water accessibility; which is below RDP standards i.e. a communal tap more than 200m away from a dwelling. Here, the water profile indicates that in the year 2001 there were 10,452 persons in Stellenbosch that had access to water through sources below levels of basic services. This number has dropped considerably as in April of 2012; only 1,680 persons were now affected by water service levels below basic standard levels of a standpipe.<sup>6</sup>

From the information received from the DWA Water Profile of SLM, it is possible to identify areas of success and struggle. There has been a decrease in the backlog for required minimum level of water service delivery, yet the backlog for households and for the total population receiving proper infrastructure is still stands at a considerable amount indicating that developments and upgrades are constantly needed.

### **2.4.3. Reaching Goals for Stellenbosch**

The SLM needs to incorporate various strategies to be able to decrease the access to water infrastructure backlog that has been expressed above. With keeping this information in mind, the researcher has outlined some of the SLM's areas of interest concerning service delivery.

SLM has gone through an extensive community consultation process in order to identify the most critical areas where improvement in service delivery is needed. Briefly, as there is repetition throughout the 19 wards and their priority areas, some of the residents' highest priorities were (Stellenbosch, 2010: Ch. 3, 4-10):

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<sup>3</sup> Dept. of Water Affairs, Water Services – National Information System:  
[http://www.dwaf.gov.za/dir\\_ws/wsnis/default.asp](http://www.dwaf.gov.za/dir_ws/wsnis/default.asp)

<sup>4</sup>*Ibid*

<sup>5</sup>*Ibid*

<sup>6</sup>*Ibid*

- Housing;
- Poverty alleviation;
- Emergency services;
- Skills development and training (including Youth and Women);
- Water provision and conservation;
- Roads and sewerage;
- Primary health care;
- River management and rehabilitation;
- Conservation within the urban environment;
- Better infrastructure.

From the above list, it is possible to see that many of these priority areas, if catered to, would contribute to the municipality's ability to respond to disastrous events. Many of these priority areas also outline essential shortcomings in capacity.

With regards to one of their highest priority areas, water provision and conservation, the IDP (Stellenbosch, 2010: Ch. 4: 11) does encourage and outline restrictions with regards to water conservation, development planning, and the sustainable use of water supplies within residential areas. SLM understands that the condition and quality of their rivers are important, therefore it is stated that rivers will be protected by conservation zones and that only passive recreation will be permissible within such protection zones. Sustainable water use practices such as green roofs and water wise gardening are encouraged. Finally, this section (Stellenbosch, 2010) also stipulates that waste water treatment works (WWTW) must be upgraded and maintained in such a way that they meet the minimum water quality standards as set out by DWA.

According to their 2010 IDP, the SLM states that their response plan aims to identify those that are "most vulnerable and most at risk" to a hazardous event. Thus, it is essential for the municipality to maintain their service delivery with regards to water provision and water resource conservation through understanding vulnerability within their communities. To assist in attaining this goal, the SLM has stated within their Water Service Development Plan (WSDP) (2011b) that they would avail allocated budgets for the years 2011/2012 –

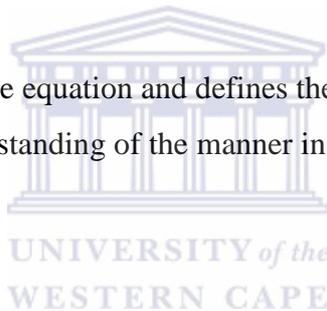
2013/2014 to the amount of R219,563 million (Stellenbosch, 2011b:vii) for Water and Sanitation Services<sup>7</sup>.

## 2.5. Components of Disaster Management

Disaster management and the reduction of disaster risks become possible when one understands the components that are involved in risk mitigation. These components are important as they make it possible to equate risk and identify the hazards and vulnerability that are involved which cause shocks to the affected locations as well as recognising coping mechanisms used to mitigate for these risks. The risk equation of the United Nation's International Strategy for Disaster Reduction (UNISDR, 2002:24), states that:

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Coping Capacity}}$$

The following section considers the equation and defines the various components. This analysis allows for a greater understanding of the manner in which disaster management and reduction should be understood.



### 2.5.1. Risk

*Risk can be defined as the likelihood, or more formally the probability, that a particular level of loss will be sustained by a given series of elements as a result of a given level of hazard. The elements at risk consist of populations, communities, the built environment, the natural environment, economic activities and services, which are under threat of disaster in a given area (Alexander, 2000:282).*

The definition posed by Alexander (2000) considers the broader context and includes all relationships where risk is associated. This has led the researcher to consider a definition of risk that not only considers the urban context but also encompasses concepts such as the probability of hazards and degree of vulnerability. The definition of Rashed and Weeks (2002:576) adds meaning to the above definition: "Risk indicates the degree of potential losses in urban places due to their exposure to hazards and can be thought of as a product of the probability of hazards occurrence and the degree of vulnerability." What should also be taken into consideration when understanding risk would be that an impact and its actions on

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<sup>7</sup>Comparable figures for previous years were unavailable.

one region may also induce an impact on risk in another region, and vice versa (UNISDR, 2005:1).

For the purpose of this study, a framework to understand risk would be to consider the probability of a hazardous event taking place that will be deemed to be harmful to the livelihoods of those that are affected by being exposed to a hazard which takes place within urban spaces. Through Mayekiso (1996:173 cited by Mgquba and Vogel, 2004:31) we are able to see that the urban space or environment that people live in plays a major role in their exposure to risk: “Many studies have shown that crowding and disease were closely interrelated. And of course we are faced with many other environmental and health problems.” Further, Mgquba and Vogel (2004) explain that the historical context of South Africa (colonialism, capitalism, apartheid and segregation laws) may well have increased the probability of certain sections of the population having been and being more prone to risk and disaster than others. Mgquba and Vogel (2004:31) point out that the “socially-engineered system” of apartheid also created uneven capacity to access assets such as water and electricity. Here we are already able to see that, due to an unfair historical legacy within South Africa, certain demographics were created that led to a vulnerable society and one that would eventually have greater probability of being prone to risk.

### **2.5.2. Hazard**

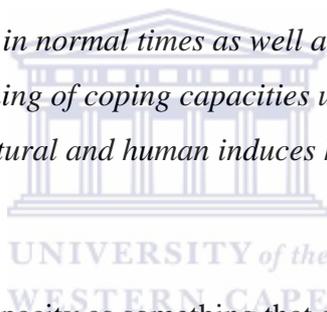
A hazard differs from a risk because a hazard could be potentially harmful, e.g. the difference between a cyclone occurring on a remote island with no inhabitants to one occurring at Durban. A risk refers to the probability of the hazard causing damage to the inhabitants; e.g. the cyclone may hit Durban but depending on their preparedness it may not result in immense damages being caused to the people, infrastructure and natural environment (Oxford University, 2005; Cutter, 2001, cited by Blanchard 2005:32). Therefore, it could be said that hazards are only posed once an event (natural or anthropogenic) is perceived by humans to be damaging to the livelihoods of individuals that are within the area of potential impact (Mitchell and Cutter, 1997 cited by Thywissen, 2006:19; Burton *et al.* 1993:232 cited by Blanchard, 2005:33). An imminent impact of any hazard needs proper preparedness. This includes having a certain level of resilience (pre-disaster) and rehabilitation (post-disaster) within national, provincial and local government spheres. Therefore, to assist in hazard preparedness it is essential to have all staff, especially those that work within hazardous environments, trained so that early warning systems and monitoring protocols may function

properly. These essentials allow for all levels of authorities to take the necessary precautions and reduce the impact of hazards (UNISDR, 2008:3).

### **2.5.3. Coping Capacity**

In order to reduce the possible damages inflicted upon an individual or group, their resilience to a hazard plays a major role. The main component of such resilience would be the extent of coping capacity that the affected have within their means. In order to fully understand and grasp the coping capacity within one situation, an assessment or analyses needs to take place. This assessment of coping capacity is required so that it may take into account the possible and identified resource constraints facing a particular situation that may need confrontation. With this in mind, coping capacity is seen as,

*“The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster. In general, this involves managing resources, both in normal times as well as during crisis or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human induced hazards”* (UNISDR, 2004 cited by Thywissen, 2006:13).



The UNISDR describes coping capacity as something that an individual or group/community should inherently contain within their means. Due to the spatial and time variances over which disasters occur, the variation of coping capacities from one area to another is affected (Tol and Yohe, 2001:4). Thus, communities are dependent on coping capacities that are available within their means and the manner in which they manage their resources will predict the period in which it takes for the affected community to build resilience in order to recover from the disaster.

Vulnerability is a focal aspect of this report, and attention has been given to its definition and understanding within disaster management. Vulnerability is not a static concept. The researcher presents an array of definitions in order to produce a common view with regard to the understanding of vulnerability. Vulnerability is defined below and then discussed in order to produce a holistic understanding of the concept.

#### 2.5.4. Vulnerability

Various authors have indicated that there is no static definition of vulnerability and that its definition is dependent on the orientation and research discipline in which it is utilized (Alwang, et al. 2001:2; Dow, 1992, Cutter 1996, 2001 cited by Cutter, et al. 2003:242). However, Alwang et al. (2001:1) identify the general principles of vulnerability. These principles are that vulnerability:

- Is forward looking and defined as the probability of experiencing a loss in the future relative to some benchmark of welfare;
- Can be caused by uncertain events;
- Its degree depends on the characteristics of the risk and the households ability to respond to it;
- Depends on the time horizon; and
- Is experienced greatly by the poor and near poor, because of their limited access to assets and limited abilities to respond to risk (Alwang et al. 2001:1).

Globally, as people occupy different locations and situations (economically) they are prone to inhabit regions that affected by hazards (Wisner, et al., 2003:5). Not only does the location and socio-economic status of specific populations impact on their state of vulnerability but also their ability to access information and resources in order to cope with the impacts of certain hazards. Their vulnerability may also be directly affected by the type of disasters which may lead those affected to respond either before (*ex ante*) or after (*ex post*) the disaster may have taken effect (Alwang et al., 2001:2-3). And, depending on the resources available to them, what may be a disaster to an individual person or household may not be to another with greater resources.

The definition of the United Nations International Strategy for Disaster Reduction (UNISDR) was also found to be useful, as it identifies it as: “The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of a community to the impact of hazards” (UNISDR, Geneva 2002:24 cited by UNISDR, 2005:1). This definition allows assessment of social vulnerability with regards to the Hyogo Framework for Action (HFA) in relation to disaster management and mitigation strategies that are implemented and utilized at national, provincial and local levels of government. This is because the HFA priorities of action relate to various physical, social, economic and environmental factors.

Although this definition is established through an emphasis on Disaster Risk Reduction (DRR), it concentrates on all spheres of interest – social, environmental, economic and physical – to establish an understanding of vulnerability. It highlights that the effects of vulnerability can be increased by these impacting forces (e.g. environment, economy, etc.). Therefore, one can establish that vulnerability can be expected in the “relation between human society and the environment, instead of only human systems and environmental threats” (Fraser et al., 2003, Turner et al., 2003, Leurs, 2005 cited by de Graaf, 2009:21).

Moser and Holland (1988:2 cited by Alwang, et al. 2001:18), with a sociological field of interest, define vulnerability as “the insecurity of the wellbeing of individuals, households, or community and the face of a changing environment.” This definition emphasises that vulnerability (experienced in a “changing environment”) is a process of change, rather than a static concept or state of being.

Using the definition of Moser and Holland (see above) from the field of sociology, we are able to extend the scope of understanding by including the term ‘social vulnerability’. Social vulnerability concentrates on the characteristics of the individual or group (such as age, sex and dwelling type) and their susceptibility to a hazard and how inequalities determine their ability to respond to such a hazard (Cutter et al. 2003:243). Mgquba and Vogel (2004:33) also agree that the ability of a person or a community to respond to certain shocks and risks is closely linked to their ability to retain and compete for the access to “rights, information, resources and assets.”

Using Alexandra township as a study location they then further articulate that informal settlements “with a lack of infrastructure, inadequate sanitation, overcrowded conditions, and with generally limited access to economic resources are often most vulnerable to environmental and other changes” (Mgquba and Vogel, 2004:33). From this we are able to identify reasons why people within informal settlements and poor living conditions are most vulnerable to hazards. Therefore it would be important to find social (organisational networking and assistance) and institutional (policy and planning frameworks) components to reverse the impacts of disasters on the lives of people that live in informal settlements and indigent households.

The inequalities that expose communities or individuals to vulnerability may be related to their geographical position (where they may occupy hazardous zones – e.g., flood plains, coastal areas, etc.) and the frequency, magnitude, duration, impact, rapidity etc., of the

disasters or shocks to which these communities and individuals are unprotected against (Cutter, 1996:530-532). Cannon et al. (2005:5) bring to light many other characteristics that encompass social vulnerability. These characteristics are:

- Initial well-being (physical and mental health);
- Livelihood and resilience (assets, income and qualifications);
- Self-protection (degree of protection afforded by capability and willingness to build a safe home and at a safe site);
- Social protection (hazard preparedness provided by the society e.g. mitigations and implementable policies);
- Social and political networks and institutions (role of the institutional environment in setting good conditions for hazard protection)(Cannon et al., 2005:5).

Not only would it be ideal to have systematic cooperation between the social and institutional components of disaster management, but that disaster management also seeks the cooperation of service delivery within designated areas of responsible authorities. For this, Mqguba and Vogel (2004) emphasizes that poor infrastructure and service delivery (without support or operational maintenance) can heighten the impact of a disaster and may cause greater damage to livelihoods of the inhabitants as their vulnerability to a disaster increases (Mqguba and Vogel, 2004:33).

Simply put, 'social vulnerability is defined by the possession of social attributes that increase susceptibility to a disaster' (Zahran, et al., 2008:539). Cutter et al. (2003:243) discuss the 'social fabric' of a community. Social fabric refers to the holistic make up of a community and how this affects or determinesthe impact of disaster or shock. Therefore, their capabilities are influenced by the living environment of the community or individual including their demographic, economic and housing characteristics as well as social cohesion and capital.

Building on the influence of the community or individuals social fabric (makeup), there is a general consensus within the social sciences community about the major factors that influence social vulnerability (Cutter, et al. 2003:245). These include access to resources, political power and representation, social capital, beliefs and customs, building stock, age, and density of infrastructure (Cutter, 2001, Tierney et al., 2001, Putnam, 2000, Blaikie et al., 1994 cited by Cutter et al., 2003:245)

There is a general perception that a disaster causes a community to experience vulnerability, but from the researcher's point of view this is not the case. Vulnerability within a community exists prior to any hazard becoming a disaster, and it is the hazard in action that increases the susceptibility of a community to the effects of a disaster. Kelman (2007:1) suggests that natural events (the "hazard") that take place are only seen as disasters from a human perspective – as the human built environment undergoes shock as they cannot cope with the event taking place (hazard) within their space. Cannon et al. (2005:4) agrees with the notion that "disasters happen when a natural phenomenon affects population that is inadequately prepared and unable to recover without external assistance." Through these ideas of what constitutes a disaster and what creates vulnerability, a need arises to profile populations that are vulnerable to hazards.

## **2.6. Disasters and their Impacts**

According to Action Aid (2006:1), "Disasters cost lives, destroy communities, wreak havoc on people's livelihoods and leave a lasting impact not only on physical infrastructure but also on people's psycho-social well-being." There are other risks that should be considered as well, such as disasters that are brought about by social threats that may cause vulnerability within a certain community or population of a certain ethnicity. Examples of such social threats are the xenophobic attacks that occurred in South Africa in 2008. The Risk and Development Annual Review (RADAR) of the Western Cape states that the xenophobic attacks left 22,414 people displaced (Holloway et al., 2010:50) within the Western Cape Province who looked for refuge from the threats and violence that mostly occurred in informal settlements where foreign nationals were living. Table 1 illustrates the amount of people that were displaced and their locations within the Western Cape.

**Table 1: No. of people displaced in the Western Cape (27 May 2008), Holloway et al., 2010:50**

Municipality	Number Displaced
City of Cape Town	20,418
Drakenstein	730
Saldanha Bay	590
Overstrand	226
George	150
Knysna	200
Theewaterskloof	100
Total	22,414

On 4 June 2008, the conditions became so horrific that the Premier declared the events a provincial disaster (Holloway et al., 2010:51). The displacement of foreign nationals caused them to seek shelter in various facilities such as police stations, churches, mosques and various other private facilities. These facilities then became overcrowded and the City of Cape Town started opening up Centre of Safety Sites (CoSS) to temporarily place foreign nationals that had sought refuge. Instances of vulnerability were experienced by these foreign nationals due to the lack of amenities that the CoSS had. As they were sites of temporary residence the availability of services and resources were sporadic. Foreign nationals also used the CoSS for periods that extended the allocated period of use, as the last CoSS was closed only in April 2010 (Holloway et al., 2010:51).

Holloway et al.(2010),state that the distinguishing difference between such social violenceand natural hazards is that social violence such as this existed for a “prolonged duration”. Other hazards, such as fires or other weather events may last for a few hours or days, but due to the prolonged displacement as people were afraid to return to their homes after the xenophobic attacks it increased the demand for resources and other amenities from government and other responsible authorities (Holloway et al., 2010:52).

### **2.6.1. Vulnerable Populations**

From the above discussion, it is clear that there are indications that the most vulnerable people would mainly be persons that live in poor conditions and that have minimal or no

access to resources – which prevents appropriate responses within the community.<sup>8</sup> But, Cannon et al. (2005) state that vulnerability is different and that it is not only those that are poor and have insufficient access to resources that are deemed vulnerable. Vulnerability cannot be compared as it is “not the same as poverty, marginalization, or other conceptualization[s] that identify section[s] of the population who are deemed to be disadvantaged, at risk or in other ways in need” (Cannon, et al., 2005:4). Adelekan (2011:256) states that there are other elements that also need to be included before considering a population to be deemed vulnerable. These elements include (Wisner et al. 2004, Barroca et al. 2006 cited by Adelekan, 2011:1):

- geographical location,
- exposure of population and infrastructure,
- socio-economic and cultural conditions,
- political and institutional structures, and
- coping and adaptive capacity that differentiate the impacts on people and human system.

From this, we should understand that being poor does not necessarily mean that you are vulnerable. For instance, as indigenous knowledge may increase a population’s ability to respond to certain hazards and being ill-prepared can be one of the main causes that increase a population’s social vulnerability. Although we should take this into consideration, Cannon et al. (2005:5) further suggest that the poor may not necessarily be deemed as vulnerable but they (the poor) are “disproportionately more vulnerable than other groups, and much less capable of recovering easily,” in certain situations. This notion is substantiated by Zahran et al. (2008) who state that the loss of life is likely to increase within localities that have a higher percentage of ‘socially vulnerable or disadvantaged populations’<sup>9</sup> and that unequal harm would be experienced by minority groups and those with lower income status (Rita, 2005 cited by Zahran, et al., 2008:537).

Zakour and Harrel (2003:28) emphasize that the housing stock (dwelling type) of lower income households may have less ability to withstand the destructive forces of natural and anthropogenic disasters. Here further emphasis is given to the facilities and infrastructure

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<sup>8</sup> See for instance: Alwang, et al., 2001; Cutter, et al., 2003; Peacock, Morrow and Gladwin, 1997 as cited by Zakour and Harrel, 2003:28; Downing et al. 2006:1.

<sup>9</sup> See also: Thomas and Mitchell, 2001, Cutter, 1996, Cutter, Boruff and Shirley, 2003 cited by Zahran, et al., 2008:537.

that the poor have, and how these amenities are susceptible to hazards. One can think that the amenities are as proportionally susceptible to hazards as the poor owners are - in relation to the budget available for the materials bought and used for structural and maintenance purposes.

Coming back to the characteristics that encompass vulnerability, as noted in the previous section, livelihoods and social protection are directly influenced by social and political networks (Cannon, et al. 2005:6). For instance, when looking at a provincial level – and the many municipalities and wards that are established within the province – there are many political and social networks that play a role with regard to service delivery, but some networks may or may not be as well established or equipped as other networks. Thus, communities at different locations may experience variances in levels of cohesion and resilience between municipalities and even within them (Cannon, et al., 2005:6).

Furthermore, vulnerability can be experienced by wealthier individuals as well and so poverty should not be the only anticipated indication of vulnerability. For instance, Feldbrügge and von Braun (2002) describe an example where the Sudanese population experienced a drought (1988-1990) and how the perceived wealthier population (livestock owners) were greatly affected as well. They experienced problems with “converting their possession ... into available income”, and eventually these wealthier livestock owners suffered from “reduced liquidity” (Feldbrügge and von Braun, 2002:11). Thus, with this definition, we are able to understand that wealthier populations (although perceived to have a greater coping capacity) may experience vulnerability, as their amount and type of assets may have no value within periods of disaster.

From the above discussion, we are able to understand that vulnerability does not only affect persons of a certain age, race, economic status or health. It does however, have a greater impact on those persons or communities that have less access to resources (economic, social or natural), which then reduces their coping capabilities against forms of shock or disaster.

### **2.6.2. Insight into What Makes People Vulnerable**

We now know that poverty and wealth are not directly linked to whether communities or people are vulnerable or not, but that it affects the degree to which vulnerability is experienced. From this, there is a need to bring forth the causes of vulnerability that occur and are experienced by communities and the individual. Cutter, (et al., 2003:251) identifies

eleven composite factors that influence and cause the relative level of social vulnerability that would be experienced within a community or households. These factors are:

- Personal wealth – wealth enables a person and sometimes a community to quickly absorb and recover from losses. A lack of wealth would be the primary contributor to the social vulnerability to poor households as they do not have the necessary resources for recovery thus making the community less resilient to the impacts of a hazard.
- Age – two demographic groups that are of major concern are children and the elderly. High birth rates and a large elderly (above 65 years) population infer that there is a greater dependency on the economically active. These age groups may also be less mobile.
- Density of the built environment – infrastructure that is compact within dense spaces may contribute to a higher structural loss within the event of a hazard.
- Single-sector economic dependence – if communities are dependent on one economic sector, it creates vulnerability if a hazard should affect that sector. Whereas a greater spectrum of economic sectors may cushion the impacts of a hazard.
- Housing stock and tenancy – the type of dwelling, type of ownership and location in which the household/community is situated contribute to the impacts that create social vulnerability.
- Race – contributes to social vulnerability as certain demographic groups are marginalized and may not have been given the opportunity to have accessed beneficial resources. Also note that here; greater vulnerability is shown with gender, as female headed households of a racially marginalized group may be more vulnerable.
- Ethnicity – like race, ethnicity also is a clearly defined factor contributing to vulnerability.
- Occupation – households dependent on lower wage employment might suffer greater impact from natural and anthropogenic hazards and face slower recovery from disaster.

- Infrastructure dependence – communities that are dependent on the infrastructural developments and services (e.g. road access, telecommunications) within and that surround their spaces are vulnerable to hazards as the impact may cause a complete shutdown of services rendered by such infrastructure.

Thus, we are able to see that social vulnerability, is a broad and complex concept (McFadden and Green, 2007:120; Cannon, et al., 2005:5) that allows and assists in identifying characteristics and experiences of communities which affect their experience of natural or anthropogenic hazards and which in turn enable them to respond to and recover from them (Cutter, et al., 2003: 257).

Feldbrügge and von Braun (2002) add to our understanding of the factors that influence social vulnerability. They quote Blaikie et al. (1994:21-26 cited by Feldbrügge and von Braun, 2002:10-11), emphasizing that social vulnerability,

*...develops from underlying reasons in the economic, demographic and political spheres into insecure conditions (fragile physical environment, instable local economy, [marginalized] groups, lack of state or private precautions) through the so-called dynamic processes (e.g. lack of local institutions, under-developed markets, populations growth, and urbanization).*

From the list above and Feldbrügge and von Braun (2002), it can be clearly identified that there are certain areas that influence, and could possibly cause, vulnerability to an individual or community. These areas are the type of natural environment, infrastructure and the economic settings that the individual or community is set in; and the demographic and cultural profile of the community or the individual. Thus, if a community is highly dependent on one of these areas to attain resources that will enable their coping mechanisms, their level of vulnerability would increase as the accessibility to these resources and amenities would either be constrained or inaccessible.

Positive influences that gained attention would be per-person economic growth and social security systems that have the ability to create improved technological and institutional coping mechanisms (Feldbrügge and von Braun, 2002:13). These influences bring about a need to establish institutions that consider and support the values, norms and rights of a society, thus there is a need to establish “good”, reliable institutions (Feldbrügge and von

Braun, 2002:13) in order to ensure that social vulnerability is reduced within a household and community.

The following section examines literature that has a focus on the causes and influences of vulnerability that prohibit or hinder communities and individual's access to water; and the infrastructure that provides water to communities. As Cutter et al. (2003) point out within the eleven composite factors that influence vulnerability – infrastructure dependence – institutional services (such as water services and amenities) are major contributors to the coping ability of a community.

### **2.6.3. Vulnerability and Water Accessibility**

Downing et al. (2006) highlight that there has been a keen interest in the topic of human vulnerability and its relation to water use; and that it has been linked to and discussed with other issues such as climate change, flood and drought hazards, and poverty.<sup>10</sup>

As we know, potable water is a very scarce resource. It is an important resource for social and economic development (Appelgren and Klohn, 1998:361). Appelgren and Klohn (1998: 363 citing Ohlsson, 1998) then further emphasize that those societies that are without institutional capacities, and without educated populations and decentralized decision making capabilities are most likely to have a deteriorating capacity for adaptation due to secondary conflicts that may arise. This infers that a society that does not have some sort of institutional backbone which is able to create coping mechanisms may have a weaker response to shocks that may impact on their (community's) resources – namely water. Furthermore, Appelgren and Klohn (1998:363) suggest that having a set of indicators that focus on social water scarcity “would support recognition of the importance of the social dimension of water scarcity management.” Introducing indicators allows for a better manner in which responsible authorities would be able to manage water accessibility and availability through identifying weak and vulnerable situations. Appelgren and Klohn (1998:364) suggest that such indicators should not only focus on those usually prescribed in standard hydrological indices (such as the WSI – Water Scarcity/Stress Index) as they do not consider the social, institutional and economic capacity of countries. Management options should therefore include indicators that encompass demographic growth and institutional capacity(Appelgren and Klohn, 1998:364).

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<sup>10</sup> See also: Adger, 1999; Handmer and Dovers, et al., 1999; Soussan and Ariens 2004 cited by Downing, et al. 2006:1.

Within a developing society there are many trigger effects that may lead to greater vulnerability. Therefore; once a society has the inability to adapt and respond to hazards, socio-economic effects (decreased agricultural and economic activity and economic productivity) may be an outcome (Appelgren and Klohn, 1998:364). Appelgren and Klohn (1998) also proposed two factors that may induce water scarcity/inaccessibility. These factors are:

- Water resources are unevenly distributed in relation to population concentrations and to demand from rapidly expanding economic activities.
- Growing regional and local scarcity (inaccessibility) cannot be addressed by conventional supply-orientated measures. (Appelgren and Klohn, 1998:364)

With this in mind, it is evident that there is a need to diverge from the business as usual approach where increases in population, increases water demand. It also implies that an area's demand for water is normally met by the supply-driven approach that relies on capital investment in new water treatment works and water distribution networks (Vairavamoorthy et al., 2008:331). This approach is costly and not economically sustainable – as with time, demand for water will soon surpass the supply thereof (Vairavamoorthy et al., 2008:330).

Therefore, it is essential for water demand management and planning to be cognisant of demand changes and requirements and the impact this may have upon the system. Ultimately, demand management makes it possible to focus resources (capital and human) on measures that make better and efficient use of limited supplies (Vairavamoorthy et al., 2008:332). Also, service providers should pre-empt such changes in order to ready their infrastructure, operations and planning in such a way that it would respond to demand adequately and not require the responsible authority to provide such adequacies on the onslaught of high demand.

From the literature that follows, a number of issues are raised concerning the reasons for inadequacy and issues regarding water accessibility. One of the significant drivers of inadequacy and lack of water accessibility would be the large growth of demand due to population growth. Within urban areas, rapid population growth is contributed to by the immigration of rural populations due to the attractions that urban areas have. These attractions might be better livelihoods, employment, proper housing and services. What the urban population does not foresee are the ever increasing constraints on public services that “may

result in chaotic conditions within many towns and cities” (Vairavamoorthy et al., 2008:331). Research has shown that globally there has been an increase in the number of urban residents that have no access to improved water services and sources. This number has risen from 113 million in 1990 to 173 million in 2000 (Hinrichsen, et al., 2002 cited by Vairavamoorthy et al., 2008:331).

The ever increasing population and densification of urban areas, may also contribute to the anthropogenic changes that are experienced – such as rapid industrialization, population increase, higher energy use and land use change. Anthropogenic changes “disrupts the natural balance of the world’s climate” (Vairavamoorthy et al., 2008:332) which in turn affects the water cycle. Vairavamoorthy et al. (2008) established that disruptions in the natural water cycle may cause differentiated and distorted rainfall patterns over space and time; where some areas may experience drought, and others may experience floods. Here we are able to see that the effects of anthropogenic activities contribute to the natural water processes that replenish our water sources, which in turn supply our water treatment works and water supply networks. This chain of events, shows that what we do and don’t do as a society in order to maintain and sustain water supplies has an effect on the greater population and thus (as the effects are differentiated over geographical space and time) enable vulnerabilities that could have been avoided through proper infrastructural and authority changes.

Lack of access to clean and safe drinking water with the proper infrastructure may induce many problems within a community. Wutich and Ragsdale(2008) explore the concept of “suffering from water” (a phenomenon identified by Ennis-McMillan 2006, 2001) where communities express emotional responses towards lack of water accessibility. These emotional responses may be frustration, anguish or anger. Furthermore, ‘suffering from water’ can be an “expression of distress over social inequalities in the distribution of water” (Wutich and Ragsdale, 2008:2117). Resource inaccessibility, lack of services and social distress and inequality are common experiences within South Africa. As backlogs are ever increasing due to urban population increases and the inability of responsible authorities to meet the demand for services and resources – many residents of communities will inevitably not have access to proper, safe and adequate water resources.

Access to adequate and safe resources can be achieved through infrastructural developments, but the onset of natural disasters that cause structural damage to these developments may amplify distress within communities. Great amounts of damage may occur to infrastructure

(such as water systems and roads) if the infrastructure were subject to inadequate materials, improper design and stability, and general negligence due to an unexpected onset of disaster (e.g. flooding induced by heavy rainfall and not having storm water drainage systems present) (World Bank, 2010:38).

We can now establish that water accessibility has many determinants. Accessibility may be determined by the level of development within the society's institutional arrangements, the extent of infrastructural capacity and the exposure of these structures to the natural environment. Not only is lack of water accessibility caused by broader impacts, it also causes emotional responses and social distress within a community. As discussed by Alwang et al. (2001), vulnerability is experienced to a greater extent by the indigent due to their limited ability to respond to risk. It is therefore useful to distinguish between vulnerable persons and indigent (poor) persons.

#### **2.6.4. Indigent Policy and Criteria**

Households that are seen as indigent may be viewed as those that are defined as poor, have some form of income with no other financial support or assets and are in dire need of services to assist them within their livelihoods (Duhaime Legal Dictionary, [www.duhaime.org](http://www.duhaime.org)). For Van Ryneveld et al. (2003:5) indigent refers to “that section of the population who are unable to meet their basic needs and pay for their basic services.” For this study, however, these definitions of indigence did not create the backdrop of how indigent households were identified, but rather the criteria that are set out by local municipalities in order to distinguish which households are indeed indigent. Within the South African context indigence is also defined by the criteria set out within municipal indigent policies (See Table 2 for a list of indicators). The indigent policy stems from efforts of government to ensure an improved access to free and basic services in order to improve the lives of the indigent (DPLG, 2005a:1).

One criterion that a household in Stellenbosch needs to fulfil is for the total household income to be equal to or less than R2, 800 per month (*Stellenbosch Newsletter*, 2009:8). Once a household is registered as indigent, they are able to receive free basic services from the municipality. Such services include 60kWh Electricity per household per month, 6kl water per household per month, relief from property tax levied on a municipal valuation of R85,000 per residential property that is not privately owned (Stellenbosch Indigent Policy, 2010: 2 of

Stellenbosch, 2010: Appendix 6). Other services and concessions (such as 50% discount on fees payable for grave sites) are also offered at a lowered rate for indigent households.

Within the Draft Framework for Municipal Indigent Policy (DPLG, 2005), the Department of Provincial and Local Government (DPLG) states that the indigent policy will act as a 'social safety net' for those individuals that are currently excluded from gaining access to basic services. Within the full scope of social services, the indigent policy within local municipalities is to cater towards increasing access to services that are regarded as essential household services but which are unaffordable by indigent households. These essential household services include water, sanitation, refuse, energy and access to housing (DPLG, 2005:3), and are the services that need to be sought from the local municipality.

Despite having a national Draft Framework for Municipal Indigent Policy (DPLG, 2005), when comparing different indigent policies of local municipalities we are able to identify that their level of services ensure that indigent inhabitants receive the best possible essential household services package. For example, within three different municipalities the qualifying income differs with regards to the amount accepted as being able to apply as indigent. In the UMzimkhulu Local Municipality (Kwa-Zulu Natal Province), the qualifying gross household income for indigent registration is R2,500 per month (UMzimkhulu Local Municipality, 2012:4) but Witzenberg Local Municipality (in the Cape Winelands District Municipality) stipulates that in order to register as an indigent household within their Category A and Category B, the gross household income has to be less than R2,700 and R3,700 respectively (Witzenberg, 2009:5). Whereas, the SLM, within the same District Municipality as the Witzenberg Municipality, stipulates that total household's monthly gross income should be R2, 800. Not only does the qualifying criterion differ, so do the level and quantity of free basic services rendered to indigent households.

As we are able to see from this, indigent policies are set in place to bridge the gap between economic growth and poverty amongst the population of that municipality. Van Ryneveld et al. (2003:11) point out that creating relief for the impoverished "may stimulate growth and competitiveness by creating a more stable environment." They then further indicate that as economic growth is experienced, poverty reduction mitigation strategies should not be left unattended as economic growth does not necessarily ensure poverty reduction (van Ryneveld, et al. 2003:11).

### **2.6.5. Urban Indigence and Social Vulnerability**

Thus far, the literature examined has concentrated on what makes people vulnerable and who are most likely to become vulnerable. In many instances, the literature has pointed out that it is the circumstances which poor households, communities and individuals live in – that makes them the most likely group to be vulnerable to risks (Alwang et al., 2001; Cannon, 2000; Cannon, 2003). Not being able to access, or having limited access to, resources impedes the ability of an individual or community to respond to the shock without compromising sensitive coping mechanisms – i.e. water resources, finances, their lives. Cutter et al. (2003: 245) agree with these sentiments and point out that households that do not have access to resources such as information, knowledge and technology are other factors that increase the social vulnerability of the household. With this it is possible to see that policy and legislation, once adapted to the context where applicable, become sources of information that can be utilized for the benefit of the receiving population. Therefore, with the indigent policy in place at local municipality level as a resource of information, households are able to retain coping capacities, through knowledge sharing, which strengthens their composure during times of disaster.

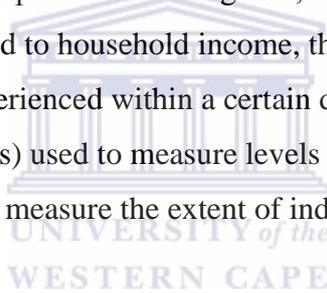
As the urban population is ever increasing, so much so that by 2005 globally, the amount of people living in urban spaces exceeded that of people living in rural areas and that “future population growth is concentrated in the urban areas of the developing world” (Davis, 2004 cited by Crow and McPike, 2009:43-44). Although many people from rural homesteads come to the city to enjoy a better life, many will be subjected to slum dwelling where there is a lack of access to safe potable water (Crow and McPike, 2009:44). When considering the very definition of water security – “sufficient access by all people, at all times, to adequate water for an active and healthy lifestyle” (FAO, 2004 cited by Wutich and Ragsdale, 2008:2117) – we can already see that indigent households living in slum dwellings, within urban spaces, do not receive adequate access to water.

Furthermore, Stalk and Alexanderson (2004) point out that there are consumable resources which are difficult to attain, such as free water services. For example, Stalk and Anderson (2004) illustrate the then conditions of the Durban Metro that coincide with the statements as presented by Crow and McPike (2009). In Durban, at the time, a population of 3 million people received free basic water services from the Metro (municipality), but due to an ever increasing backlog (as urbanization and migration occurred), 150,000 persons (or 30,000 households) had not received any form of free basic water services (Stalk and Anderson,

2004:44). Here we are able to see that Crow and McPike (2009) are correct in stating that in certain instances, indigent persons within an urban setting will be subjected to slum conditions with a lower probability of receiving proper potable water from proper infrastructure despite ostensibly protective legislation.

The main issue, with regards to the backlog, has been the inability of the Durban metro to provide the necessary infrastructure (Stalkand Alexanderson, 2004:44). Therefore, infrastructural backlog and a lack of service delivery can be seen as agents that increase the vulnerability of indigent households. Also, due to not having any infrastructural amenities, households are unable to receive basic resources (either water or electricity), which eventually leaves households with an inability to cope with effects resultant of shock.

Van Ryneveld (et al., 2003:5) indicates that, within South Africa, the term indigent refers to “that section of the population who are unable to meet their basic needs and pay for their basic services.” Through this attempt to define indigence, we can see that the term has some underlying factors that are attached to household income, the ability to afford tariffs of basic services and that indigence is experienced within a certain demographic sector of the population. The criteria (indicators) used to measure levels of indigence, aim to create a baseline against which they could measure the extent of indigence. Table 2 shows some of the indicators used.



**Table 2: Indigent Indicators of the DPLG, 2005**

<b>Indicator</b>	<b>Definition</b>
Female Headed Households	Portion of households headed by women
Social Security	Proportion of population receiving a social security grant
Illiteracy	Proportion of population (15+) who have not completed Gr. 7
Rate of Unemployment	Proportion of economically available population who are unemployed
Household income	Proportion of households with a monthly income of less than R1600
Crowding	Proportion of households sharing a room with at least one other household
Dwelling Type	Proportion of households classified informal or traditional
Sanitation	Proportion of households that do not have sanitation facilities as defined in the Free Basic Services Policy
Water	Portion of population that do not have access to water as per the Free Basic Water Service Levels
Electricity	Portion of population that do not have access to electricity as per the Free Basic Energy Service Levels
Refuse Removal	Proportion of population whose refuse is not removed by the municipality
Malnutrition	Proportion of population who visit provincial and local clinics who are severely malnourished

Source: (DPLG, 2005b:8-9)

The indicators shown in Table 2 above, are able to assist in identifying areas where service delivery is either lacking or do not take place. Once the appropriate responsible authority can identify the issues underlying inappropriate or inadequate service delivery, it would then be

possible to respond with plans to enable capacity to mitigate and resolve the inadequate levels of service delivery.

Added to these indicators, there are also baseline indicators – the generally accepted basic level of services that should be accessible to the population. For instance; with regards to free basic water service levels, having access to piped water within the dwelling would be deemed as a higher level of service, whereas piped water inside the yard and/or within 200m of households would be deemed a basic level of service (Dept. of Cooperative Governance and Traditional Affairs, 2009:13). These standards of basic levels of services, especially water services and infrastructural developments were well defined within the Reconstruction and Development Programme (ANC, 1994:30 cited by Muller, 2008:71).

As development takes place; industrialization, urbanization and population growth create increased demand on municipalities to ensure service delivery. Furthermore, due to the ever increasing demand the increased pressure on natural systems affects the quantity and quality of resources (Earle et al., 2005:3). Population growth, especially within the periphery of urban centres, consists mainly of households with low incomes and may have a higher number of members (or multiple households in one unit) than households with higher incomes. The FBW Policy (which ensures households receive 6 kilolitres of water per month at no charge) does not consider the often larger size of households or multiple households in one unit in low-income peri-urban communities that may need to consume much more than the stipulated, basic allowance (McDonald, 2002a cited by Earle et al., 2005:17).

In order to assist the National Governments efforts to utilize water resources in a more sustainable and equitable manner, there is a need to consider treating the issue of water consumption at the user end of the water network. In order to ensure sustainable water management, the IWRM approach, which (when implemented appropriately) would ensure a meaningful and productive public participation process (Dungumaro, 2007:1142). Such concerted effort from the end users (consumers) creates a sense of ownership which is hoped to develop into conscious consumption, thus resource sustainability is ensured.

## **2.7. Hyogo Framework for Action**

There are various ways in which researchers are able to quantify and analyse vulnerability within a selected region, and its inhabitants, with regards to a selected situation or threat – be it economic, health or disaster related. Cannon (2000:3) states that “vulnerability analysis asserts that for there to be a disaster there has to be not only a natural hazard, but also a

vulnerable population.” Cannon (2000) then emphasizes five components that need to be studied in order to understand the situation of vulnerability of a region or a person. These components are:

- Initial wellbeing – evaluates the initial nutritional and health status of people in everyday life;
- Livelihood resilience – measuring the capacity to which a household or person has the ability to cope with the aftermath of a disaster, and then reinstate their living pattern;
- Self-protection – ability or willingness of the person or household to provide themselves with adequate protection;
- Societal protection – concerns itself with the ability of political or social institutions to provide protection from particular hazards;
- Social capital – involves the soft security provided by a group or community’s capacities to enhance or reduce a person’s resilience (e.g. support networks or rivalry) (Cannon, 2000:9-10).

Therefore when searching for the correct method of assessing social vulnerability of a given region towards a specific threat, researchers should take into consideration the above mentioned components of everyday life. From this the researcher has considered using the Sustainable Livelihoods Framework which considers five capital assets which are essential to reduce a person’s vulnerability to any given threat. The capital assets of the Sustainable Livelihoods Framework (SLF) are (Serrat, 2008:2):

- Human capital – considers the health, nutrition, education, capacity to work and capacity to adapt of a person;
- Social capital – considers the networks and relations of trust and support, formal and informal groups and participation in decision making processes and roles persons may have;
- Natural capital – considers all the natural resources and services that the person may have within their ability to attain or provided by the natural environment;
- Physical capital – considers the available infrastructure, tools and technology that a person has at their disposal;

- Financial capital – considers the financial stability of the person or household, credit worthiness, debt, whether individuals are pensioners or rely on wages.

With this said, it should be noted that the SLF is not only dependant on the capital assets that the individual or household is able to attain, the SLF also considers the structural institutions that set and implement policy and legislation and service delivery (Serrat, 2008:3). Although this method of assessing household/community vulnerability would be viable to use in a study like this, the researcher requires a method of analysis that encompasses the various components and their subdivisions of DRM. Therefore, the researcher has used a framework that was adopted at the World Conference on Disaster Reduction held in January 2005 in Kobe, Japan. This framework and its priorities of action are known as the Hyogo Framework of Action (HFA).

The HFA aims to attain the UNISDR expected outcome of “The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries” by striving to fulfil three strategic goals, which are (UNISDR, 2005:3-4):

1. The more effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction;
2. The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards; and
3. The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of affected communities (UNISDR, 2005: 3-4).

The HFA essentially “aims to substantially reduce the loss of life as well as the social, economic and environmental losses caused to communities and nations as a result of disasters” (Action Aid, 2006:4). To achieve the outcomes of the strategic goals appropriate action needs to be put in place. The following priorities for action were deliberated and accepted at the 2005 World Conference on Disaster Reduction:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels (UNISDR, 2005:6).

These priorities of action have associated activities that should be considered when implementing the HFA. Table 3 below, is produced by Umvoto Africa (Hay et al., 2011) and is based on the HFA which outlines each priority area and their associated core indicators in order to fulfil the aim of reducing vulnerability and impact of risks.



**Table 3: Outline of the HFA Priority Areas and its associated Core Indicators (Source: Hay et al., 2011)**

<b><u>Hyogo Framework for Action Priority Areas</u></b>	<b><u>Core Task for Disaster Risk Reduction (DRR)</u></b>	<b><u>Key Indicators</u></b>
<b>HFA 1 - Making Disaster Risk a Priority</b>	Engage in multi-stakeholder dialogue to establish foundations	Legal framework exists with explicit responsibilities defined for all levels
	Create or strengthen mechanisms for systematic coordination	District Municipality multi-stakeholder platform
	Assess and develop institutional basis	District Municipality policy framework exists that requires plans and activities at all levels
	Prioritize and allocate appropriate resources	Dedicated adequate resources to implement plans at all levels
<b>HFA 2. Improving Risk Information and Early Warning</b>	Establish an initiative for country wide risk assessments	National risk assessment based on hazard and vulnerability info/data and include risk assessment for key sectors
	Review availability of risk related info and capacities for data collection and use	Systems are in place to monitor, archive and disseminate data on hazard and vulnerability
	Assess capacities and strengthen early warning	Early warning in place for all major hazards
	Develop communication and dissemination mechanisms	Early warnings reach and serve people at community level
<b>HFA 3. Building a culture of safety and resilience</b>	Develop a programme to raise awareness	Municipal awareness strategy exists that reaches all communities and people of all education
	Include DRR in education system and research	School curricula includes DRR elements and instructors are

<b><u>Hyogo Framework for Action Priority Areas</u></b>	<b><u>Core Task for Disaster Risk Reduction (DRR)</u></b>	<b><u>Key Indicators</u></b>
	community	trained in DRR
	Develop DRR training for key sectors	Have plans in place where training of key stakeholders are priority
	Enhance the compilation, dissemination and use of DRR info	Incorporating DRR information into skills development.
<b>HFA 4. Reducing the Risks in Key Sectors</b>	Environment: incorporate DRR in environmental and natural resource management	Environmental protection and natural resource management and climate change policies include DRR elements
	Social needs: establish mechanisms for increased resilience of poor and most vulnerable	Specific policies and plans are implemented to reduce vulnerability of impoverished groups
	Physical planning: establish measures to incorporate DRR in urban and land use planning	Land-use development zoning, plans and building codes exist, include DRR elements and are strongly enforced
	Structures: strengthen mechanisms for improved building safety and protection of critical facilities	Long term programme to protect schools, health facilities and critical infrastructure from common natural hazards
	Stimulate DRR activities in production and service sector	Procedure in place to assess the DRR implications of major infrastructure project proposals

<b><u>Hyogo Framework for Action Priority Areas</u></b>	<b><u>Core Task for Disaster Risk Reduction (DRR)</u></b>	<b><u>Key Indicators</u></b>
	Financial/economic instruments: create opportunities for private sector involvement in DRR	
<b>HFA 5. Strengthen Preparedness for Response</b>	Disaster recovery: develop a recovery planning process that includes DRR	Plans that incorporate relief, recovery and rehabilitation into DRR
	Develop a common understanding and activities to support preparedness	Disaster preparedness and contingency plans at all levels with regular training drills and rehearsals to test and develop disaster preparedness and response
	Assess preparedness, capacities and readiness	Independent assessment done, responsibilities for implementing recommendations and resources schedule assigned
	Strengthen planning and programming for response, recovery and rehabilitation	All organisations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response
Financial and contingency mechanisms are in place to support effective response and recovery		
Procedures are in place to document experience during hazard events and disasters and to undertake post event reviews		

These priority areas and their associated core indicators are essential when attempting to understand the status of vulnerability within a given jurisdiction – either community or at municipal, provincial or national level.

The Global Network of Civil Society Organisations for Disaster Reduction (GNDR, 2011) and their Views from the Front Line (VFL) Programme, identified that the most important factor in accelerating the implementation of risk reduction policies is to have supportive government structures that are open to the formation of local partnerships (GNDR, VFL 2011:5). These types of supportive and inclusive government structures and processes not only allow for the possibility of increasing the skilled workforce that are able to implement and initiate projects within communities that are in dire need of risk reduction but also can “lead to greater coordination and collaboration” and more effective implementation (GNDR, VFL 2011:6). Partnerships within a given setting provide one of the many coping capacities that enable a reduction of vulnerability within a community – as stipulated by the HFA 1. By making DRM a priority through allowing the creation or strengthening of mechanisms for systematic coordination, it allows various stakeholders to engage on a platform where information can be shared between government, academic, and organisational institutions.

In 2005, there were 168 countries (including South Africa) that endorsed the HFA and agreed to achieve “the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries” (UNISDR, 2005:3). With endorsing and implementing the HFA these countries inherently agree to review their progress on achieving the goal of reducing loss caused by disaster. Through a reviewing progress, the UN also developed a scoring mechanism by which countries are able to monitor their progress. The table below showcases the scores that selected countries have attained through their efforts thus far in implementing and delivering the Core Tasks towards meeting the outcomes of the HFA. The numeric value associated with the level of progress is understood as follows:

**Table 4: Definition of numeric level of progress**

Level of Progress	Description
1	Minor progress with few signs of forward action in plans or policy
2	Some progress, but without systematic policy and/or institutional commitment
3	Institutional commitment attained, but achievements are neither comprehensive nor substantial
4	Substantial achievement attained but with recognized limitations in key aspects, such as financial resources and/ or operational capacities
5	Comprehensive achievement with sustained commitment and capacities at all levels

Source: HFA Monitor Template (<http://www.preventionweb.net/english/hyogo>)

Table 3 above presents the Core Tasks and Indicators, Table 4 above represents the definitions associated with the numeric level of progress and Table 5 below shows the HFA and its related Core Indicators and the level of progress that selected countries attained for that core indicator<sup>11</sup>. Currently, South Africa does not have a progress report registered with UNISDR. However, South Africa is in the process of updating the National Progress Report with data from the 2013 Global Risk Update (the national focal point for this report is DWA: Deputy Director – Veldfires Regulation)<sup>12</sup>. Also, Local Progress Reports are available for Cape Town, Johannesburg, and Durban.

<sup>11</sup>Prevention Web: <http://www.preventionweb.net>

<sup>12</sup> UNISDR: [www.unisdr.org](http://www.unisdr.org)

**Table 5: Country and Level of Progress Achieved**

Country and Level of Progress Achieved against Core Indicators					
HFA Priority Area	Core Task	Canada	Bangladesh	Sweden	Mozambique
HFA 1	Core Task 1	4	4	4	4
	Core Task 2	4	4	4	4
	Core Task 3	5	4	3	4
	Core Task 4	4	4	4	4
HFA 2	Core Task 1	3	3	4	3
	Core Task 2	4	3	4	3
	Core Task 3	3	4	4	4
	Core Task 4	4	4	3	3
HFA 3	Core Task 1	4	3	3	3
	Core Task 2	3	3	3	2
	Core Task 3	3	3	3	2
	Core Task 4	4	4	3	4
HFA 4	Core Task 1	3	4	3	4
	Core Task 2	3	4	4	3
	Core Task 3	4	3	2	2
	Core Task 4	4	2	4	3
	Core Task 5	5	3	3	4
	Core Task 6	4	3	4	4
HFA 5	Core Task 1	5	4	4	2
	Core Task 2	5	3	4	5
	Core Task 3	3	4	4	3
	Core Task 4	3	4	5	2
Level of Progress (Avg.)		3.8	3.5	3.6	3.3

Source: PreventionWeb: <http://www.preventionweb.net>

When looking at the Level of Progress (average) we are able to note that all the countries can state that their level of progress may equate to a level of progress where institutional commitment is attained, but achievements are neither comprehensive nor substantial (as stated within the supporting documents and according to their numerical score).

When taking a look at each core indicator and investigating the means of verification and description of how these scores came about, we are able to identify that there are variances between the countries that shows different scores for particular core indicators. For example, looking at HFA 4: Core Indicator 4 (“strengthen mechanisms for improved building safety and protection of critical facilities” or “planning and management of human settlements incorporate disaster risk reduction elements, including enforcement of building codes”) as stated in supporting documents we see that Bangladesh has a low score (Level of Progress: 2 – “some progress, but without systematic policy and/ or institutional commitment”). The author of the Bangladesh HFA Progress Report (Disaster Management Bureau, 2011), Ahsan Zakir (DG – Disaster Management Bureau), states that this low level of achievement may be due to the absence of slope stabilization in landslide prone areas and the lack of provision of safe land for low income households and communities. Furthermore, the Bangladesh report states that added constraints are experienced due to not having sufficient human capital and technical resources.

Highlighting such factors informs and reinforces the statement that when digging deeper and seeking more precise evidence of a certain activity at a micro-level, there are indicators that may or may not attain the same scoring as other entities at a broader level. Also, these levels of progress scores indicate that countries that are less developed may be at a higher risk of being vulnerable when subjected to instances of disaster or hazardous events.

## **2.8. Conclusion**

It has been noted that DRR activities are implemented within various national directorates that allow legislation to focus on the importance of understanding disasters and its impacts. Not only does the legislation make us aware of the potential risks, but they also provide guidance to ensure coping mechanisms are available that reduce the instances of vulnerability. We have identified that one of the important pieces of legislation that produces coping mechanisms, besides the National Disaster Management Act (Act 57 of 2002), is the National Water Act (Act No. 36 of 1998). Through the NWA (36 of 1998) it is clear that there is multi-stakeholder communication present as the focus of water resource management, while protection and sustainability is envisaged throughout the efforts of the National and Provincial Governments; and the District and Local Municipalities.

The literature reviewed identifies the issues related to the provision of and access to water services within an urban poor environment. Here it was understood that due to financial,

social and economic constraints, the persons with the least ability to afford certain livelihood amenities were the most affected by disasters. Such livelihood amenities include the ability of a household to access and afford water and for some their inability to maintain household water infrastructure or pay for water may cause a disaster for a household.

Given the local situation the researcher agrees that international goals and standards may have the ability to create a baseline from which it is able to build upon, but they do not focus on local contexts. For example, what is the value of having a baseline standard of providing standpipes with potable water less than 200 meters from any household, while there are still communities that employ the bucket system for their daily sanitation and hygiene needs?

All this then reinforces the need to understand local context and how a lack of resources can cause vulnerable populations to experience certain events as disastrous. When discussing the components of DM and DRR; it was made evident that there are various concepts (risk, hazard, coping capacity and vulnerability) to consider as well as various indicators of such concepts to understand. When considering these concepts and the impacts that disasters have on communities, it enables response and pro-action within relevant responsible authorities. It is also possible to utilise the HFA as a method to not only monitor local levels of progress but to also understand areas where responses are lacking through the completion of the various core tasks and their respective indicators.

Having explored the literature relating to water resource management and disaster management and its related concepts, the researcher will now describe the means used here to incorporate the concepts into this study which aims to uncover the instruments set in place in Kayamandi in the SLM that could reduce instances of social vulnerability and increase the coping capacities of households in the event of disasters and the probability of water inaccessibility.

## Chapter 3

### Research Methodology

#### 3.1 Introduction

The following research methodology assisted with answering the research questions that were intended to assist in understanding the social and institutional mechanisms available to respond to the onslaught of disaster, reduce social vulnerability and increase water accessibility within Kayamandi, Stellenbosch.

Data utilised in this study incorporated primary and secondary data. Primary data was mainly gathered through questionnaires and interviews. With regards to projecting household vulnerability, secondary data (shape files and attributes) were obtained through institutional custodians and responsible authorities. The data then assisted the researcher in projecting the findings through a GIS application (ArcView 9.3). Secondary data was also obtained through grey and other literature.

Both qualitative and quantitative data was obtained to help answer the research question and aims and objectives. Qualitative data was drawn from a variety of questions in the interviews that were held with community based organisations (NGOs/NPOs), government and residents, as well as literature that was identified as necessary for understanding vulnerability within such communities. Quantitative data was also sourced through certain questions in the surveys with the community; as well as through other institutions that offered secondary data.

The main role players of the study were the Stellenbosch Local Municipality and the residential community of Kayamandi. Below is an overview of the study area as well as an outline of the research methodology utilised in order to fulfil the understanding of the research question.

#### 3.2 Overview of Study Area

As the researcher was part of a project team for a larger study undertaken by Umvoto Africa entitled: *“Investigating the Social Vulnerability of People and their Livelihoods and their Response to Water Infrastructure”* (Hay, et al., 2011); the researcher was required to take a study area into consideration that coincided with the greater project of Umvoto Africa. The researcher chose Kayamandi, in Stellenbosch as the ideal study area to base the investigative research element of this study (Figure 1).



The Kayamandi settlement is situated in the north west of the SLM on the border of the greater Stellenbosch town – GPS Coordinates: 33°54'59.95'S, 18°51'00.20'E – (Figure 1 – shows the Kayamandi borders in the top right corner of the map). The Kayamandi settlement came into existence not only as a result of segregation (within the Apartheid era) in the early 1950's, but also due to a group of employers and institutions within Stellenbosch (i.e. Stellenbosch University, the city administration, vineyards and a produce packing company) that erected hostels for black migrant labour workers that were mainly employed on the farms in the Stellenbosch area (du Toit, 2009:72-73).

According to the Western Cape Department of Health's District Health Information System, it states that there were approximately 32,782 persons living within Kayamandi in 2010 (with a year on year 2% increase in population). The settlement is composed of dwelling structures that range from regular housing structures (brick structures on a separate stand) to caravans and tents. In 2001, 49% of the dwelling types within Kayamandi consisted of informal housing found in informal settlements (Statistics SA, Census 2001).

The lack of service delivery experienced in Kayamandi contributes to the possible threats of looming disasters. A backlog concerning water and sanitation exists in Kayamandi as numerous families have to share communal ablution blocks and water stand pipes that are at times situated far from some families' dwellings (Van Wyk et al., 2004; Barnes et al., 2004 cited by Hay, 2011:43). Due to the lack of water service delivery; and the distance certain families have to walk to reach a communal water stand pipe; the community would make use of other water resources, such as the Plankenburg River, for domestic use (Hay et al., 2011:43).

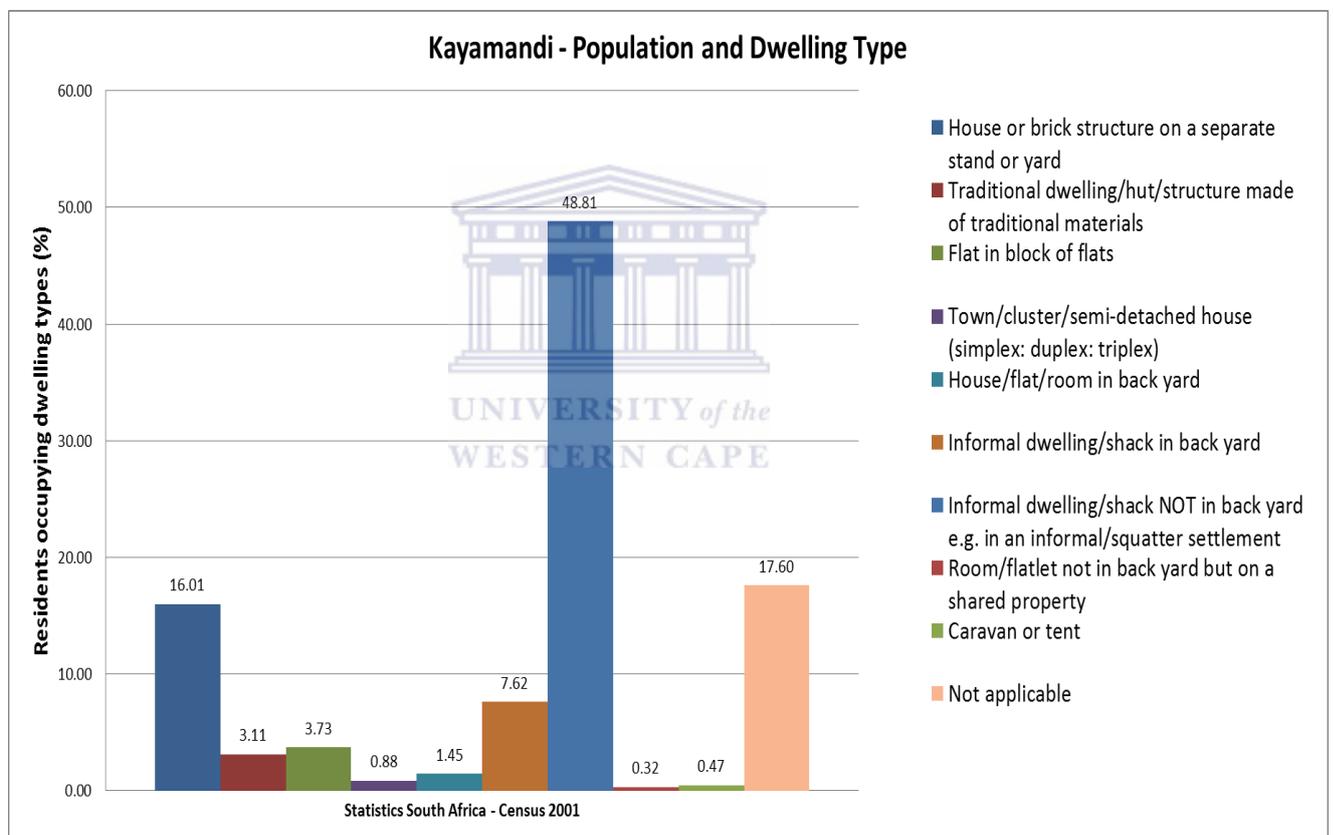
Beside the high rates of tuberculosis and HIV/Aids within the community (Barnes et al., 2004 cited by Hay et al., 2011:43), the residents face another serious threat from the Plankenburg River. This is the high amounts of *Escherichia coli* (*E. coli*) found within the river. *E. coli* is a bacterial disease that can cause major health issues to humans. The presence and levels of the bacteria within the river may vary during the year, as different temperatures, water velocity and other circumstances influence the amount of *E. coli* prevalence in the river. For instance, a test conducted by the University of Stellenbosch showed, that on the 22<sup>nd</sup> January 2002, there were 17,500 *E. Coli* organisms per 100ml, and on the 2<sup>nd</sup> May 2002 this figure reached 172,400 organisms per 100ml (these samples were collected below the Kayamandi settlement) (Barnes, et al. 2004). Barnes (2005:2) notes that “contact should be avoided at

>2000 *E. coli* per 100 ml water.” The viruses detected in the water of the Plankenburg River were Enterovirus, Rotavirus and Adenovirus (Barnes, 2005:3).

Thus, the location of Kayamandi (Stellenbosch) and the current water and sanitation services situation, as briefly analyzed, makes it a prime area for the researcher to gather information and data in order to produce findings for this study.

### 3.2.1 Population

According to the District Health Information System (DHIS, 2010), there were approximately 32,782 persons living within Kayamandi. Below is an outline of the percentage of residents that occupy certain dwelling types within Kayamandi.



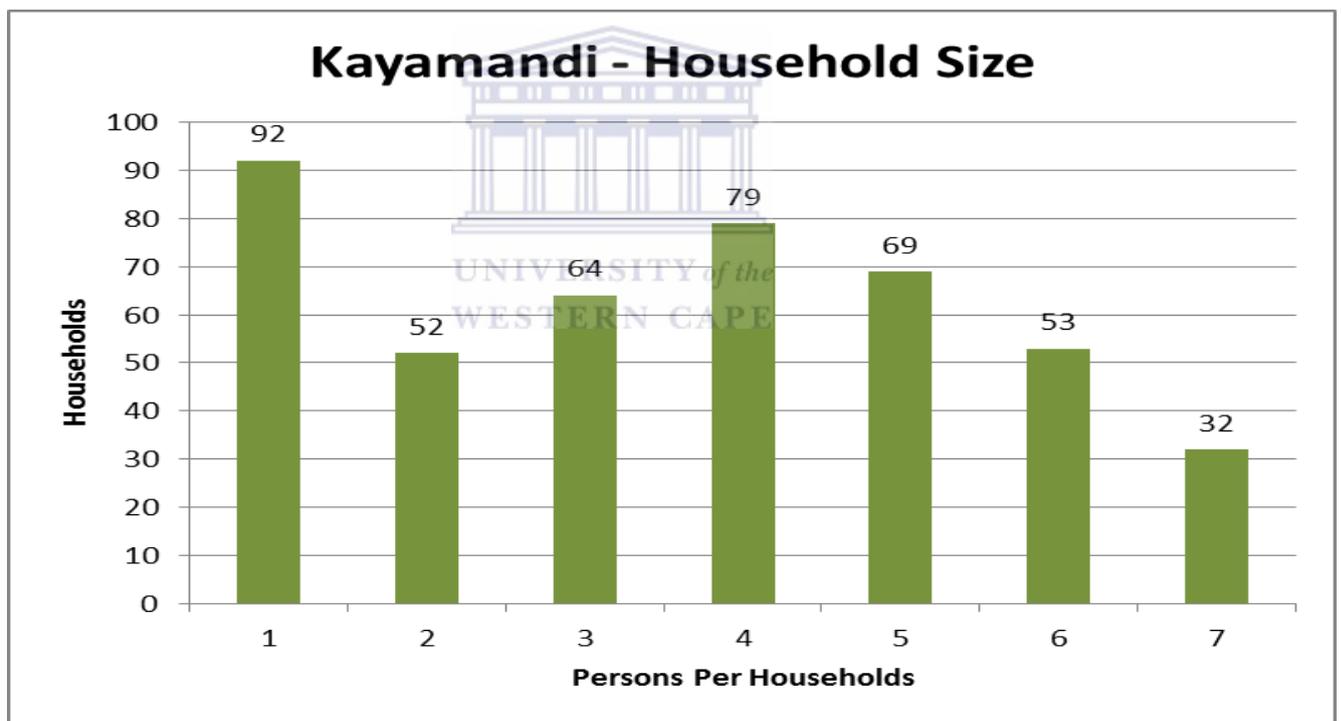
Source: Statistics SA, Census Data 2001

**Figure 2: Kayamandi - Population and Dwelling Type**

According to Census 2001 data (Statistics SA 2001), the majority of the residents within Kayamandi occupied informal dwellings (48.81%), such as those found in informal settlements/squatter camps. Housing type, as Cutter et al. (2003:25) observe, is a factor that influences and causes relative social vulnerability. Therefore, seeing such a large amount of

informal households would be alarming if the persons within those households had to be relocated due to the loss of their residence through natural or anthropogenic events.

The number of people that live within a household is a good indicator of household resource sharing. The greater the amount of persons per household can have a positive or negative influence on people living within that household. The manner in which household population size influences resource sharing can be attributed to the economic standing of the household. For instance, there could be dual scenarios for either a household with low or high household population. Households with a low population and low financial income causes stress on their vulnerability. Households with a high population and low financial income have an increased risk of vulnerability as the types and amounts of resources that contribute to their initial coping mechanisms are less than that of higher financial income households and they have a higher dependency ratio than smaller low income households.

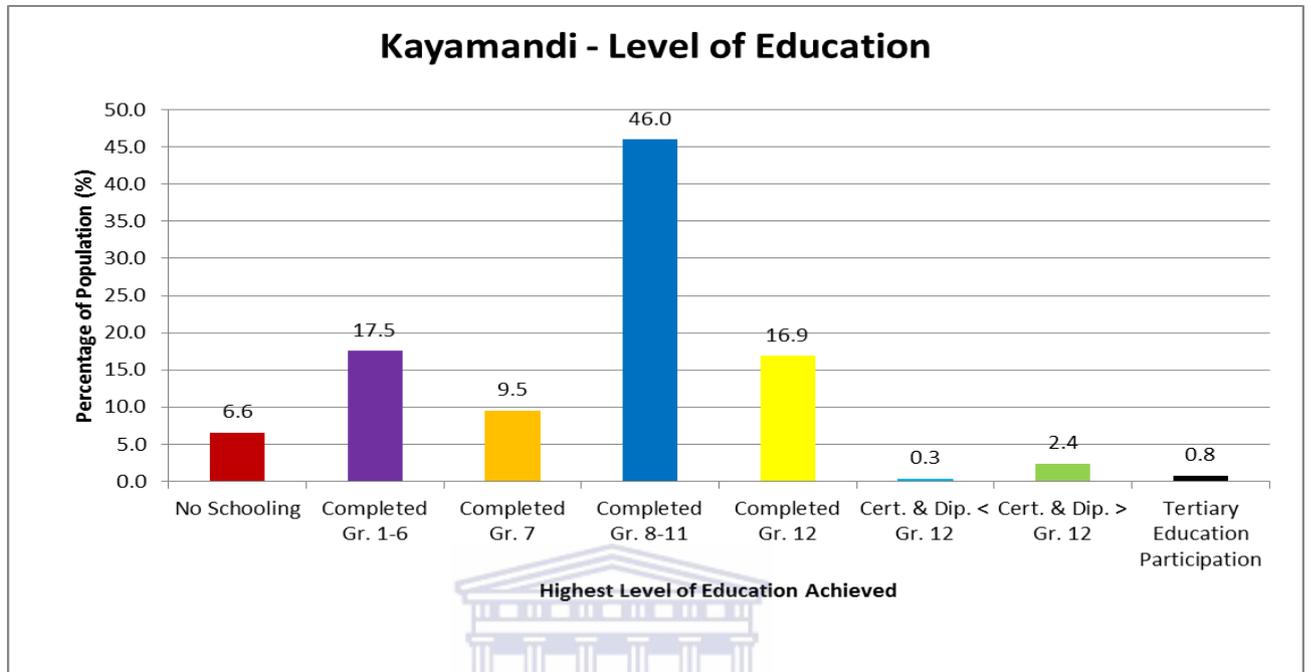


Source: (Statistics South Africa, Census 2001). Note: If calculated, number of persons in households multiplied by household size will not render Kayamandi population

**Figure 3: Kayamandi Household Size**

Finally, below is an indication of the highest level of education achieved within the Kayamandi population (Statistics SA, Census 2001). The graph indicates that majority of the Kayamandi population (45.98%) were able to achieve an education greater than the accepted basic level of education (i.e. Grade 7). This indicates that majority of the population are

literate. There is a drop between those that completed Grades 8 – 11(46%) and completed Grade 12 (16.9%), and only 3.5% of the population have an education greater than Grade 12 (which includes tertiary levels of education).



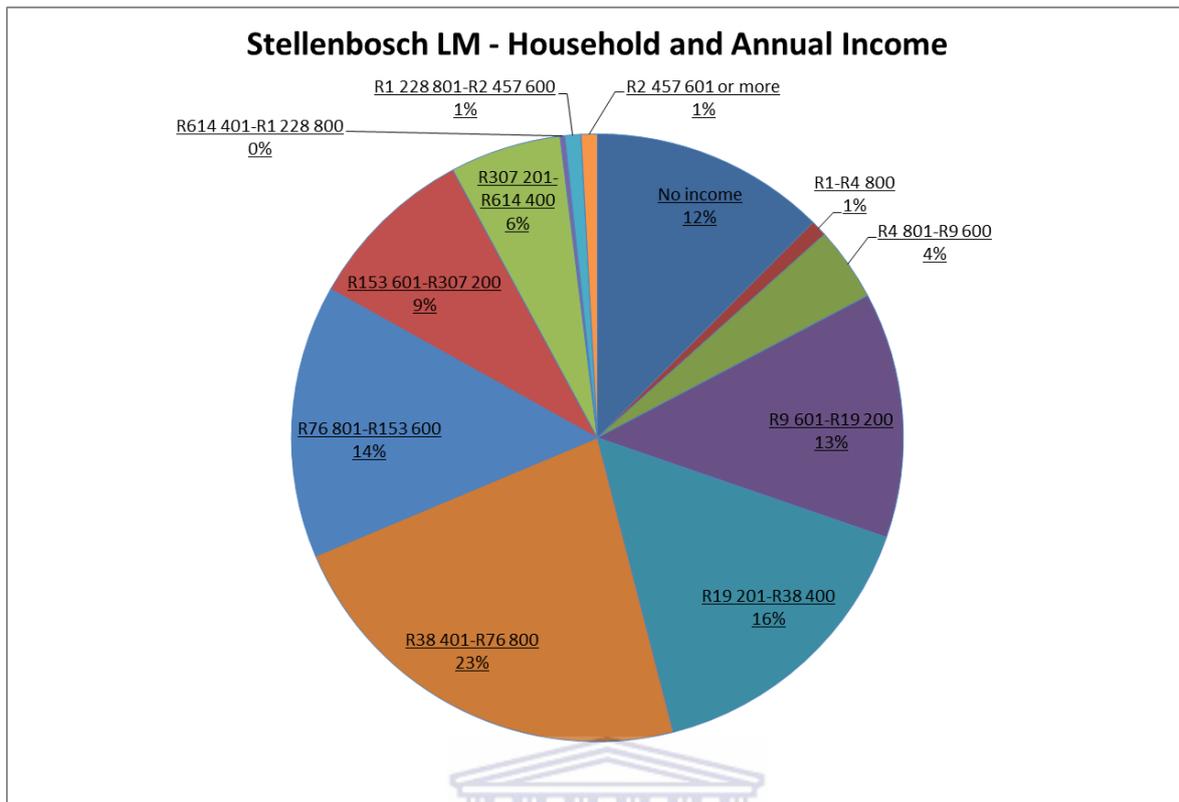
Source: Statistics SA, Census Data 2001

**Figure 4: Kayamandi Population - Level of Education**

### 3.2.2 Household Annual Income

A study done by the Department of Theology (Stellenbosch University) and Transformation Africa (Stellenbosch University, undated), utilising Census 2001 data found that households within Kayamandi could expect an annual average income of R 0.00 – R 60,438.35.

Fortunately, Stellenbosch Municipal data is available through the Community Survey 2007 (Statistics South Africa, 2007), and from this we may make certain inferences. In 2007, 23% of economically active persons in SLM received R38,401 - R76,800 per annum. This translates to an average of R4,800 per month. This is the income category where the single highest percentage of income earners are grouped, but the largest cohort of income earners within the SLM received an income between R9,601-R19,200 and R19,201-R38,400 per annum, which equates to 29% of the total Municipal population. This gives this group an average income of R2,400 per month. When one adds this income category to the 12% of the population that do not earn an income, we see that the ability of households to cope with external stress is limited.



Source: Statistics SA, Community Survey 2007

**Figure 5: Stellenbosch Local Municipality - Annual Household Income**

The average annual household income as stipulated through the study done by Transformation Africa and the Dept. of Theology (Stellenbosch University) correlates – to a certain extent– with the results of the Statistics SA Community Survey (2007).

### 3.2.3 Experience of Disasters

In 2004, the Watees Consortium undertook an assessment of disaster management within the SLM entitled: “*Disaster Hazard, Vulnerability and Risk Assessment for Stellenbosch Municipality*” (Watees Consortium, 2004). This report looked at hazards and risks within SLM and considering which ways they may cause vulnerabilities to the municipality and its residents. There are numerous hazards that may lead to vulnerable situations (see Appendix G).

They noted that flooding within the municipality was and will always be a hazard that the municipality will be faced with (*Ibid*). Such reoccurring flooding could be due to failing stormwater infrastructure that is incapable of extracting/detouring surface water. The Consortium also states that, excluding veld fires which have a greater potential of occurring during the dry seasons, fires also pose a serious threat to informal settlements. The

authors(Watees, 2004) state that the lack of proper infrastructure, the type of building materials being used, and the use of fossil fuels as a primary energy source in such settlements, together contribute to the probability of a fire hazard occurring within the community. It is essential for informal settlements, such as that found in Kayamandi, to utilise proper materials and maintain safe keeping and use of their primary energy sources (Watees Consortium, 2004: 62-65).

A map (Figure 6) produced by the National Disaster Management Centre (NDMC) coincides with the information gathered by the Watees Consortium. It shows that most disaster events within the SLMare flooding and fires. The map also shows that the majority of the events in the SLMare reported in and around the town of Stellenbosch.



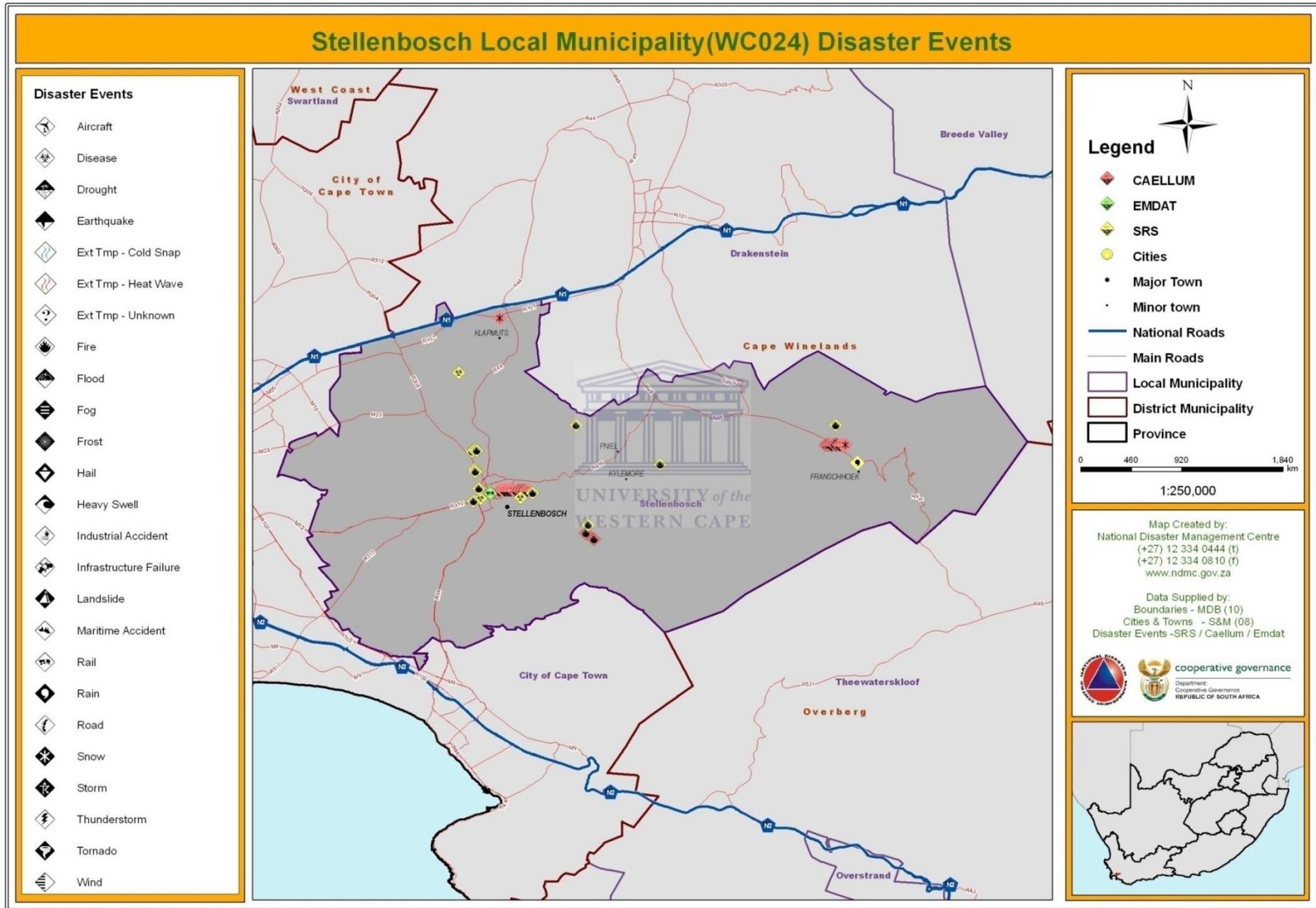


Figure 6: Disaster Events in SLM

### 3.3 Participants

The researcher identified and made contact with various institutions (municipal departments), stakeholders and key role-players that were needed to successfully complete the study.

Different manners of capturing information and data were used. The various entities and the manner to which information and data collection took place included:

- **Community/inhabitants of Kayamandi:** The researcher identified the study area which has residents in various circumstances and levels of indigency, although the study aims to identify levels of vulnerability within the study area. A purposive sampling method was utilised for collecting data at this level. Characteristic of purposive sampling, the focus of this part of the research done in the study area was on the inhabitants and not the number of households sampled (Mack et al., 2005). Therefore, the households surveyed are not necessarily a true reflection of the Kayamandi population. As this thesis concentrates on the social impacts of vulnerable communities due to disasters, the researcher attempted to interview 50 households across the three Wards that comprise Kayamandi (i.e. SLM Wards 13, 14 and 15), but could only complete interviews with 47 households. The researcher selected a location within each ward and began surveying every 5<sup>th</sup> household from that location in either direction. Only households with bricked infrastructure were surveyed as surveying multiple forms of dwelling types may produce too wide a range of responses for the researcher to capture and respond accordingly to. Furthermore, and importantly, the potential vulnerability of people living in brick dwellings can be overlooked when compared to others living in informal dwellings despite their potential vulnerability.
- **Community Organisations (NGOs and NPOs):** For the purpose of not overlooking the work being done by entities on behalf of and with the inhabitants of Kayamandi, the researcher interviewed organisations within Kayamandi (Kuyasa Project and Love to Give to Children). A convenience sampling method was utilised to identify who to interview. Although Kemper et al. (2003:280) note that such a sampling method can result in ‘spurious conclusions’, the researcher found that the experience gained of previous in-field data capturing helped to produce genuine results from these interviewees.

- Responsible authorities: Chapter 2 of the Municipal Systems Act (No. 32 of 2000) describes the roles and responsibilities of the municipal council, its officials and members of the community within the municipality. Administratively (amongst other duties as outlined in Chapter 2, section 6(2)(a)), municipal officials must be responsible to the needs of the local community. Therefore, this section considered municipal officials that function within departments relating to Engineering: Water Services, Disaster Management Centre, Community Development, Community Services, and Housing: Informal Settlements. For this group, the researcher utilised the snowball sampling method. The reason for using this method was that it was an essential tool in uncovering persons that the researcher would not normally have been able to reach or identify through other sampling methods (Macket al., 2005). Therefore, the researcher explored the social and institutional networks of contacted personnel, in the aforementioned departments, in order to attain data and information at this level.

### **3.4 Data Collection**

#### **3.4.1 Collection of Relevant Data for GIS**

##### **Attribute Data**

Primary attribute data was created for the households that were surveyed by the researcher in order to maintain the associated information of each household that participated within the questionnaire. For example, the researcher coded households within Kayamandi as K (to represent households within Kayamandi). The number associated with this acronym then helped identify the households, e.g. K28 would refer to the 28<sup>th</sup> spread sheet that holds attribute information about that specific household in Kayamandi. Other secondary attribute data that the researcher utilised were the geographic locations and specifications of amenities situated within and around Kayamandi. The reason for obtaining such attribute data was that the database in which such attribute data is stored in would assist in the conversion of data into information with value (Heywood, et al., 2006:111).

##### **Spatial Data**

Spatial data was obtained from various sources. Public custodians of these sources of data include the Stellenbosch Local Municipality, the National Geo-spatial Information Directorate, and the National Demarcation Board. Spatial data included maps that represented infrastructure, and the built and natural environment. Other spatial data included boundaries

associated with demarcated land-use activities as well as other municipal areas. The spatial data can be characterised by the information it is able to retain about a specific location's position, the connection this location has with other features and boundaries and as well as be able to retain details of other non-spatial data (Burrough, 1986, Department of Environment, 1987 cited by Heywood, et al., 2006:21). The researcher utilised spatial data that can best describe the real environment within a GIS.

The researcher geographically represents vulnerable households through collecting information with a series of questions posed to inhabitants of Kayamandi. Indicators at this level included household population, dependency ratio, female headed household, household type, tenure status, water accessibility, number of disastrous experiences, and community meeting attendance. Selected households that experienced a greater amount of effects were represented as highly vulnerable. Visually, different icons were used to illustrate surveyed households and which of these households were deemed most vulnerable

### **Database Management**

It was essential that the data utilised for this study be easily accessible for regular updating and backing up. It is important to maintain a good database management system (DBMS) that is able to reduce the problems and risks associated with DBSM up-keeping. These problems may include duplication, data sharing difficulties if common codes are not used as well as increased maintenance costs (such as time costs) (Heywood, et al., 2006:111-112). Thus, the researcher utilised and created a DBMS that retained information according to features and entities that associated with one another. For example, the researcher created a reference of the Kayamandi area then a sub-reference with other information such as demographics, imagery, and datasheets that relates to this location. It is ideal for the researcher to retain an electronic or computer based database in order to achieve maximum advantages. These advantages include (Heywood, et al. 2006:113):

- Access to database through various methods,
- Electronically, it is possible to store data independently from the applications for which it would be used,
- Instances of data duplication would be reduced,
- Access to the researchers data would be centralised,
- Relatively uncomplicated to update and maintain data,
- Possible to query data through simple and standardised query languages.

By adhering to the above points the researcher is able to handle electronic documents, data, spatial and attribute information as well as query the data with ease.

### **3.4.2 Interview Methods and Instruments Used**

As previously stated the researcher made use of various methods to receive maximum information. Various tools for collecting data and information were also utilised.

- **Inhabitants/Residents:** Interviews consisted of questionnaires that asked respondents a series of closed and open ended questions. Interviews were undertaken by the researcher and two student research assistants recruited from the vicinity of the study area. The research assistants had to meet a set of criteria before they were employed to administer the questionnaires. These included sex (given possible security concerns only male students were selected), English language proficiency, first language comprehension and recommendations from educators. The enumerators were remunerated per questionnaire they successfully completed. They received training on the background and purpose of the study as well as how to administer the questionnaires. There was quality control of the questionnaires throughout the study.
- **Organisations and responsible authorities:** As this group of interviewees were responsible for their own departments and organisations it was necessary to conduct interviews that were discussion based. The researcher posed open-ended questions using a semi-structured questionnaire as a guideline. This allowed space for the respondent to reply and offer new information and ideas but kept the interviews within the framework of the objectives of the study. The questionnaires also meant similar questions or areas were covered by all of the key interviewees. The researcher undertook all of these interviews and due to their nature, a recording device was utilised with the permission of interviewees in order to transcribe discussions that took place.
- **Mapping of findings:** Finally, as previously noted, the researcher made use of a mapping tool – namely ESRI ArcGIS 9.3.1 – to geographically display findings within the community. This included other necessary maps.

### 3.4.2.1 Interviews and Surveys

#### Household Surveys

The interviews that the researcher conducted within Kayamandi were accompanied by a questionnaire in four sections that concentrated on what the researcher deemed as relevant (See Appendix C for a complete questionnaire). Section A, focused on the households demographic profile, dependence on social welfare, and household type and tenure status. The type of household and living conditions of the residents may influence the ability of the household to cope in vulnerable situations. Tenure status of a residence may also be seen as a manner in which coping capacity could be measured - as residents that rent may be more likely to be evicted than those that own a dwelling.

Section B, concentrated on water accessibility within the household. This section looked at where residents obtained their water from, what they used their water for, if they had ever experienced water interruptions, if they had ever used water from the Plankenburg River, if they knew of any other household that had experienced water interruptions, and what the monthly cost of their water bill was. This section was developed to identify a snapshot of water utilisation and accessibility within Kayamandi and what their response mechanisms were if interruptions do occur.

Section C related to whether or not the household had ever experienced a disaster. Disasters listed on the table were flood, fire, sickness, broken water pipes or leakages. This section of the questionnaire also aimed to establish whether or not there were certain trends with regard to the water interruptions that they may have experienced and if these instances could have been related or not. The questionnaire also aimed to establish how long the household experienced any of the listed disasters. Finally, this section aimed to identify what the households coping mechanisms were to cope with exposure to any of their listed disasters.

Finally, Section D established whether or not the household had any community involvement and public participation, as it had been noted that community involvement creates a network where households are able to find assistance and reliance. This section aimed at establishing whether or not the household member or head had ever attended a community meeting and what these meetings were about. This also provided a picture of the community's awareness with regards to current issues that the community faces. It also asked whether or not the household had ever taken part in government or non-governmental organisation (NGO) projects. This section identified the range of involvement within the community and whether

or not these households are willing or not to partake in projects that take place within their community.

### **Community Based Organisation Interviews**

It is possible for a community to become less vulnerable if the community has other networks that are able to assist the residents with either social interaction or skills development.

Therefore, organisations that focus on such activities and are based within Kayamandi could benefit the community to an extent greater than individuals or households are able to do on their own. The questionnaire posed to such community organisations had four sections (see Appendix D).

The first section concentrated on the background of the organisation and the people that work within the organisation. It was also essential to know the types of projects that the organisation focuses on as this illustrates their general sphere of expertise. This section also established the organisations view of how the community perceived projects that are implemented in Kayamandi and the funding sources of these projects.

The second section of this questionnaire concentrated on the involvement that the organisation has with the residents of Kayamandi. There are many instances where community members feel that organisations do not have a broad reach and that not everyone enjoys the benefits or such organisational involvement. Therefore this section drew out information about where the majority of the organisations work takes place and what the impacts of their projects were on the residents.

The third section concentrated on the role of the community organisation and whether or not, through their projects, they have assisted the community in increasing their coping capacity against social vulnerability, disasters and risk. This section also focused on the organisation's ability assist others through the communications channels that make them aware of possible disastrous events.

Finally, the fourth section asked about the involvement that community members have within the organisation and tapped into their public participation. This section gathered information that concentrated on meeting attendance, project involvement of the community and the organisation's involvement in government run projects. With regard to water accessibility, the researcher posed a question that assisted in understanding the community organisation's perceptions of water accessibility within Kayamandi.

## **Responsible Authority Interviews**

With regard to water services and disaster management within Stellenbosch, the first point of contact for the Kayamandi community would be the SLM. Within the SLM the researcher was able to hold interviews with key personnel within the Water Services (Engineering) Department, Disaster Management Centre, Community Development Department, Community Services Department and the Housing Department. Appendix F provides the questionnaire used for responsible authorities.

The first section of the questionnaire asked for background information on the department in which the responsible person is placed and about the interviewee including their academic background and what their position within their organisation entailed. Other information gathered within this section included the departmental objectives, area of responsibility, stakeholder interaction and the projects that these interactions are based on.

Section B was separated into two segments (B.1 and B.2) that focused on the Local Municipality's Disaster Management Centre and its Water Services Unit, respectively. Section B.1, concentrated mainly on the amenities and actions within the Disaster Management Centre and how they are able to fulfil these actions – such as early warning services, stakeholder engagement, DRR training, etc. Section B.2 concentrated on the available water services of the local municipality. Disastrous events can impact on infrastructure in such a way that regular services to the community may be disrupted. With this in mind this segment concentrated on maintenance, the impacts certain scenarios may have on water supplies and the current constraints that impede water service delivery.

Section C of these interviews attempted to identify the role of disaster management activity within the department – be it any of the departments mentioned above. This section mainly concentrated on the protocol followed when a disastrous event occurs and if the department includes disaster awareness in their awareness campaigns.

Finally, Section D comprised the main part of the interview. This segment identified the extent of public participation between the department and the receiving community (especially Kayamandi). Other information gathered in this section related to the size of attendance at public meetings and events as well as the role and participation of the public and other organisations within projects run by the local municipality. At the end of the interview, the researcher posed a question to encourage an open discussion about water service delivery, disaster management and risk reduction activities within the municipality.

### 3.4.2.2 Observations

Creswell (2007:134) states that there are certain steps that should be adhered to when conducting observations within a setting, including that the observer should take into consideration whether they are an insider or outsider observer. The researcher of this study was unfamiliar with the environment and setting of Kayamandi at the outset, and was therefore an outsider observer stance was taken. To gain the confidence of possible participants, the researcher was aided by two local students. They also provided an introduction to the area with regards to its social, environmental and economic settings. Creswell (2007:134) also suggests that when making observations during qualitative research, it is beneficial to record certain aspects of what has been observed. Such aspects include behaviours of informants/participants, physical environment in which the observations are taking place, particular events that may occur, activities and the researchers own reactions (Bogdan and Biklen, 1992 cited by Creswell, 2007:143).

Creswell (2007:134) states that the notes that the researcher creates during observations should include both descriptive and reflective notes that depict the researcher's experiences, feelings, intuitions and what had been learnt.

### 3.5 Method of Analysis

Due to the relationship that the researcher has with Umvoto Africa, the researcher made use of a method of analysis that is consistent with that of Umvoto Africa. This was to use the HFA and its Priority Areas as a means to analyse the availability of coping capacities (within the institutional and public domain) and to find the gaps that may ultimately expose the vulnerability of the Kayamandi community.

Appendix B clearly outlines the core tasks that need to take place within each Priority Area. The Indicator identifies which plans have to be present in order to fulfil the Core Task. Therefore, to qualitatively analyse vulnerability in Kayamandi, the researcher identified and marked off all plans that are in existence. If a gap was found, where a plan has not been put in place that caters for the required Core Task, it indicated that Kayamandi would be deemed vulnerable with regards to that specified outcome, unless the outcome has already been stipulated within a document that combines various outcomes.

For example, HFA1 has four Core Tasks that should be met to reduce vulnerability to a minimum. Therefore, if HFA1 concentrates on multi-stakeholder dialogue, mechanisms for systematic coordination and assessment and developing an institutional basis. If these are in

existing plans but there are no appropriate and allocated resources for these plans to be put into practice, then it would impair all the other processes that are needed to reduce vulnerability.

Other indicators at the micro-level that the researcher utilised included: ·Household Income · Tenure Status · Sanitation · Refuse Removal · Health · Education · Literacy Levels · Dwelling Type · Social Dependency · Employment/Skills Development · Family Structure · Water Supply · Gender · Age · Population Distribution.

### **3.6 Ethical Considerations**

For the duration of the study the researcher maintained responsibility for the information gathered during the data collection and dissemination phases of this study. The researcher abided to the Code of Research Ethics as set out by the University of the Western Cape and was granted approval to undertake the study. Prior to interviews taking place, participants were informed about the study and prior consent was then sought. The participants were informed about their right to anonymity (See Appendix B.1 and B.2 for the consent forms for participants).

The researcher understood that some questions would be considered as sensitive. Therefore, the researcher provided an information statement and a verbal overview of the study to allow participants to fully understand the scope of the study. Interviewees were also informed that they could stop the interview at any time and did not have to answer any question they did not want to.

The researcher has preserved the anonymity of the respondents as far as possible. Numbers or aliases were assigned to participants (Creswell, 2007:141). This ensures that no names or details of the participants could be disclosed to other parties.

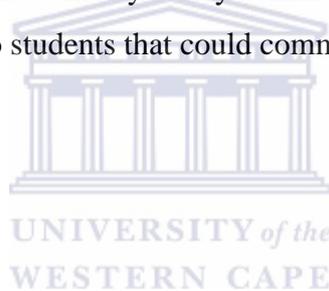
### **3.7 Limitations of the Study**

It was found by the researcher that the SLM does not have adequate technology to allow for data and map representation and acquisition. Although personnel within the municipality state that there are certain steps that are taking place towards that goal, there was no possibility of obtaining certain data and geographical information from the SLM. The researcher relied on national departments to gain access to relevant GIS data and information. Data was not always available at a scale relevant to this study and this had a negative impact on the ability of the researcher to produce certain relevant maps.

Through the selection of particular types of dwellings (brick infrastructures) the researcher is not able to comment on the vulnerability of people living in other dwelling types such as informal settlements in Kayamandi. The understanding of vulnerability, concepts and the methodology could be applicable to other types of households.

With regards to information sharing, communication is vitally important. The researcher struggled communicating with the various departments of SLM for interviewing and information gathering. Either information was never shared, or the response time of the responsible personnel to requests was extremely long.

Although the researcher did make provision for the possibility of a language barrier between residents and the survey by recruiting and training students from the Kayamandi community, the language barrier was still present. This limitation was more prevalent through the understanding and defining of phrases such as Disaster Management and Risk Reduction, as these terms are not commonly utilised in day to day communications. Therefore, for these situations, the presence of the two students that could communicate with the residents was an added advantage.



## Chapter 4

### Research Findings

#### 4.1. Introduction

This chapter presents and analyses the findings of the research focusing on the results of the interviews with households and organisations in the Kayamandi community and officials of the SLM. The chapter focuses on the following issues:

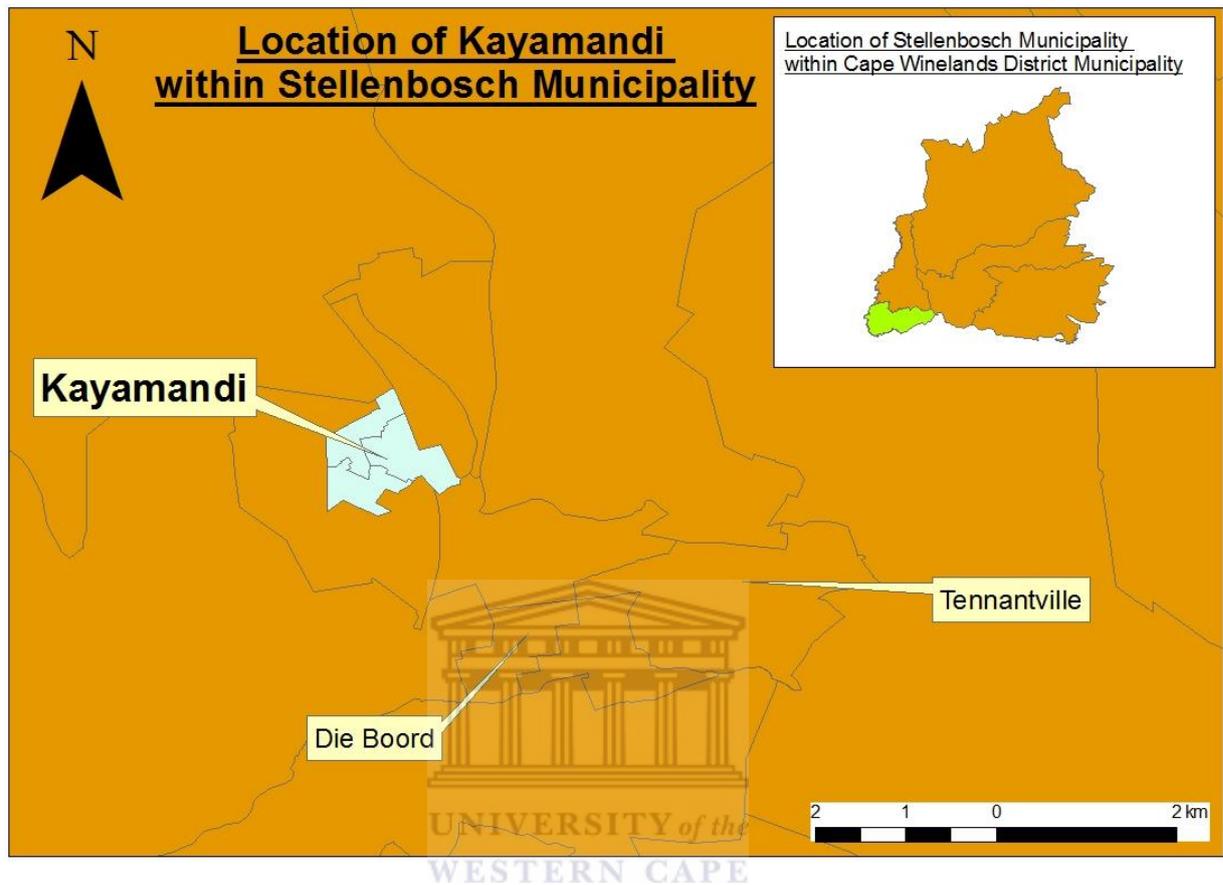
- Household water accessibility,
- Water utilisation,
- Water Interruptions, causes and coping mechanisms,
- Occurrences of selected risks, and
- Community Participation.

The chapter starts by highlighting the findings from the household survey establishing certain demographic and household information. The next section examines water utilisation and extent of preparedness with regards to water interruptions within the households and community. This is followed by an exploration of the findings with regards to possible experiences of selected disasters and the possible implications that such disasters could bring to the household. As participation within a community establishes community cohesion and can build social capital, the findings presented in the next section help in understanding levels of community cohesion and participation within Kayamandi. The vulnerability of households established through this analysis is presented spatially using a map. Finally the chapter illustrates and analyses municipal preparedness relating to policy and legislation within the scope of the HFA.

#### 4.2. Household Analysis

The Kayamandi settlement was established prior to the Group Areas Act ( No. 41 of 1950), but racial segregation was already prominent at this time as black people living within Stellenbosch at that time (1930-1940) were moved from various locations, such as Platteklip Farm, “to the north-western outskirts of Stellenbosch” (Lindner, 2009:54). Even today, we are still able to see the effects of the then laws of segregation, through racial demographic segregation and the imbalances of socio-economic levels. Kayamandi mainly consists of a

black African population (that comprises of 97.36% of the population), other than this the coloured and white population are minimal (respectively, 2.56% and 0.08%).<sup>13</sup>



**Figure 7: Location of Kayamandi (33°55'8.073'S, 18°50'47.589'E)**

#### **4.2.1. Demographics and Socio-economic Status of Households**

The researcher was able to conduct 47 interviews during the household survey. Through the survey, the researcher was able to deduce the following demographic information. With regards to the households surveyed, the respondents sex and age representation are shown in Table 6 and 7:

<sup>13</sup><http://census.adrianfrith.com/place/10806>

**Table 6: Sex of Members of Surveyed Households**

<b>Sex</b>	<b>Number</b>	<b>Percentage of household members</b>
F	122	58%
M	90	42%
<b>Total</b>	<b>212</b>	<b>100%</b>

The results of the household survey indicate that 58% of the population within surveyed households were female, and males constituted 42% of those households surveyed. Table 7 shows that a third of the household members were under 18 years of age.

**Table 7: Age Distribution of Members of Surveyed Households**

<b>Age Group</b>	<b>Number of Persons in Age Group</b>	<b>Percentage of Surveyed Population</b>
0-6	30	14%
7-13	21	10%
14-17	19	9%
18-35	81	38%
36-65	56	26%
66<	5	2%
<b>Total</b>	<b>212</b>	<b>100%</b>

Table 8 below shows the highest level of education achieved by household members where respondents could provide information. It is recognised that those persons with a level of education above Grade 7 should be considered literate (DPLG, 2005b:8-9). However, literacy, social awareness and education programmes within communities such as Kayamandi may have improved levels of literacy for those who did not complete Grade 7.

**Table 8: Education Status of Members of household of Surveyed Households**

<b>Highest Level of Education Achieved</b>	<b>No of Persons</b>	<b>Percentage</b>
No School	10	6%
Some Primary	22	13%
Completed Primary School	2	1%
Some High School	66	40%
Completed High School	32	19%
Tertiary Participation	34	20%
<b>Total</b>	<b>166</b>	<b>100</b>

From the table above, it is possible to establish that a high number of individuals have successfully completed Grade 7 and attained some high school education. At this level of education (and above) it could be said that the majority of the members of households surveyed have received basic levels of literacy. Unfortunately, 32 members of the households surveyed show an indication that they have not successfully reached a desired level of literacy.

From the survey it is also possible to deduce the number of employed and unemployed persons there were within the sampled households.

**Table 9: Employment Status of Members of Surveyed Households**

<b>Employment Status</b>	<b>No. of Persons</b>	<b>Percentage</b>
Full-Time	61	46%
Part-Time	13	10%
Unemployed	60	45%
<b>Total</b>	<b>134</b>	<b>100</b>

Note: This table shows the number of people in the employment market including some who were under 18 years of age but who had left school.

Table 9 above shows that 46% of the economically active population were employed full-time with a further complement of 10% with part-time employment. When questioned about

employment type, 56 members of the households surveyed worked in the formal sector and 15 within the informal sector. Working against these percentages of those in employment are the amount of household members who were unemployed (45%), and (as represented in the age distribution tables) the number of household members who were below the age of what is to be considered economically active. This data indicates high dependency ratios on those who are employed.

With regards to access to social welfare, twelve of the households surveyed said that they received either or both old age grants (or pensions) and child support grants (See Appendix A for qualifying criteria).

**Table 10: Household Access to Social Welfare**

Household	K01	K03	K15	K16	K22	K23	K25	K26	K29	K30	K36	K38	Grand Total
<b>Grant Type</b>													
Child Grant		1	1	4	1	1					1	3	12
Old age	2		1		1		1	1	1	1			8
<b>Total</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>20</b>

Table 10 indicates that there are certain households within the survey that receive more than one grant per household. For instance, K16 and K38 receive four and three child support grants per month respectively, whereas households K15 and K22 receive both child and old age grants. This does raise the question whether these households that receive numerous and various grants are dependent on these “incomes” and how, if by any means, are they able to supplement and sustain their livelihoods during the month if they are solely dependent on the grants for income.

Housing stock (dwelling type) is a very important aspect with regards to the resident’s ability to respond to vulnerable situations (Cutter, et al. 2003:251; Zakour and Harrel, 2003:28).

Table 11 shows the results regarding the dwelling type of households interviewed.

**Table 11: Dwelling Type**

<b>Housing Type</b>	<b>No. of Households</b>
Brick house in separate yard	27
Semi-detached brick house	19
Backyard dwelling	1
<b>Total</b>	<b>47</b>

Not only do Cutter et al. (2003:251) state that dwelling type should be regarded as an important factor that influences and causes relative social vulnerability, but that type of ownership should also be regarded with the same importance. Table 12 shows the tenure type of households interviewed. It shows that almost three quarters of households interviewed do not have to pay rent or bonds.

**Table 12: Tenure Status of Surveyed Household**

<b>Tenure Status</b>	<b>No. of Households</b>
Occupy rent free	10
Owned fully paid	25
Rented	7
Owned not paid off	5
<b>Total</b>	<b>47</b>

Not only is housing stock seen as an important factor in the context of this study and assessing vulnerability (as housing stock is regarded as a composite factor that influences and may cause a relative level of social vulnerability as identified by Cutter *et al.*, 2003:251) but it is also an important factor for responsible authorities. In the quote below, interviewee RA04 stipulates the importance of home ownership and points to three other significant components with regards to home ownership, i.e. economic security, physical security and emotional security.

*“Having a place to stay, having a place from where you can operate. You cannot look for a job if you don’t know where [you are] going to sleep tonight then your first priority is going to find a place to sleep tonight ... The one is the physical need to feel*

*safe, and to be dry in winter specifically, in the sense of being protected. The emotional component, to have a sense of belonging, to have a permanent address that I can put up if I want to open an account somewhere fall under those kind of things. An asset financially. So in terms of poverty alleviation it contributes on a physical way as well as an emotional way and - this is who I am.”*

Each household within Kayamandi has a unique situation that influences the manner in which they utilise their resources, their level of social vulnerability and how they are able to initiate coping mechanisms in response to possible disasters. The sections that follow analyse the survey data further and incorporate responses from responsible authorities about their respective areas of responsibility.

#### **4.2.2. Water Accessibility in Kayamandi**

##### **4.2.2.1. Access Points**

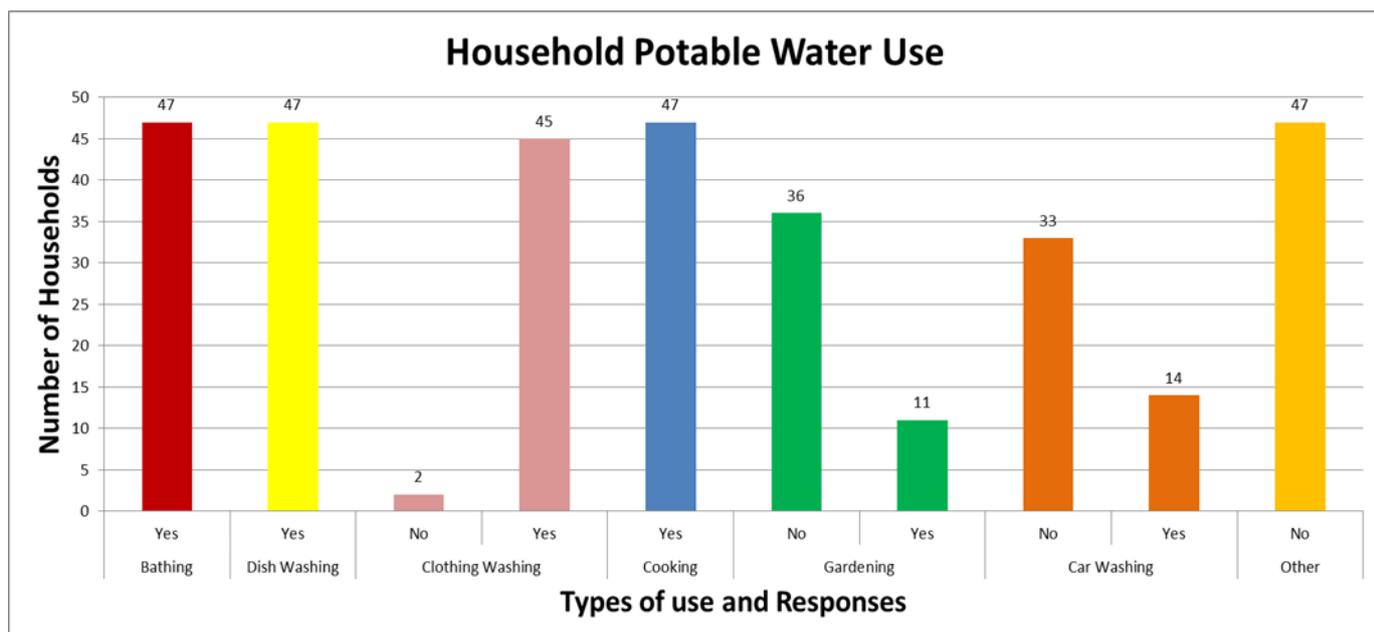
Most of the households surveyed are able to access their water from inside their dwelling. Only two households (4%) had to access their potable water from an in yard standpipe. This already indicates the state of water infrastructure inside households as one of these households is a made of a brick infrastructure and the other a back yard dwelling. Although there are many households with inside dwelling water accessibility, the service and household situation across the households surveyed with regard to accessing water will become apparent in the following sections.

**Table 13: Water Accessibility of Surveyed Households**

<b>Water Access Points</b>	<b>No. of Households</b>
In yard stand pipe	2
Inside Dwelling	45
<b>Total</b>	<b>47</b>

##### **4.2.2.2. Potable and River Water Usage**

The graph below shows households interviewed utilise water for the identified basic activities as well as those households that do not.



**Figure 8: Activities related to potable water use**

Each household in the survey in Kayamandi utilise their household potable water supplied by the municipality, however not each household consumes their water in the same manner. Households within the sample have varied amenities that require specific utilisation of water. For instance, 11 and 14 of the households surveyed use potable water for irrigation and car washing purposes, respectively. The assumption is that these households would then have relatively higher household water consumption and income to pay for it than the other households.

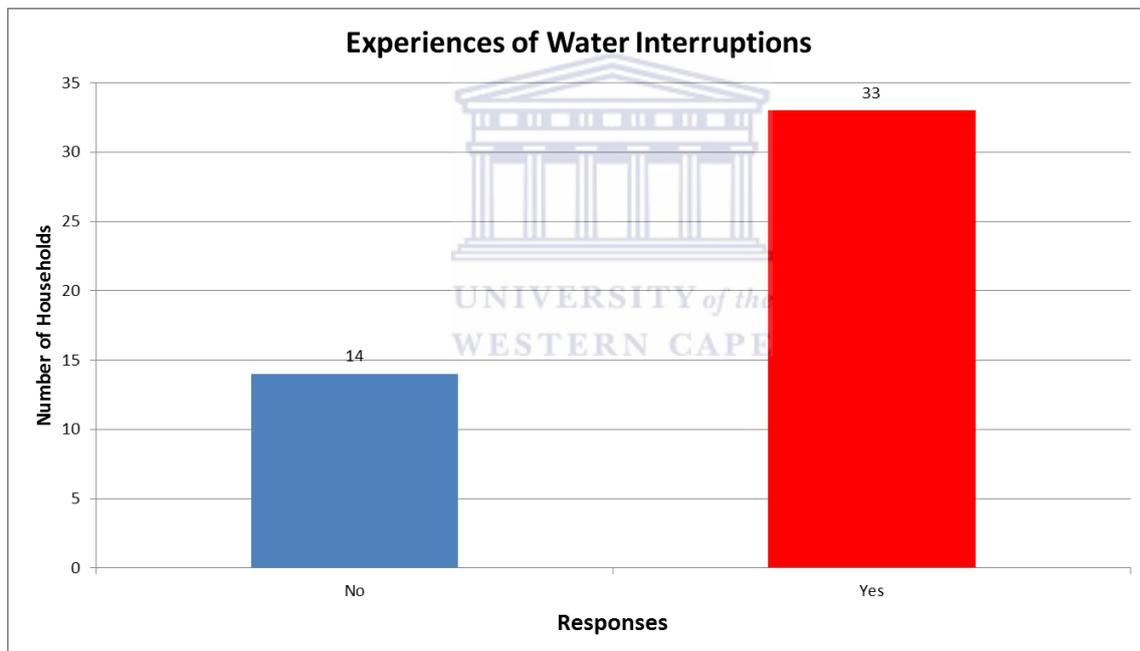
During the research one household (K15) was identified that utilised water from the Plankenburg River for clothes washing activities. This raises questions about affordability of water as the household was likely to be trying to save money and/or keep within the free basic water allowance. The use of the Plankenburg River may have a negative impact on the health of K15 as there are health risks associated with using unprotected water sources as they are “open to contamination and therefore carry health risks” (Thompson, J. *et al.* 2000:47). And, as noted above previous research has found unacceptably high levels of *E. Coli* bacteria and other viruses in the Plankenburg River (Barnes et al., 2004, 2005). With reference to water use in East Africa, Thompson et al. (2000:48) found that it is not uncommon for households to utilise different water sources for different activities. So, with reference to K15, the household used water from the river for clothes washing, but potable water for cooking and dish washing. With the current state of water availability, the concept

of variable water source usage is promoted, but it should be the onus of the responsible authority to educate communities on which types of different water sources are viable options different activities taking into account economic, environmental and health factors.

#### 4.2.2.3. Water Interruptions

One of the many frustrations related to water accessibility is caused by household water interruptions that cannot be controlled by the household. Such factors may include municipal water works on the water infrastructure or treatment work, or that household water interruptions were caused by natural effects.

Figure 9 shows the households surveyed that had experienced water interruptions before April 2011. It shows that the majority of the household's surveyed (33 households) had experienced some form of water service interruption.

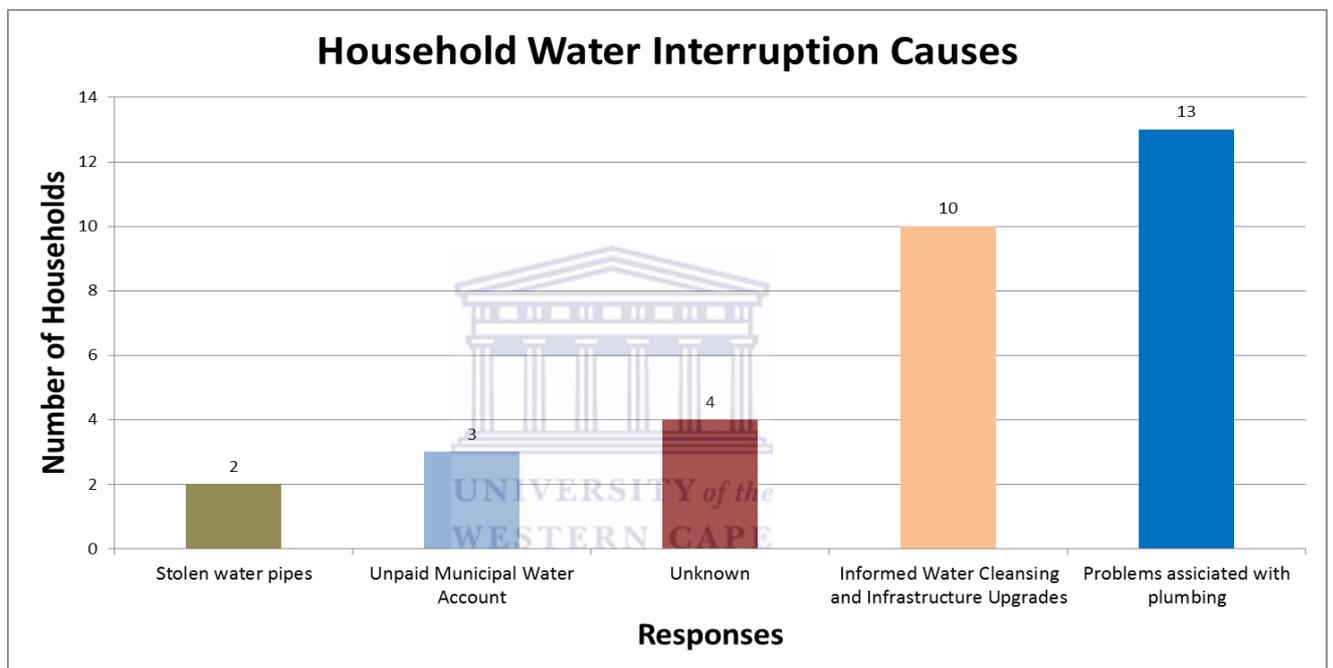


**Figure 9: No. of Households that experienced water interruptions**

From a household perspective, the researcher has gained insight as to the causes of these water interruptions (Figure 10). The majority (thirteen households) of these interruptions were caused by problems associated with plumbing within the household – burst pipes were included in this scenario. This could indicate that the household plumbing networks were installed below standard and thus many households experienced interruptions caused by problems associated with plumbing. It could also relate to problems associated with infrastructure use on behalf of the household. Such misuse may include irregular fittings on

plumbing infrastructure, replacing fittings with faulty parts, or temporary fixtures (by the household) being used for prolonged periods of time. Poor maintenance of plumbing and the use of inappropriate fixtures may also reflect low household incomes where households cannot afford the proper part or a qualified plumber to mend or install components.

Figure 10 shows that there is a certain degree of criminal activity within the community that has affected the water supply and water infrastructure of some households (2). This is because copper fittings used in the household plumbing networks can be and are being stolen by criminals to sell for profitable gain.



**Figure 10: Identified causes of water interruptions through household survey**

On a positive note, there are the instances (10 households) – second to the majority – where the households were informed about household water interruptions from the water service authority. This then indicates that there instances where the WSA takes the necessary steps to include the community in their plans regarding water and communicates such plans with the community. It also suggests that the WSA is attempting to maintain and upgrade the water infrastructure. However, further limitations are set upon the SLM if their water treatment works (WTW) should experience any form of event that may cause an interruption. The following has been stated by RA05:

*“Let’s say there’s a failure, your reservoir should have enough backup water for the next 48hrs or maybe 36hrs. That is where we’re lacking. So if the WTW is up and*

*running, there is no problem, but as soon as we have an interruption on our WTW then our reservoir system is not big enough to cater for long periods.”*

Therefore, even though households may be able to incorporate coping mechanisms to relieve experiences of water inaccessibility, there is a bigger risk to overcome and that require ensuring the infrastructural reliability of the responsible authority.

As previously discussed, within poor communities there are certain constraints with regards to their financial and economic standing. Three households stated that their water services were interrupted due to unpaid municipal accounts. As stated within section 2.3.2 of this document, water services limitation and cut-offs are possible within the SLM through their *Credit Control and Debt Policy* (Stellenbosch, 2008b), as long as these actions are in accordance with the appropriate legislation, i.e. National Water Services Act (No. 108 of 1997, Section 4(3)). The use of the Plankenburg River by household K15 also indicates that just because a household has potable water supply, and even a free basic water allowance, water may still not be sufficient or affordable, due to the tariffs set upon the services, for poor or indigent households.

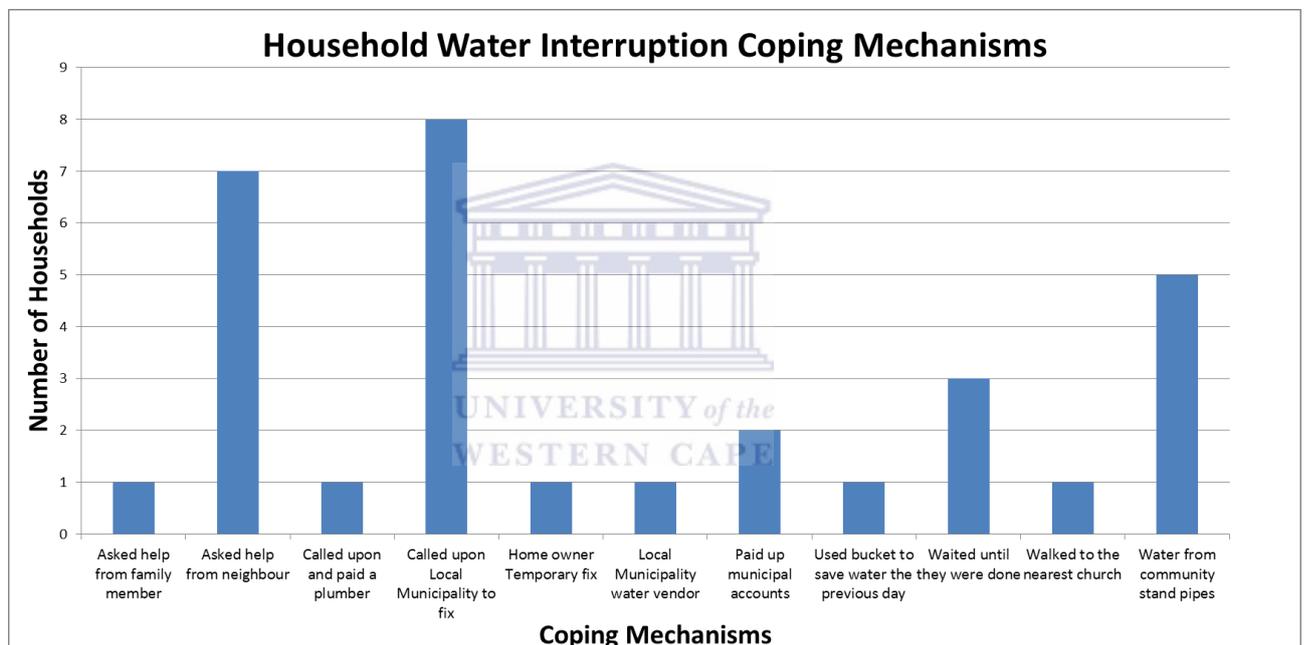
During an interview with RA05 it was stated that, from an infrastructural point of view, vandalism and theft of SLM infrastructure within Kayamandi are the main causes of water interruptions experienced within the community:

*“We’ve got a new system the only times when there were interruptions would be when there were interruptions due to vandalism ... Vandalism and theft. Because they vandalise to steal ... Breaking into the pump stations, stealing telemetry, small copper cables, they just want to get in there so they break the whole panel...”*

Although there may only be a certain number of reasons why households experienced water interruptions, the researcher has found that within the Kayamandi community, there were many ways in which they respond to such water interruptions. The array of responses that the community has towards water inaccessibility also increases the availability of coping mechanisms within the community.

Figure 11 shows the responses towards water inaccessibility that the researcher identified within the Kayamandi community. The researcher has identified certain themes with regards to these coping mechanisms. These themes include a reliance on social capital (this includes religious institutions, neighbours, family members, or the responsible authority) and

technical/infrastructural responses (which includes self-help temporary fixes and seeking technical assistance from the responsible authority or professional services). The ability of a household to rely on social capital indicates that there is a certain level of cohesion and that the household is capable of identifying possible persons that may assist them. This theme may also indicate that the household is incapable of attaining necessary professional assistance and there may be financial constraints that won't allow the resident to obtain the necessary resources. With regards to reliance on technical/infrastructural responses, it indicates that the household (or person taking up the activity) has knowledge about the infrastructure and a certain level of skill or that the household has sufficient financial capital to obtain necessary resources to respond appropriately.



**Figure 11: Coping Mechanisms Implemented by Households**

When interviewing the households within Kayamandi, the researcher noticed that there were two distinct choices made in order to cope with water interruptions within the household. The majority of the households interviewed would rely on either asking for help from their neighbours (23%), or calling their local municipality (26%) for assistance. Other coping activities practiced within the community include the following:

- Utilised buckets to save water the previous day (3%),
- Waited until the interruption is done (10%),
- Walked to the nearest church (3%),

- Asked for help from a family member (3%),
- Obtained water from community standpipes (16%),
- Obtained water from a vendor (3%),
- Paid their municipal accounts (6%),
- Employed and paid a plumber (3%), and
- Home owner temporarily fixed household water infrastructure (3%).

Once the researcher noted that households had been able to save water the previous day, it became evident that there is some information about water interruptions being communicated to at least some households in the community. But as only a few households did so it suggests that such communications do not reach all households in Kayamandi. With regards to the 10% of the households surveyed that stated that they would wait until the water interruption is over, RA05 stated that:

*“... It doesn't take long for a team to report to a burst main and to fix, let's say in 4 or 5 hours then water is restored.”*

Although a response and repair time of four to five hours may not seem long, especially if the household is not at home during the day due to work/school commitments, it does contribute to a “fragile physical environment” (IFRC, 1996).

As noted above, collecting water from their nearest standpipe was a popular choice amongst interviewed households. During emergencies public water standpipes are advantageous, but with such advantages, these standpipes also have major disadvantages that may bring more harm than actual good. During a discussion with RA06, the researcher mentioned a statement made by RA05 who pointed out that most of the communal standpipes are situated in close proximity to ablution facilities. RA06 then said the following:

*“Which is actually bad news for us from an infection point of view because it is already a contaminated area.”*

This comment from RA06 shows that ablution facilities, in their current state within Kayamandi are not the best places to erect communal water standpipes. RA06 and RA05 were in agreement with regards to ablution facilities and communal standpipes, as RA05 stated:

*“I will say that our biggest risk is at the ablution facilities and [it's a] health risk.”*

Having water standpipes available for communal use is a great advantage to have when there are water disruptions within households. But when their use means being faced with another risk – while the primary risk of an interrupted water supply is being attended to – negatively affects the coping capacity of the household as they may be subject to and unprepared for the health risks associated with using communal standpipes in Kayamandi.

#### **4.2.2.4. Users knowledge of other interruptions**

It is important for households to know of other households that may have experienced water interruptions. This knowledge enables households to react, when necessary, if such an event does occur in their household. A lack of knowledge and awareness impedes the household's ability to implement possible coping mechanisms that may reduce their vulnerability. Among the households surveyed the majority of the households (81%) were not aware of water interruptions occurring at other households. The minority of households (19%) that did know of other water interruptions were more aware of the implications of such interruptions and which coping mechanisms to implement if they were left without water for extended periods of time.

The majority of the households that knew of other households that had experienced water interruptions were also able to identify the causes of these interruptions although two households stated that they did not know what caused these interruptions. Thereported interruptions identified by these households included:

- Broken water pipes,
- An occurrence that happened to all residents,
- Water cleansing and infrastructure upgrades,
- Informal dwelling.

It is evident, from the ability of these households to communicate to the researcher causes of other household water interruptions, that there is a certain degree of communication within the community and awareness of what is taking place within the community.

#### **4.2.3. Experiences of Disaster**

Having gained insight into the demographics, employment status and water accessibility of the surveyed households the findings related to disaster experiences and the choice of responses and coping mechanisms are explored.

#### 4.2.3.1. Types of Disasters Experienced

Within the NDMC Annual Report 2007/2008 (NDMC, 2007/2008:12) it is stated that the principle causes of vulnerability include rapid and uncontrolled urbanisation, the persistence of widespread urban and rural poverty, the degradation of the environment resulting from the mismanagement of natural resources, inefficient public policies, and lagging and misguided investments in infrastructure.

These principle causes are evident when analysing the disaster occurrences at a household level and the disaster management abilities within SLM. The NDMC has also made maps available so that there may be a geographical understanding of disasters and the frequency of their occurrences (for instance see Figure 6, p. 63). From these maps, it was possible to see the occurrence of recorded disasters within the Cape Winelands District Municipality but unfortunately the map does not stipulate the time period over which these events were recorded. From the map legend and image, these disasters include and are not limited to fire, floods, snow, disease, storms, tornadoes, and wind.

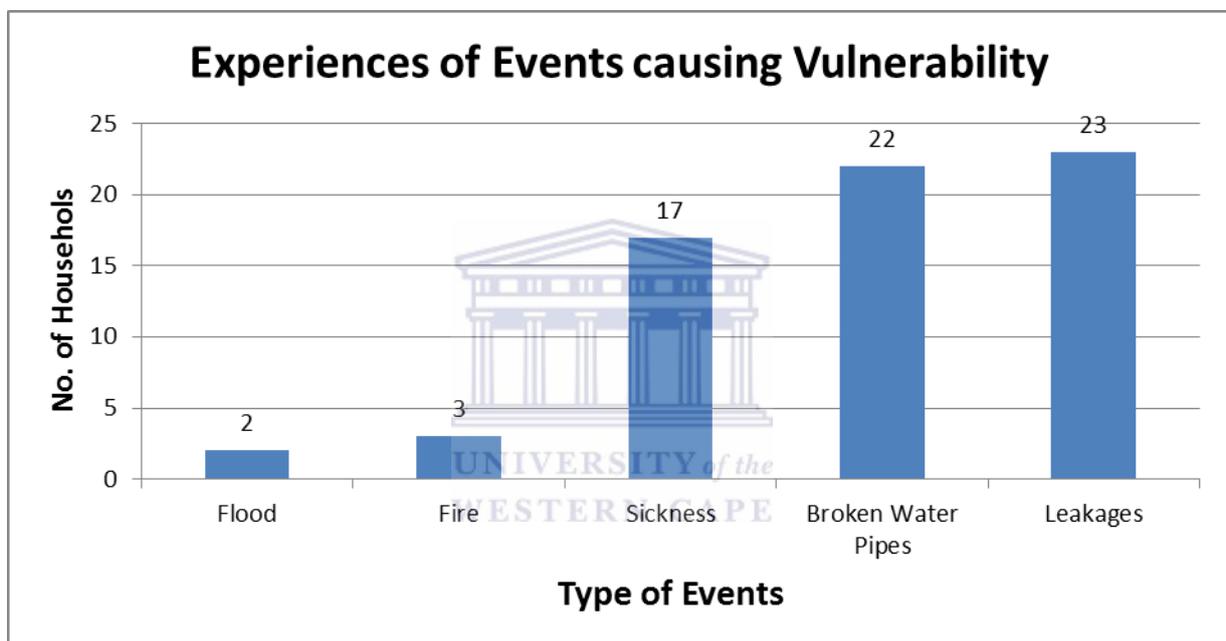
The map produced by the NDMC (See Figure 6, p 63) shows that the NDMC recorded the following disasters in the SLM related to,

- Fire,
- Flood,
- Snow,
- Disease,
- Rail,
- Rain.

When looking at the map in Figure 6 (p. 63) it is possible to see that there have been a significant number of fires recorded within the SLM. These could be contributed to by the number of informal housing settlements within the municipality that have no proper access to electricity and either rely on flammable fuels, candles or illegal cable connections for heating and lighting purposes; and also rely on flammable materials to construct their informal housing structures (Du Toit, 2009:47).

During the survey, the researcher posed questions to the households as to whether they had experienced any of the listed disasters or had experiences that may have left them vulnerable within the previous year (2010/2011). Multiple experiences of disaster increases a poor or

indigent household's vulnerability to disaster as the experience of a certain disaster may reduce their ability to cope if another threat should occur. Figure 12 shows the types of disasters and vulnerable situations experienced within surveyed households. It should be noted that although some of these events may not initially appear disastrous, for a poor or indigent household, they may be. Incidences such as sickness, broken water pipes and leakages cost money. Many wage earners, even those in formal employment, are not entitled to paid sick leave so being sick means both a loss of income, and the related costs associated with being ill. These incidents can also represent a financial shock and even disaster to the household.

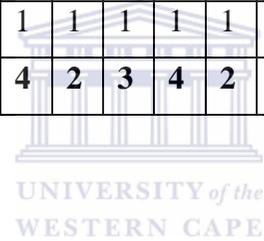


**Figure 12: Experiences of events causing vulnerability in surveyed households**

Figure 12 above shows that fewer households had experienced fires (2 households) and flooding (3 households) than sickness (17 households), broken water pipes (22) and water leakages (23 households). The table below indicates which of these households experienced such disasters. A value of 1 indicates that the household has experienced an event that could have contributed to their vulnerability.

**Table 14: Vulnerable experiences within households**

Household	K03	K04	K05	K06	K09	K11	K14	K15	K17	K19	K20	K21	K22	K24	K25	K26	K27	K28	K29	K31	K32	K33	K34	K35	K36	K38	K39	K40	K41	K42	K43	K45	K46	K47	Total	
Flood												1					1																		2	
Fire											1	1		1																						3
Sickness						1	1	1					1	1		1	1		1	1	1	1				1		1	1	1	1			1	17	
Broken Water Pipes	1	1			1				1	1				1	1	1	1	1	1	1	1	1	1	1			1	1	1		1		1	1	22	
Leakages	1		1	1			1		1					1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1		1	23	
<b>Total</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>67</b>	



When analysing the table further, it becomes evident that over half (58%) of households that experienced some sort of event had multiple experiences of vulnerability; experiencing more than one threat. Households that had the highest count of vulnerable experiences are households K24 and K27 that share vulnerable experiences of broken water pipes, leakages and sickness; but differ with regards to fire (K24) and flooding (K27). Many of the households surveyed that have gone through vulnerable experiences have applied some sort of coping mechanism.

#### 4.2.3.2. Coping Methods

Following the definition of the UNISDR of coping capacity which consists of utilising available resources and abilities to face adverse consequences (UNISDR, 2004 cited by Thywissen, 2006:13) the table below reflects the households and the coping method applied to different scenarios.

**Table 15: Coping Mechanism Applied by Households**

<b>Coping Method</b>	<b>No. of Households</b>
Informal self-repair	2
Community or family assistance	3
Visited doctor or clinic	3
Called plumber	7
Called municipality	17
<b>Total</b>	<b>32</b>

Here, the interviewed households in Kayamandi show a high reliance on the SLM for assistance, as 53% of households that were in need of assistance directed their needs to the municipality. Furthermore, Table 15 also illustrates that there is low reliance on social capital when concerning community or family assistance, whereas Figure 11 illustrates that, concerning coping mechanisms responding to water interruptions, there is a greater degree of social cohesion. Furthermore, it is also noted that a resource such as water that is freely available is easier to share than other resources such as finances and technical assistance or know how that are not as readily available to households when confronted by an event that may cause or has caused a degree of vulnerability. Therefore, it is also possible to conclude

that variances in experiencing events (coupled with the ability of the household and surrounding community to access and share resources) causes a variance in possible coping mechanisms that the household could employ to strengthen their resilience (Tol and Yohe, 2001:4).

It should be noted that these categories have been grouped according to their relevant topics. There are unique instances, such as within the category of community and family assistance. For instance, household K20 experienced a severe fire disaster and the coping mechanism that was applied by this household was to relocate the children to various other households of friends and family within Kayamandi as it was not possible for one household to host all of the displaced family.

Figure 11 displays the coping mechanisms employed when households experience water interruptions and Table 15 concentrates on the coping mechanisms applied to selected events that may cause vulnerability. Together they indicate that there are some trends that can be identified. What is evident from both scenarios is that the residents surveyed, in some instances, are required to pay for the services needed in order to regain a state where the risk of vulnerability is reduced to an acceptable state. Thus financial resources may be necessary in order to address a water interruption or other perceived disaster or event. Plumbers cost money and low-income households may not be able to afford them.

Also, both Figure 11 and Table 15 show that households have a high reliance on the municipality (26% of households regarding water interruptions and 53% regarding other events). This not only suggests that the surveyed households of Kayamandi have a high reliance on the municipality but also suggests that the SLM is able to deliver, to a certain degree, services to those that call out for it. The researcher states this as it is evident from the results that the SLM still maintains a reactive response instead of a proactive response to possible threats of events as the amount of households that had no response to the events (Figure 11, 10%) and those surveyed households that initiated self-repair (Figure 11, 22% and Table 15, 6%) suggest that the SLM does not monitor conditions as extensively, or at all, as they should.

Therefore, if the SLM initiates a proactive approach to monitoring levels of services and infrastructure in poor and indigent communities such as Kayamandi, it would be possible to reduce the effects of two of the general principles of vulnerability as outlined by Alwang et al. (2000). These are mainly the degree of risk and the household's ability to respond. The

latter vulnerability is greatly experienced by the poor as they have limited access to assets and limited abilities to respond to risk (Alwang et al. 2001:1).

#### **4.2.3.3. SLM DMC Human Capital Response**

There is a high reliance on the SLM for assistance during times of need. However, with regards to disaster management, SLM lacks human capital to respond to and investigate disasters as the department consists of only one person that is responsible for facilitating activities within the scope of disaster management within the SLM. Although there is ad-hoc assistance throughout the year from various institutions such as universities and community organizations, there is still a need for an increased staff complement for the day to day running of the disaster management department of the SLM.

Contributing to this notion, RA03 states that there is a great need for the municipality to increase expert personnel with regards to disaster management within the municipality:

*“We are still battling in terms of funds because you need the expertise from outside unfortunately, the disaster management component does not have the funds to appoint the expertise.”*

Therefore, an increase in personnel within the disaster management department is essential to increase the municipality’s ability to respond to risks that may affect vulnerable residents.

#### **4.2.4. Public Participation**

##### **4.2.4.1. Household Attendance at Community Meetings**

The households interviewed indicate that when it comes to water interruptions they rely significantly on community and family to see them through the interruptions, but when it comes to larger events that make them vulnerable, community and family play a lesser role. Participation in community organisations and activities has been identified as adding to the coping mechanisms of poor and indigent households (Cannon et al., 2005:5). This is because it can add social capital as well as provide opportunities to receive relevant information to assist in coping with disasters and in disaster prevention (Mgquba and Vogel, 2002:33).

Household attendance at community meetings is important as it provides an opportunity for community members to raise their concerns and opinions about activities that are done within the community as well as to receive relevant information. With regards to the Kayamandi households interviewed in this research, 91% of households stated that they attend community

meetings. At these community meetings various issues were discussed. Interviewees stated that the following topics were discussed at community meetings that they had attended:

- Crime
- Social issues
- Pollution and environmental issues
- Municipal services
- Housing developments and related issues
- Political discussions
- Job creation.

Out of the topics above, 32% of surveyed households said they had attended meetings discussing municipal services and 23% of households had taken part in community meetings that were related to housing developments and related issues. Saddening, is that only 6% of households could recollect attending community meetings about pollution and environmental issues.

Households were asked who was responsible for organising these community meetings. Some 62% of the households surveyed said the majority of the meetings were organised by Ward Councillors of Kayamandi. While 9% of households surveyed stated that they had attended community meetings held by a member of the community, and 15% by the municipality. These results perhaps in part reflect the topics of the meetings attended by participating households.

#### **4.2.4.2. Household Participation in Projects**

One of the core tasks listed in the HFA is to “enhance the compilation, dissemination and use of DRR Information” (UNISDR, 2005:9). Furthermore, participation in community organisations and projects is seen as a way of building social capital and networks and to develop skills and therefore coping mechanisms (Mgquba and Vogel, 2002:33). With this in mind, the researcher questioned households with regards to their participation in projects presented to them through organisations (such as NGOs, CBOs, etc.). Only eight households stated that they had participated in a project presented to them through an NGO or other similar organisation (38 households said that they had not participated, and one household did not reply to this question). Of the respondents that had participated in projects provided by NGOs or other NPOs, the following list of project activities were identified:

- Sports and recreation
- Crime prevention
- HIV/Aids awareness programmes
- Youth development programmes, and
- Study groups.

The data collected for this question illustrated that of the households that had participated in projects the majority had participated in projects relating to sports and recreation (three households). Although five and two of the households surveyed for this question stated that their experiences with these organisations and projects were good and excellent respectively, three of the households that had participated stated that they had bad experiences when participating in projects organised by NGOs or other NPOs.

When community based organisations and NGOs were asked about the types of projects that they run, C01 stated that their projects were mainly focused on children and the youth, but they are opening opportunities for training for adults. However, the projects that C02 concentrates on does fit in with DRR a bit better as they aim to reduce malnutrition and to assist poor families to become self-sufficient.

Discussions with some of the households as to why they had bad experiences with NGOs and CBOs revealed that many of the households related to the sentiments expressed by K22. Respondent K22 stated that organisations do not inform people who live further away from the centres or the location of the projects about what projects are taking place. Therefore, they only find out about the project after it has taken place. Such interactions (or lack of them) with these organisations causes a certain degree of reluctance to participate in community projects and a sense of exclusion.

RA03 stated that there is training that occurs in the community for the residents, but due to the movement and relocation habits of residents it is hard to maintain a group of individuals that are knowledgeable about procedures to follow during disastrous events. Furthermore, RA03 stated that project participation is efficient for the short term. However, the trend of community residents relocating hampers the ability of residents to instil and implement the knowledge gained within their initial surrounding and environmental setting.

When questioned about the community's perceptions of projects that were implemented, C01 had the following to say:

*“Most are favourable. We regularly get reports from parents or other community members that people like [us]. The only time that I know of when we get bad publicity is when there is community gossip after some people have received and others have not. For example, if there is a donation, the people who receive are happy and those who came late are unhappy.”*

Therefore, community organisations can relate to the sentiments of the residents that feel that they were skipped or left out of certain projects that were intended to benefit residents of the community. But, the comment of C01, suggests that there is not enough for everyone always and that some miss out because they are late. However this raises questions as to which residents receive information about programmes and projects, as well as how, when and where? K22 above suggests it is because information is not distributed evenly across Kayamandi.

Public participation in government related projects were also not well attended as only five households interviewed stated that they had attended government related projects in the past. Upon further analysis of these households and what type of projects they had participated in, one household had participated in a project related to street cleaning and four households stated that they had participated in projects related to political activities. Of the households that participated in government related projects, only one stated that they had experienced some sort of problem while interacting with government on the project.

As important as public participation is, it is essential that departments of the responsible authority (SLM) take up opportunities to involve the public in their projects. RA02 stated that they have incorporated the views of the Kayamandi residents with regards to the design of the Thembelitsha Park, while RA03 incorporates the experience of certain residents for research purposes. Added to the project participation of Kayamandi residents, RA03 states that post disaster residents assist with clean-up operations. Here we are able to see that residents are incorporated into the work of the municipality at various levels and for different purposes.

Furthermore, RA01 states that their slogan “Nothing for us, without us”, represents their aim to incorporate the views, resources and skills of the local residents into the processes and implementation of their projects. With regards to housing developments, public participation through the SLM is formalised, as stated by RA01:

*“And therefore we have formal agreements, formal partnerships with poor people so we open up the space. We teach them, show them ... we don't have all the answers – government officials don't, and we go in and as a consequence we go in and then learn from you.”*



### 4.3. Social Conflict and Division within Kayamandi

As a by-product of the interviews held with the responsible personnel, the researcher identified that although there is some degree of public participation within the community not everyone within the community experiences the benefit of such participation due to social conflict and factions within the community. It should be stated that conflict in the Kayamandi community is not a new phenomenon. It has been noted by Lindner (2009) that social conflict existed previously within Kayamandi between hostel dwelling farm workers and new residents that were accommodated in formal housing (Lindner, 2009:55-56). These divisions were identified by four of the responsible personnel interviewed. Below are statements made by RA01, followed by RA06 which describe these divisions and some of their implications.

*“There are fractions and frictions. There are divisions. Alarming, it is sick for us practicing housing we see this every day. So if we build in this section, everyone else would be unhappy with you. And you see then poor people are the poised, pitted, against one another. Social conflict and strife’s and all the rest would now get up in arms and march.”*

*“Whenever you go into a community there are fracture points bigger than the ocean. And the simple matter that you go in there and you speak to that guy, the other lot is angry with you. There is no two ways about it.”*

Evident from these statements, is that the social fractions experienced within the community relate to the witnessing of certain projects only being the benefit to the “other” and that there are limited resources so projects cannot benefit all residents who may see themselves in need.<sup>14</sup> Also, these fractions are filled with emotional attributes that create negative and violent responses not only against the responsible authority but also against the beneficiaries of such projects. Not only do these factors contribute to the social fractions within Kayamandi, but RA03 also responds with other factors that contribute to social division within Kayamandi:

*“In Kayamandi, you have been there? You have different wards different political affiliation that is what we have out there. You’ve also got, within your wards; you’ve got issues like national foreigners in there, so that plays a major role.”* RA03 states that the political conflict

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<sup>14</sup>As in other people within the community and not themselves.

experienced between the wards that make up Kayamandi and ethnic/cultural conflict experienced within those wards contribute to social fractions within the study area. Therefore, it is possible to state that that the misinterpretation of the community and the miscommunication of the SLM, about the projects and their planning procedures creates and increases social conflict and contributes to the social fractions and divisions within Kayamandi. However, it should be stated that although social fractions within Kayamandi are witnessed and are a daily reality, there are ways through which such social divisions and its occurrence can be reduced, as stated by RA01: *“So we said that there should be a dialogue amongst poor people. They themselves, understand themselves. We connect them, facilitate the dialogue between them. Each one teaches one [and] they learn from each other. All then begin to understand that their strength lies in cooperation across the city with each other.”* RA01 notes a strong necessity with regards to community planning and development, that there should be open dialogue between the residents and the responsible authority. RA01 then further describes that within their department and their method of public communication, they aim to establish a relevant level of understanding across the board (residents and municipal authority). In doing so, there are fewer instances of miscommunication and misinterpretation between the two parties. However these divisions and the seeming sometime poor communication between NGOs and the SLM operating in Kayamandi may have an impact on the effectiveness of the implementation of relevant legislation and policies which encourages public participation. Such legislation includes the National Disaster Management Act (No. 57 of 2002) that stipulates in Section 3(17)(1d) that the National DMC should “take steps to disseminate such information, especially to communities that are vulnerable to disasters”.<sup>15</sup> Effective and efficient communication is also highlighted in the HFA that dedicates the third priority of action to various aspects of information management, education and training, research and public awareness (UNISDR, 2005:9-10).

#### **4.4. Representation of Vulnerable Households<sup>16</sup>**

A disaster may have an impact on a large scale such as a community or town, but it also has an impact on the household – as each resident in a community has their own set of coping mechanisms in place to reduce their vulnerability. Some disasters may be household specific, for instance a house fire or sickness, which for a poor or indigent household may spell

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<sup>15</sup> Referring to the information concerned in Section 3(16) - “Communication links with disaster management role-players” (of Act No. 57 of 2002).

<sup>16</sup> See Appendix G for a table of all households surveyed and their total number of negative reports.

disaster. Therefore, the researcher chose a group of indicators from the survey to identify the most vulnerable households within the survey. The indicators and the reason they were chosen, and allocating their score against other households, are found below:

- Household Type and Tenure Status:
  - Within the composite factors outlined by Cutter et al. (2003:251) it is noted that the dwelling type and type of ownership contribute to the possible impact of disasters and can create a certain level of social vulnerability. Furthermore, the HFA states that infrastructural planning and building measures should be addressed and prioritised and include disaster risk considerations before implementation (UNISDR, 2005:12).
  - To define these households the researcher chose semi-detached and backyard households from all households, and selected all the households with a tenure status listed as rented against those listed as owned by residents.
  
- Water Accessibility:
  - Overall water access, river use, and water interruptions were classified under water accessibility. As Wutich and Ragsdale (2008:2117) point out, when exploring the concept of suffering from water, the lack of water accessibility (be it either through limited and unsafe water sources, infrastructural failure) may warrant emotional responses from residents such as frustration, anguish and anger, therefore social fractions and inequalities may be produced by the unequal distribution of water. Furthermore, the implementation of resource management through structural and non-structural manners, provide an increased possibility of attaining resources such as water (UNISDR, 2005:10)<sup>17</sup>.
  - For this indicator, the researcher separated (and scored) those households that accessed their water resources through backyard standpipes and utilised river water against households with in-house water access.
  
- Multiple Experiences of Disaster:

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<sup>17</sup>Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure. Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts". (UNISDR, Geneva, 2004 cited by UNISDR, 2005:10-11)

- The effects of a single disaster may create a lasting impact on not only the physical infrastructure but also on the affected and their psycho-social well-being (Action Aid, 2006:1). The effects of multiple disasters on a household may create compound impacts on their livelihoods. Therefore, it is essential that households be aware of and trained about mitigation and coping mechanisms available within their grasp to combat compound impacts of disaster (UNISDR, 2005:10).
  - To identify multiple impacts of a disaster, each household that had experienced an event that may have left them vulnerable was singled out against those that have not experienced such impacts. Households that indicated multiple records of impacts were then selected.
- No Community Meeting Attendance:
    - A person, household or a community's ability to respond to shock is closely related and linked to their ability to access and retain information (Mgquba and Vogel, 2002:33). Therefore, households that seek out information through various channels have a better opportunity in responding to risk. Also, within the HFA (UNISDR, 2005:7, 10) it is stated that community participation and networking should be promoted and is essential to establish resource and responsibility distribution. Furthermore, it is also important that public awareness is essential to 'stimulate a culture of disaster resilience' (UNISDR, 2005:10)
    - For this indicator, the researcher attached a higher score for those that have not attended community meetings, against those that have.
- Female Headed Households:
    - Again, Cutter et al. (2003:251) note that it is not only race that contributes to social vulnerability and marginalisation, but gender as well. Female headed households are usually seen as being more vulnerable. Therefore, the HFA establishes within its general considerations that "a gender perspective should be integrated into all disaster risk management, policies, plans and decision making processes" so that such considerations become inherent throughout (UNISDR, 2005:4).

- As the researcher recorded demographic information of each resident within the household, the researcher would identify the head of the household through the survey by placing that person within the last record. From this, their score value according to sex (male vs. female) made it possible to identify which of these households were female headed households.
- Household Economic Dependency:
  - Age and unemployment of economically active residents are contributing factors to household dependency rates. Cutter et al. (2003:251) identify that high ratios of youth and elderly to the economically active that are employed infer greater dependency within the household. Therefore, the HFA suggests that responsible authorities should “strengthen the implementation of social safety-net mechanisms to assist the poor, elderly and the disabled and other population affected by disasters” (UNISDR, 2005:11). Included in these mechanisms it is suggested that responsible authorities should encourage diversified income options to reduce vulnerability to hazards in certain areas (UNISDR, 2005:11).
  - To figure out the dependency ratios of the sampled survey, the researcher resorted to a calculation that deducted the persons employed from the total household population; the result was then divided against the number of those employed. For example, the total household population of K16 is 9; the number of people employed is 2 – The calculation as follows:  $(9-2)/2 = 3.5$ . Therefore, the dependency ratio for this household is 1:3.5.
- Household Size
  - It is understood that resources are shared within a household. Therefore, with more people within the household, the amount of resources they consume would be greater than that of smaller households. When considering the method as to how water resource allocations were calculated<sup>18</sup>, this allowed the researcher to establish a household size baseline that would indicate vulnerable households.

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<sup>18</sup> Refer to Smith J., (2009), “Social Policy, Welfare in Urban Services South Africa” – Unpublished PhD. Rhodes University, p. 24-26.

- Utilising the 8 persons per household limitation on FBW Services, the researcher distinguished between those households that have eight or more residents within a household against those with fewer residents.

In order to understand Table 17, the researcher provided the key below so that it is possible to follow the codes associated with the chosen indicators and the household responses:



**Table 16: Key for Table 17**

FID	Generic unique identifier that ArcGIS associates with unique attribute information
HH_ID	Unique identification associated to each household prescribed by the researcher
HH_POP	Household population size
HH_DPCY	Household dependency ratio
FH_HH	Whether or not the household is a Female headed household
HH_Typ	Dwelling type
ISY	In separate yard
SD	Semi-detached
BY	Back yard dweller
HH_Ten	Tenure status
ONP	Own - Not Paid
OFP	Own - Fully Paid
REN	Rented
ORF	Occupy Rent Free
HH_WA	Where water is accessed
IH	In house
IY	In yard
HH_WI	Experiences of water interruptions
Num_Dis	Number of disasters experienced
HH_DisX2	Has the household experienced multiple disasters
HH_CM	Whether or not the household attended any community meetings previously?

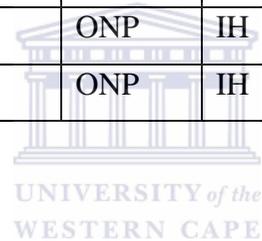
The table below represents the constructed attributes table that was used, in conjunction with XY coordinates, to identify households within Kayamandi of the surveyed sample. This table also outlines the various indicators that were used in order to identify vulnerable households as well as against their weighting score.

**Table 17: Total Account of Households that may be in or experienced vulnerable situations**

FID	HH_ID	HH_POP	HH_DPCY	FH_HH	HH_Typ	HH_Ten	HH_WA	HH_WI	Num_Dis	HH_DisX2	HH_CM
0	K01	4	99	N	ISY	ORF	IH	N	0	N	Y
1	K02	3	2	N	ISY	ORF	IH	N	0	N	N
2	K03	7	2.5	Y	ISY	OFP	IH	Y	2	Y	N
3	K04	7	2.5	Y	ISY	OFP	IH	Y	1	N	N
4	K05	4	1	N	ISY	REN	IH	N	1	N	Y
5	K06	2	1	N	ISY	OFP	IH	Y	1	N	Y
6	K07	3	0.5	N	ISY	OFP	IH	N	0	N	Y
7	K08	4	3	N	ISY	ONP	IH	N	0	N	Y
8	K09	2	0	N	ISY	ORF	IH	N	1	N	Y
9	K10	5	1.5	Y	ISY	OFP	IH	Y	0	N	Y
10	K11	5	4	N	ISY	ORF	IH	N	1	N	Y
11	K12	1	0	N	ISY	REN	IH	Y	0	N	Y
12	K13	2	0	N	ISY	REN	IH	N	0	N	Y
13	K14	3	0	N	ISY	OFP	IH	Y	2	Y	Y
14	K15	5	4	N	SD	OFP	RIV	Y	1	N	N
15	K16	9	3.5	Y	SD	OFP	IH	Y	0	N	Y
16	K17	3	0.5	N	ISY	REN	IH	Y	2	Y	Y
17	K18	3	0.5	N	ISY	ORF	IH	Y	0	N	Y

FID	HH_ID	HH_POP	HH_DPCY	FH_HH	HH_Typ	HH_Ten	HH_WA	HH_WI	Num_Dis	HH_DisX2	HH_CM
18	K19	2	99	Y	ISY	ORF	IH	Y	1	N	Y
19	K20	5	0.25	N	ISY	OFP	IH	Y	1	N	Y
20	K21	7	1.3	Y	ISY	OFP	IH	Y	2	Y	Y
21	K22	5	99	N	ISY	OFP	IH	Y	1	N	Y
22	K23	4	3	Y	ISY	REN	IY	Y	0	N	Y
23	K24	8	7	N	SD	OFP	IH	Y	4	Y	Y
24	K25	4	99	N	SD	OFP	IH	Y	2	Y	Y
25	K26	4	3	Y	SD	OFP	IH	Y	3	Y	Y
26	K27	7	6	N	SD	OFP	IH	Y	4	Y	Y
27	K28	6	1	N	ISY	OFP	IH	Y	2	Y	Y
28	K29	8	3	N	SD	ONP	IH	Y	3	Y	Y
29	K30	7	2.5	N	ISY	OFP	IH	N	0	N	Y
30	K31	1	99	N	SD	ORF	IH	N	3	Y	Y
31	K32	3	2	N	SD	OFP	IH	Y	3	Y	Y
32	K33	5	1.5	N	SD	OFP	IH	N	3	Y	Y
33	K34	5	4	N	SD	OFP	IH	Y	2	Y	Y
34	K35	4	3	N	SD	REN	IH	Y	2	Y	Y
35	K36	5	4	N	SD	ONP	IH	N	1	N	Y
36	K37	4	1	N	SD	ORF	IH	N	0	N	Y
37	K38	8	99	Y	SD	OFP	IH	Y	1	N	Y

FID	HH_ID	HH_POP	HH_DPCY	FH_HH	HH_Typ	HH_Ten	HH_WA	HH_WI	Num_Dis	HH_DisX2	HH_CM
38	K39	5	1.5	Y	SD	OFP	IH	N	2	Y	Y
39	K40	3	0.5	N	SD	OFP	IH	N	3	Y	Y
40	K41	5	0.7	N	SD	OFP	IH	Y	3	Y	Y
41	K42	5	0.7	N	ISY	OFP	IH	Y	1	N	Y
42	K43	2	99	N	BY	REN	IY	Y	3	Y	Y
43	K44	1	0	N	ISY	ORF	IH	Y	0	N	Y
44	K45	5	1.5	N	ISY	ORF	IH	Y	1	N	Y
45	K46	4	99	Y	ISY	ONP	IH	Y	1	N	Y
46	K47	8	3	N	ISY	ONP	IH	Y	3	Y	Y



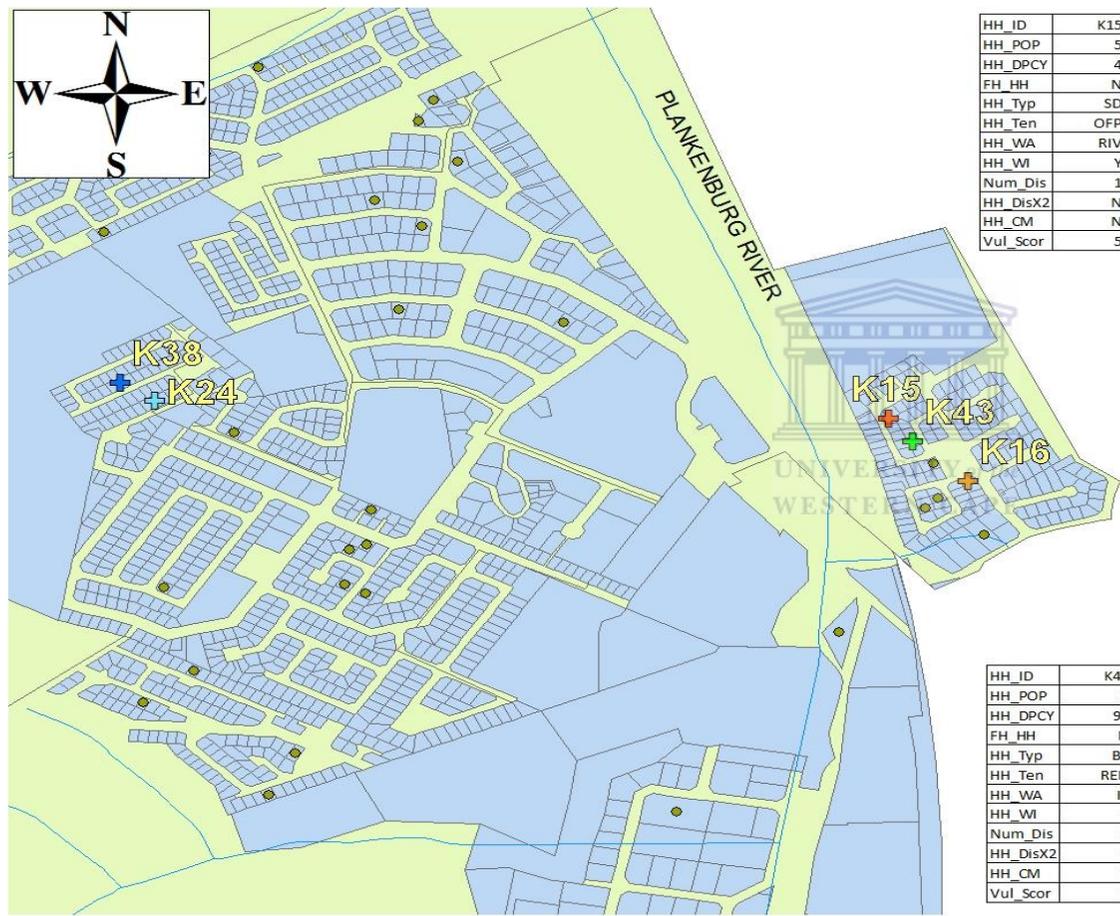
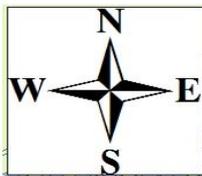
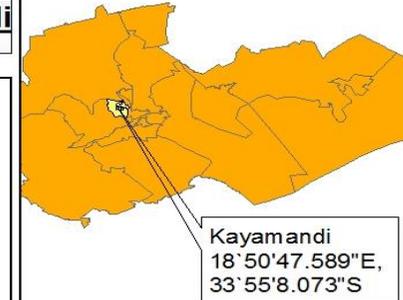
Following the total calculated values attached to each indicator, it becomes possible to identify the most vulnerable households as the addition of each weight contributed to their total vulnerability. Therefore, those households with a total of greater than five negative reports would be utilised for map illustration.

For the purpose of representing each household with their unique circumstances, the researcher used a GIS tool (ArcGIS 9.3) to project the location and attribute information of each case that is to be represented, i.e. the most vulnerable households. Also, as the researcher assured residents that their personal information would not be divulged through this research, the researcher utilised the random equation in Microsoft Excel to produce different identifiers for each household, thereby retaining anonymity. Therefore, each surveyed household was plotted on an erven allocated to it through the randomization calculation. Figure 13 below represents how it is possible to plot and define the most vulnerable households identified by selected indicators.





Location of Kayamandi in  
Stellenbosch Municipality



HH_ID	K15
HH_POP	5
HH_DPCY	4
FH_HH	N
HH_Typ	SD
HH_Ten	OFP
HH_WA	RIV
HH_WI	Y
Num_Dis	1
HH_DisX2	N
HH_CM	N
Vul_Scor	5

HH_ID	K16
HH_POP	9
HH_DPCY	3.5
FH_HH	Y
HH_Typ	SD
HH_Ten	OFP
HH_WA	IH
HH_WI	Y
Num_Dis	0
HH_DisX2	N
HH_CM	Y
Vul_Scor	5

HH_ID	K24
HH_POP	8
HH_DPCY	7
FH_HH	N
HH_Typ	SD
HH_Ten	OFP
HH_WA	IH
HH_WI	Y
Num_Dis	4
HH_DisX2	Y
HH_CM	Y
Vul_Scor	5

HH_ID	K38
HH_POP	8
HH_DPCY	99
FH_HH	Y
HH_Typ	SD
HH_Ten	OFP
HH_WA	IH
HH_WI	Y
Num_Dis	1
HH_DisX2	N
HH_CM	Y
Vul_Scor	5

HH_ID	K43
HH_POP	2
HH_DPCY	99
FH_HH	N
HH_Typ	BY
HH_Ten	REN
HH_WA	IY
HH_WI	Y
Num_Dis	3
HH_DisX2	Y
HH_CM	Y
Vul_Scor	6

**Legend**

**Kayamandi Most Vulnerable Households**



**VulnerableHouseholds**



Created By: Winston Harris

For Thesis: "Experiences of Social Vulnerability in Indigent Households related to Water Service Delivery in Kayamandi, Stellenbosch"

Date: September 2012

0 50 100 200 300 400 m



Figure 13: Map illustrating most vulnerable households of surveyed sample

In the map above (Fig. 13), every surveyed household was given an indication on the map, but households that were deemed most vulnerable were outlined with unique features as well. These features include unique colour and a unique symbol, instead of circular points and mono-colour features experienced by other households. Also, the researcher utilised bigger fonts for household identity for legibility.

#### **4.4.1. Identified Vulnerable Households**

Adjusting the data format and information to suit the GIS application it became possible to project the necessary information through analysis tools provided by the application. Looking at the most vulnerable households (Fig. 14), five households were identified as the most vulnerable households. In numerical format, household K15 attained negative records through a household dependency ratio of 1:4, living in a semi-detached house, utilizing water from the river source, experiencing water interruptions and not attending community meetings to obtain information. Negative records to note are the high economic dependency ratio and the use of water from the Plankenburg River. Household K16 attained negative records through having the highest recorded household population of nine people living at the residence, having a dependency ratio of 1:3.5, being a female headed household, living in a house that is semi-detached and having experienced water interruptions in the past. Negative records to note within K16 would be the high household population and being a female headed household, also records from the survey illustrate that K16 receives four child support grants to sustain necessities throughout the month.

Household K24 attained negative records through having a household population of eight persons, having a household dependency ratio of 1:7, living in a semi-detached house, having experienced not only water interruptions but multiple forms of disasters that included fire, illnesses within the family, and broken water infrastructure and extended leakages. Negative records to note within household K24 would be the high household population, high dependency ratio and the experiences of multiple disasters.

Household K38 attained negative recordings by having a household population of eight people, having no persons employed within the household (Code .99), being a female headed household, living in a semi-detached house, and having experienced water interruptions. Negative records to note within household K38 are having a high household population with no persons employed. Also, the survey noted that this household receives three child support grants to assist in attaining necessities throughout the month.

Finally, the most vulnerable household (K43), with six negative recordings, attained this score by having total unemployment within the household population of two persons, living in a backyard, renting the dwelling, having to access water from inside the yard, having not only experienced water access interruptions, but also multiple forms of disasters that included illness, broken water pipes and extended periods of leakages. Negative records to note within this household would be the fact that none of the persons are employed, that their water source is not secure as it is accessed through the backyard and having experienced multiple forms of disasters.

Evident trends from these households and their negative recordings would be that all identified vulnerable households not only experience unemployment and have a dependency ratio of 1:3.5 or greater, but also that all households have experienced water interruptions. The majority of the households surveyed were living in semi-detached houses, these households are vulnerable in that should an infrastructural disaster occur (for example either through fire or earthquake), it is probable that the effects would affect both houses and their residents. As household K43's dwelling type is a backyard dwelling, the materials used to build such a dwelling have less resilience against natural and anthropogenic disasters as these materials can easily be damaged or catch light. Another trend that is noticeable from the household survey is that all the identified vulnerable households have experienced water interruptions within their household.

#### **4.5. Assessing DRM Preparedness of SLM using the HFA**

##### **4.5.1. HFA 1: Making Disaster Risk a Priority**

The first priority for action of the HFA ensures that "DRR is a national and local priority with a strong institutional basis for implementation" (UNISDR, 2005:6). Furthermore, the key activities focus on legislative frameworks, human resources and capacity, and community participation.

Nationally, as it has been well established in the legislative framework section of this thesis the National Disaster Management Act (No. 57 of 2002) outlines the roles and responsibilities of all tiers of government concerning DRM. To supplement this piece of legislation locally, the researcher has identified a Disaster Management Plan (Watees Consortium, 2006) that is in place but is out dated, dating back to 2006 and has not been reviewed since then. Further, this plan does not establish DRM as a priority within other departments (such as water and sanitation, environment, community development); therefore

there is no policy integration between SLM DMC and other departments. Recent IDP documents (released for years 2010, 2011 and 2012) have referred to but not technically concentrated on disaster management and preparedness. Therefore, Stellenbosch (2012a) has stipulated that it is necessary to establish a Disaster Management Plan. However, lack of financial and human resources hinders the progress of this plan (Stellenbosch, 2012a:58-59).

With regards to stakeholder awareness of Disaster Management, the researcher found that all departments interviewed (i.e. Integrated Human Settlements, Water Services: Reticulation, Community Services, and Community Development) have knowledge of the contact responsible personnel within disaster management. However, these departments lack knowledge of processes and procedures in place for when a disaster affects a community and services which they are responsible for. However there is continuous correspondence and contact between SLM and the Cape Winelands District Municipality as RA03 stipulates that municipal stakeholders meet on a quarterly basis to discuss matters of interest within their respective municipalities.

The SLM faces financial constraints and this may impact their ability to respond to possible risk and limit their capacity to prepare. The SLM's Medium Term Revenue and Expenditure Framework (2012b:17) states that within the financial year of 2012-2013, a total of R610,030 would be allocated for responding to disaster incidents and relief aid'. This budget allocation is increased to R646, 640 within the financial year 2013-2014, a 6% increase year on year. The severity of a disaster is unpredictable (whether natural or anthropogenic); therefore the SLM cannot correctly establish a true indication of the necessary budget requirements/allocation of the SLM DMC. However, although budget allocation towards the disaster management department is low, various departments (if affected) respond to (on an ad-hoc basis) post disaster needs and these actions relieve some budget expenditure of the SLM DMC.

#### **4.5.2. HFA 2: Improving Risk Information and Early Warning**

The second priority of action of the HFA encourages the responsible authority to “identify, assess and monitor risks and enhance early warning systems” (UNISDR, 2005:7). Added to this, key activities include risk assessments, early warning systems, capacity, and understanding the regional and emergency risks.

Although the risk assessment and the disaster management plan may be outdated, the SLM has utilised the assistance of other institutional stakeholders to conduct surveys and

writereports. The NDMC has established the *Programme Monitoring Tool* (NDMC, 2005) to be used to gather information to establish the level of disaster management activity within the District or Local Municipality.<sup>19</sup> The programme monitoring tool lists four key performance area's (KPA's) through which municipalities should be assessed. These are:

- Institutional capacity for disaster management;
- Risk assessment and monitoring;
- Disaster planning and implementation; and
- Disaster response and recovery.

It is only hoped that with the intended processes of developing a disaster management plan and risk assessment that the SLM utilises these KPA's to measure their success. However, with regards to the monitoring processes of the SLM DMC there is an electronic documented system in place through which a report on disaster management activity is written up by responsible personnel and this is not always the department personnel(NDMC, 2005).

With regards to reporting incidents and possible early warning systems, the SLM DMC relies on notification via community development workers from each ward, technical early warning systems within their engineering department (however, this is believed to be from the national weather service), through the control room (that contains CCTV cameras that currently only monitor Jamestown and Vlottenburg areas) of the SLM, and the South African Police Services if the incident relates to social conflicts, disturbances or protests (Interview, RA03; Stellenbosch 2012a: Ch. 2, p. 3). The early warning system mainly concentrates on inbound communication, i.e., warning the municipality. But, importantly the SLM lacks outbound early warning communication systems to alert the community as the only outbound system utilised at community level consists of communication via loud speaker (Hay, et al. 2011:46). Therefore, the early warning system utilised within the SLM does not thoroughly reach or serve people at the community level.

#### **4.5.3. HFA 3: Building Capacity of Safety and Resilience**

A strong indication of resilience is the ability of a household to be able to initiate their own coping mechanisms through the use of their own knowledge. Therefore, the third priority of action is essential in the HFA as it concentrates on the use of “knowledge, innovation and

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<sup>19</sup><http://www.ndmc.gov.za/Documents/Framework.aspx>

education to build a culture of safety and resilience at all levels” (UNISDR, 2005:9). Key activities that relate to this priority of action include information management, education and training, research and public awareness (UNISDR, 2005:9-10).

As previously mentioned, the SLM does have CCTV monitoring, but it is limited to only certain areas and is of limited use. The system only monitors activities related to the responsibility of law enforcement and not disaster management. However, the SLM DMC does maintain continuous community awareness programmes set in place in conjunction with other stakeholders including the Cape Winelands District Municipality (CWDM) and the Provincial Government of the Western Cape (PGWC) in order to prevent duplication of awareness campaigns that are relayed to groups involved in schools, old age centres and ward meetings (Stellenbosch, 2012a:Ch. 2 p. 4). RA03 stated that the SLM DMC does provide schools with awareness campaigns against risks associated with floods, fires and the use of hazardous substances through presentation at schools. However, although the SLM DMC does offer these awareness presentations, when interviewed, the Kayamandi Primary School stated that they do not have aspects of DRM within their school curriculum.

Whilst interviewing community organisations within Kayamandi during the researcher’s internship tenure at Umvoto Africa, it was established that many of the community organisations introduce and raise awareness about issues that have social and health facets to them. These awareness programmes include social welfare, counselling, HIV/Aids, disability, etc. However, these community organisations, although they are prepared to assist with relief, do not have any plans to, or see it as their remit to raise awareness around household water management, and DRM.

#### **4.5.4. HFA 4: Reducing the Risk in Key Sectors**

Risks, associated with disasters, are cross cutting issues that affect multiple sectors of essential components within services delivery. Therefore, the fourth priority of action aims to “reduce the underlying risk factors” (UNISDR, 2005:10) associated with these sectors. The key activities that are required to achieve this action include environmental and natural resource management, social and economic development practices and finally, land use planning and other technical measures (UNISDR, 2005:10-12).

The researcher has not identified DRM processes integrated into other plans and policies, except the suggestion of a proposed disaster policy within the IDP of SLM (Stellenbosch, 2012a). It appears to be seen as the sole responsibility of the SLM DMC. But, without the

integration of DRM and related attributes across relevant departments of the SLM, disaster preparedness is not possible. However, it should be noted that the SLM states within their Housing Strategy (Stellenbosch, 2008c), that objective four of the strategy would strive towards sustainable living. This does impact on the municipality's land use planning and building plans. The impact on land use planning is sustained through the intention to create high living densities, open green spaces and access to public transport. Furthermore, the impact on building plans is sustained through an energy efficient design. Contributing to these intended actions to achieve sustainable living, housing would include the ability to use water more efficiently (Stellenbosch, 2008c:18).

Fortunately, indigent residents of Kayamandi have access to social welfare that is granted to eligible cases through the South African Social Security Agency (SASSA) for a range of vulnerable groups (refer to p. 8 and Appendix A). Furthermore, the SLM has established an Indigent Policy that defines and sets out criteria for qualification for these subsidies within its municipal boundaries (Stellenbosch, 2011c).

In order to receive a sustained water supply there needs to be a presence of sound and reliable infrastructure. Through discussions with RA05, it has been established that there are Operations and Maintenance (O&M) documents for each water and waste water treatment plant. These O&M documents are important as they stipulate procedures and times lines for when maintenance should take place at these plants. However, CPUT (2008:23) and comments made by RA05 indicate that there are not only internal but also external factors that impact on the reliability and structural integrity of water infrastructure within SLM. The internal factors include, but are not limited to maintenance neglect of an aging infrastructure which is facing increasing demand. External factors include, but are not limited to, vandalism and the theft of copper piping, wire and other components.

With regards to tertiary institution assistance, the SLM receives continuous support from various universities (e.g., University of Cape Town, Cape Peninsular University of Technology and Stellenbosch University) with regards to assessment and monitoring of disaster management and preparedness within SLM. However, RA03 stated that there is a great need to employ the skills of the private sector and involve them in DRM, but due to lack of finances there is little ability to involve the private sector. RA03 also stated that lack of finance limits their ability to progress from the current assessments and to produce a complete disaster management policy for the SLM.

The SLM IDP (2010:Ch. 4 p. 15-16) provides an outline of what is expected with regards to response, recovery and relief, but, as the SLM disaster management plan is yet to be accepted by council, the procedure is yet to take effect. However, there are efforts in place by community organisations (through the facilitation of the SLM DMC) to support distressed communities with relief. The SLM does make the materials and resources (food, blankets, fire kits and flood kits) available to those in need in the event of a disaster (Interview, RA03). However, recipients of these materials sometimes misuse these resources through selling or damaging materials provided and to a degree, then become more vulnerable than they were before. However, the sale of relief resources could indicate either high rates of poverty or the lack of cash incomes of recipients or that the materials and resources provided are not what the recipients need to cope with the outcome of the event.

#### **4.5.5. HFA 5: Strengthening Preparedness for Response**

The fifth priority of action concentrates on the ability of the responsible authority to “strengthen disaster preparedness for effective response at all levels” (UNISDR, 2005:12). Therefore, the key activities of this action look at institutional mechanisms in place that encourage dialogue between relevant agencies, coordination of regional approaches, the extent of disaster preparedness and contingency plans, activities surrounding emergency funds and actively engage stakeholders (UNISDR, 2005:12-13).

Being prepared for disasters shows an increased ability to respond to disasters, and in order to prepare for such ability requires regular monitoring and investigation of personnel’s level of disaster management competency. The fifth HFA priority area requires that training, monitoring and testing of disaster management personnel, including external organisations and volunteers, takes place on a regular basis (UNISDR, 2005:12). RA03 does recognise that training and monitoring of staff and the municipality’s disaster management competency do occur but not within a formalised structure.

*“We do have your fire fighting, fire awareness, home based care all those types of training comes via my department...”*

Furthermore, other DRR training takes place within Kayamandi and is formulated to incorporate and communicate with the intended groups. So for instance for residents living in multiple occupancy brick dwellings such as hostels, training would consist of evacuation and fire drills, whereas residents in informal settlements receive training that concentrates on safe use and storage of paraffin. To fulfil the position within the SLM DMC, RA03 has

participated in some formal training, but whether or not continuous training and testing takes place could not be established. It has been noted that training for the residents of Kayamandi does take place, but it is not guaranteed that the persons trained will be available the following year. RA03 stated that due to people moving and relocating within Kayamandi, and the short duration of training provided by NGO's, effective and sustained and effective DRR training cannot occur within Kayamandi.

The majority of the volunteers that assist in recovery and relief post-disaster are from the location, and it is highly likely that the DMC will utilise and request assistance from residents that have previously assisted in disaster recovery and relief (Interview, RA03). This action of the DMC implies that volunteers inherit some form of training, as a by-product from their continuous participation in DRR activities.

Furthermore, the fifth priority area of the HFA states that with proper and adequate resources and capacities, it is possible to establish proper preparedness within the community (UNISDR, 2005:13). There is a budget allocated to the SLM DMC from the SLM that stands at R610, 030 for the financial year 2012/2013 (Stellenbosch, 2011d: 16). However with the unpredictability of the intensity of certain risks and the impact of disasters on human livelihoods, this stipend may not be sufficient for the day to day running of the DMC. Therefore, the DMC also relies on external assistance (be it financial resources or human capacity) from community organisations, volunteers from the community and outside of the community and other sources of funding from the CWDM and WCPG (Interview, RA03). It should also be noted that resources and kit distribution is facilitated by and is the sole responsibility of the DMC during post disaster relief as previously there were many instances that prevented relief from reaching the intended households that were in need of these resources.

#### **4.6. Conclusion**

Evident from the findings above, it is possible to identify that there is a certain degree of existing social and institutional disaster management and risk reduction mechanisms within the surveyed households of Kayamandi and the SLM that aim towards increasing the coping capabilities of the SLM and the residents of Kayamandi towards water accessibility and responses towards events that may cause vulnerability. When presented with a question whether or not SLM can reduce the experiences of water inaccessibility, it is evident that through the interviews and the relevant documents that there are positive steps taking effect

to make total water accessibility a possibility. Through the interview with RA03 it was stated that there is an ability and a department dedicated to fix and repair broken water pipes and damages to the bulk water infrastructure and that coping capabilities are extended with the introduction of another reservoir to support the water resource needs of a growing population. These measures will assist in reaching the required reduction in occurrences of water inaccessibility. However, there are still factors that hinder this objective from being reached such as the ailing infrastructure and the desperate need of a maintenance overhaul on water infrastructure of the SLM. Added to this, regular vandalism and theft that occurs at the SLM pump stations impact on the efficiency of the infrastructure and the ability to provide adequate resources.

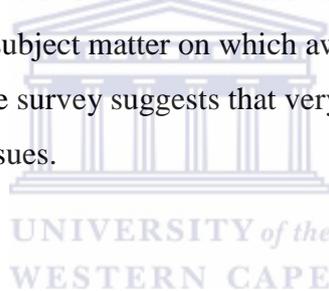
Not only looking at the SLM for opportunities where water accessibility is reduced, but there are also examples of activities within the surveyed households of Kayamandi where indigenous responses are utilised. These activities are noted to be both reactive and proactive coping mechanisms. Reactive coping mechanisms include fixing broken household water taps and reliance on the municipality and social networks within Kayamandi. Proactive coping mechanisms include the ability of the household to ensure water provision for a scheduled water interruption, such as saving water the previous day. However, due to the economic level of households in Kayamandi, there are households that have the inability to retain financial resources to permanently fix and repair broken water pipes as there are a high percentage of households that rely on self-repair. Also, with the lack of information penetration, certain households lack the ability to respond effectively to water interruptions.

Social capital has been identified as an important factor that should be considered when identifying a community's degree of vulnerability (UNISDR, 2005; Mgquba and Vogel, 2002), as it is essential to reduce experiences of causes of social vulnerability. Therefore, it has been established that the SLM has employed concerted efforts to incorporate and formalise communities into public stakeholder participation (see response of RA01 on p. 95). Furthermore, through the activation of legislative requirements, the SLM has established an indigent policy. This policy allows for resources to become, to a degree, accessible to those that may not be able to afford the full tariff of services applied by the SLM. Also, to reduce these experiences of social vulnerability SLM encourages and promotes relevant awareness campaigns and participation in community projects. However, although these public and stakeholder participation mechanisms are in place, it is evident from the surveyed households that there is a low rate of involvement of residents in community projects. This would be due

to the inability of certain projects or programmes to include everyone or a good proportion of the residents, into the programme (see response of household K22 on p. 94).

Within Kayamandi, there are good examples of good communication and interaction between residents as the results indicate that there are households that take note of events that may leave other households vulnerable. Understanding these events and possible responses then become inherent coping mechanisms within the household. There is a degree of social capital and reliance in these households in Kayamandi as there are instances where households request assistance from other community residents. Also, institutional arrangements on a national level (such as SASSA) allow residents in Kayamandi to gain access to social welfare.

Finally, although there may be areas of progress when concerning social capital and cohesion within Kayamandi, there are still hindering factors within Kayamandi that need to be considered. Due to the inherent social division between residents, earnest social cohesion and reliance will be an obstacle. The subject matter on which awareness programmes concentrate on are not equally balanced, as the survey suggests that very few households are made aware of pollution and environmental issues.



## Chapter 5

### 5.1. Conclusion

Vulnerability is location and situation specific (Blaikie, 2003 and Cannon, 1999 cited by Morrow, 1999) and consists of general principles (Alwang et al. 2001:1) that assist in the definition of vulnerability. Vulnerability has been defined as “The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of a community to the impact of hazards” (UNISDR, Geneva 2002:24 cited by UNISDR, 2005:1). Therefore, with this definition it is possible assess social vulnerability, whilst considering Cannon et al.’s (2005) characteristics that encompass social vulnerability that focus on initial well-being, livelihood and resilience, self-protection, social protection, and social and political networks and institutions (Cannon et al., 2005:5).

It is important for the responsible authorities to implement legislative enablers that safeguard citizens against events or experiences that may cause vulnerability. Fortunately, South Africa instated the National Disaster Management Act (No. 57 of 2002) which supports the appointment of national, district and local platforms that have the responsibility towards disaster risk reduction and management. One of these platforms is the NDMC with an objective “to promote an integrated and co-ordinated system of disaster management, with special emphasis on prevention and mitigation, by national, provincial and municipal organs of state, statutory functionaries, other role players involved in disaster management and communities” (Section 9 of Act No. 57 of 2002).

The study aimed to answer the research question that investigated the existing social and institutional disaster management and risk reduction mechanisms that reduce experiences of water inaccessibility, reduce the causes of vulnerability and increases coping capacities within households of Kayamandi and the community of Kayamandi in SLM. The Kayamandi settlement (situated in the north west of the SLM on the border of the greater Stellenbosch town) was brought about by not only the group segregation act (under the Apartheid era) but also due to a group of employers that erected hostels to house black migrant labourers.

It was possible to achieve the outcome of answering the research question through the methodology which also accomplished the aims of this study. The researcher surveyed and interviewed a participating group that consisted of residents of Kayamandi, community based organisations and official personnel within the SLM. For each participating group the researcher created a questionnaire based on the information needed to complete and fulfil the

aims of this study. Furthermore, as the study utilises a GIS tool, spatial data was collected from the Stellenbosch Local Municipality, the National Geo-spatial Information Directorate, and the National Demarcation Board. Attribute data was created from the responses that residents had to the questions within the survey.

Early findings of water access and use indicated that not all brick infrastructure dwellings access potable water through water infrastructure inside their dwelling, and that there are households that utilise the Plankenburg River for other activities such as clothing washing. Already here, it is possible to identify a risk that such households are exposed to, as Thompson et al. (2000:47) state that unprotected water sources “open to contamination and therefore carry health risks.” When investigating the extent of water interruptions within the surveyed households it became evident that the majority of the households (33) had experienced some form of water interruption at the time of this survey. It was then established that these water interruptions were caused by stolen water pipes (2), unpaid municipal water accounts (3), informed water cleansing and infrastructure upgrades (10), and problems associated with plumbing (13). Although there were a great number of residents that indicated that they were informed about possible water interruptions, four households indicated that they do not know the reason why their water services were interrupted. This then indicates that the communication efforts of the SLM to inform all residents do not penetrate to all areas of Kayamandi. However, the SLM also experiences capacity and infrastructural limitations. The reservoir that the SLM utilises may not be able to sustain residents of Stellenbosch if their WTW and its infrastructure should experience any form of event that may cause an interruption for long periods of time, i.e., extending beyond 36 hours. Furthermore, theft and vandalism are threats to the water infrastructure of the community and the SLM infrastructure that provides water resources to households.

Kayamandi residents also experience other events that cause further vulnerability. These include floods, fires, sicknesses, broken water pipes and leakages. The largest cohort of the households experienced leakages (23) whereas only two households experienced fires. As previously stated, vulnerability is location and situation specific. Therefore, if the location and situation of the households are prone to events that may cause vulnerability, multiple events may be experienced. This case is true for twenty of the households that were surveyed. Households that experienced the greatest amounts of events were K24 and K27. Between these households, the similarities of events experienced include sickness, broken water pipes,

and leakages; these households differ as K24 also experienced a fire and K27 experienced flooding.

The coping mechanisms employed by these households include informal self-repair, social assistance (family and/or community members), visiting a doctor or clinic, calling a plumber and calling the municipality for assistance. Analysing these coping mechanisms indicated that there was a high reliance on the SLM for assistance. However, when comparing the sources of coping mechanisms between water interruptions and experiences that may cause vulnerability, there is a greater degree of social reliance for coping mechanisms associated with water interruptions. This may be due to the possibility that water resources can be easily shared and more accessible than other resources such as finances or technical assistance.

Attending community meetings and participating in community projects have been identified as a possible means for residents to increase their ability to respond to certain threats as this may add to their social capital and provide opportunities to receive relevant information (Mgquba and Vogel, 2002:33). It was established that 43 households attended community meetings, and 38 households did not participate in community projects. Although residents are attending meetings, their coping mechanisms can dramatically increase if they are able to participate in a community project. However, it should be noted that low community participation is not only due to the unwillingness of residents, but also due to the probability of project and information penetration into distant locations. Household K22 states that another reason for this lack of project participation could be due to the instance where the residents that live further away from these centres or location of where projects take place are not informed about these projects.

As a by-product of the questionnaire posed to responsible personnel, it has been found that there are major social divisions within Kayamandi. These divisions are often caused by the implementation of housing initiatives, as developments in certain areas take place it causes residents to be pitted against one another. However, the social division of Kayamandi is not a new phenomenon as Lindner (2009) discovered that social conflict and division previously existed in Kayamandi between hostel dwelling farm dwellers and new residents that were accommodated in formal housing (Lindner, 2009:55-56).

In order to geographically represent vulnerable households, the researcher utilised responses to certain questions and developed indicators, backed by referenced material from the literature and the HFA, as a base to record negative records to which households would attain

a score. The indicators were household's tenure status, water accessibility, multiple experiences of disaster, no community meeting attendance, female headed households, household economic dependency and household size. Once analyses of these indicators were done, it was established that respondent K43 was the most vulnerable households of the surveyed sample in Kayamandi with six negative records. K43 had total unemployment, living in a back yard dwelling, having to access their water from an in yard stand pipe, experiencing water interruptions as well as multiple experiences of events that may cause vulnerability which include sickness, broken water pipes and extended periods of leakages. Therefore, all this then reinforces the need to understand the local context and how a lack of resources can cause vulnerable populations to experience certain events as disastrous.

Within this thesis, the researcher does not employ a quantitative analysis of the HFA but chose to portray the DRM and DRR practices and institutional coping mechanisms qualitatively. It is regarded as essential within the HFA (through its priority areas) that a responsible authority should be able to prioritise DRR, employ high levels of data gathering and communication, facilitate capacity building and awareness raising, reducing risks within key sectors, and increasing efforts and abilities to be prepared and respond to hazards.

Furthermore, assessing the level of preparedness of the SLM with regards to the HFA, it has been noted that the SLM currently does not have a disaster management plan in place – which is a requirement stated under National Disaster Management Act (No. 57 of 2002). The repercussions of not implementing a disaster management plan may cause maladministration and lack of technical responses to be administered by the responsible authority of the DMC in SLM. Furthermore, not having a policy affects other priorities of action within the HFA such as reducing the risk in key sectors (HFA 4).

The fourth priority of action of the HFA seeks the ability of the responsible authority to implement programmes where disaster management is a cross cutting discipline that is influenced by and influences upon other service sectors that include environmental and natural resource management, social and economic development and land use planning. However, this currently does not take place. Therefore, it has been established (through the investigation of the SLM utilising the priorities of action of the HFA) that without a disaster management policy or plan present, it is not possible for the SLM to fully establish or implement institutional processes and technical responses that would assist in the reduction of

events that causes vulnerability within its jurisdiction, and the execution of rehabilitation of residents and property after disasters have occurred.

The findings of this thesis identified that there is a certain level of response to each of the priority areas. The responses and available coping mechanisms do not support or meet the standards required to adequately react to the needs of the communities in terms of reducing vulnerability and increasing coping capacities. As previously stated, DRM and DRR require technical and legislative guidance so that once a disaster is declared, emergency response teams and responsible authorities should be able to operate equipment and facilitate coping mechanisms within a given environment efficiently.

Household coping mechanisms employed against risks associated with water accessibility vary between households. SLM should continue with their efforts to acknowledge and communicate these coping mechanisms in order to decrease vulnerability, increase available household coping mechanisms and contribute to promote social cohesion within the Kayamandi Community.



## **5.2. Recommendations**

The researcher has the following recommendations for the responsible authority, SLM and their local DMC.

### **Human Resources**

It is strongly recommended that the SLM should increase their human resource capital in the DMC in order to better manage and facilitate DRM within the municipality. A higher staff complement not only ensures that there is capacity to be involved in DRM but also ensures that key performance areas and outcomes are met with efficiency. On-going training of personnel involved in DRM is also necessary.

### **Implement Policy**

Update, establish and implement a proper disaster risk reduction policy within SLM. This policy should recognise the national legislation and fulfil the NDMC monitoring requirements.

### **Establish aspect of DRR in other Directorates**

It is recommended that directorates of SLM establish aspects of DRR within its recognised areas of responsibility. In this manner, DRR may be able to filter within internal policies such as environmental, economic or financial policies, as well as other plans such as the WSDP.

### **Set up a GIS and Data server**

Evident from the researchers GIS data collection processes, it is recommended that the SLM set up a GIS database for information monitoring and sharing. This will allow stakeholders the ability to obtain data through a central source and not through various sources. This, contributed by single format attribute information and metadata allow for more uniform map projections and analysis. Continuous information and data updates allow the municipality to monitor and measure the needs and requirements of communities, therefore adequate planning can be established. Monitoring and establishing criteria for identifying vulnerable households enables the SLM to create a baseline through which other indigent households can be measured and monitored against. Therefore, if households fall below this capacity the responsible authority would immediately know when and where interventions are necessary.

### **Account for water loss**

With regards to the recommendation for the SLM, there is a need to immediately implement IWRM activities that concentrate on water loss through municipal bulk water infrastructure and household infrastructure by installing and implementing infrastructural and behavioural change projects such as:

- a. Household water management devices that control the household water consumption at a predetermined volume.
- b. Leak repair projects where the intention is to reduce leakage and loss through damaged infrastructure that are either in need of regular maintenance, repair or replacement.
- c. Continuous awareness, information sharing and skills development relating to DRM and water use activities for both Kayamandi residents and technical municipal staff.

### **Implement a budget contingency plan**

It is also recommended that the SLM implement a budget contingency plan for the DMC as the severity of a disaster cannot be budgeted for, and may exceed the expected expenditure of the SLM DMC.

### **Central Reporting Authority**

As there are various authorities where residents may be able to communicate and report instances of disaster, it is recommended that a central disaster reporting authority be established so that all disaster related matters be directed to this authority.

### **Increase awareness**

Finally, it is highly recommended that the SLM increase community awareness programmes to include areas where it is possible to access legislative coping mechanisms that will increase the households' resource base that will enable them to respond to situation that may leave them vulnerable.

Furthermore, the researcher has also identified possible recommendation for further study and analysis. These suggested studies are outlined below:

- Monitoring residential use and activities surrounding ablution and water resource facilities (such as standpipes) to identify associated cumulative health risks within the Kayamandi community. A research paper that concentrates on factors such as this may enlighten stakeholders and the health profession about health risks and areas of vulnerability of residents that utilise these facilities. The outcomes of this research may contribute to the implementation of a task team that will initiate a programme that focuses on public facility usage.
- Finally, it is suggested that further research should concentrate around household water use activity that establishes what the real community needs are. Therefore, the responsible WSA may utilise these findings to enhance water infrastructure requirements and volumes to a given community.



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## Appendices

### Appendix A – SASSA Grants and Qualifying Criteria<sup>20</sup>

Type of Grant	The Applicant Requirements (Criteria)	Value of Grant <sup>21</sup>
<u>Grant for Older Persons</u>	Must be a South African citizen / permanent resident	R 1, 010.00
	Must be resident in South Africa;	
	If a male, must be 60 years or older;	
	If a female, must be 60 years or older; and spouse must comply with the means test;	
	Must not be maintained or cared for in a State Institution;	
	Must not be in receipt of another social grant for him or her.	
<i>NB: All South African Males aged 61 and 62 years will qualify for Grant for Older Person from April 2009;</i>		
<i>Males aged 60 years will qualify for Grant for Older Persons from April 2010; provided they meet the above criteria</i>		
<u>Disability Grant</u>	Must be a South African citizen / permanent resident or refugee;	R 1, 010.00
	Must be resident in South Africa;	
	Must be 18 to 59 years of age if a female and 18 to 62 years of age if a male;	
	Must submit a medical / assessment report confirming disability;	
	Medical assessment must not be older than 3 months at date of application;	
	and spouse must meet the requirements of the means test;	
	Must not be maintained or cared for in a State Institution;	
	Must not be in receipt of another social grant in respect of him or her.	
<u>War Veteran's Grant</u>	Must be a South African citizen / permanent resident	R 1, 030.00
	Must be resident in South Africa;	
	Must be 60 years and over or must be disabled;	
	Must have fought in the Second World War or the Korean War;	
	and spouse must meet the requirements of the means test;	
	Must not be maintained or cared for in a State Institution; and	
	Must not be in receipt of another Social grant in respect of him or her.	
<u>Child Grants: Foster Child Grant</u>	The applicant and child must be resident in South Africa;	R 680.00
	Court order indicating foster care status;	
	The foster parent must be a South African citizen,	

<sup>20</sup> SASSA - Types of grants and their qualifying criteria: <http://www.sassa.gov.za/ABOUT-SOCIAL-GRANTS/TYPES-OF-GRANTS-644.aspx> Accessed 20 October 2012

<sup>21</sup> SASSA – Amounts of Grants as at 01 April 2009: <http://www.sassa.gov.za/ABOUT-SOCIAL-GRANTS/GRANT-AMOUNT-652.aspx> - Accessed 07 November 2012

Type of Grant	The Applicant Requirements (Criteria)	Value of Grant <sup>21</sup>
	permanent resident or refugee;	
	Child must remain in the care of the foster parent(s).	
<u>Care Dependency Grant</u>	The application must be South African citizen or permanent resident;	R 1, 010.00
	The applicant and child must be resident in South Africa;	
	Age of child must be under 18 years;	
	Must submit a medical / assessment report confirming permanent, severe disability;	
	Applicant and spouse must meet the requirements of the means test (except for foster parents);	
	The care-dependent child/children must not be permanently cared for in a State Institution.	
<i>Note: The income of foster parents will not be taken into consideration.</i>		
<u>Child Support Grant</u>	the primary care giver must be a South African citizen or permanent resident;	R 240.00
	both the applicant and the child must reside in South Africa;	
	applicant must be the primary care giver of the child/ children concerned;	
	the child/children must be under the age of 15 years;	
	the applicant and spouse must meet the requirements of the means test;	
	cannot apply for more than six non biological children; Child cannot be cared for in state institution.	
<u>Grant-in-aid</u>	The applicant must be in receipt of a grant for Older Persons;	R 240.00
	Disability grant or a War Veteran's grant, and require full-time attendance by another person;	
	Owing to his/her physical or mental disabilities;	
	Must not be cared for in an institution that receives subsidy from the State for the care/housing of such beneficiary.	

## Appendix B – Hyogo Framework for Action, Indicators and Research Actions

<u>Hyogo Framework for Action Priority Areas</u>	<u>Core Tasks for Disaster Risk Reduction (DRR)</u>	<u>Key Indicators</u>	<u>Researcher Actions</u>	<u>Researcher means to attain data/information</u>
<b>HFA 1 - Making Disaster Risk a Priority</b>	Engage in multi-stakeholder dialogue to establish foundations	Legal framework exists with explicit responsibilities defined for all levels	Disaster Management Policy	Desktop study
	Create or strengthen mechanisms for systematic coordination	District Municipality multi-stakeholder platform	Investigate stakeholders Disaster Management Awareness (Institution and Public)	Desktop study/Fieldwork
	Assess and develop institutional basis	District Municipality policy framework exists that requires plans and activities at all levels	Examine Plans and Activities of Stellenbosch Emergency Management Offices – RA: Lincoln Stander	Desktop study
	Prioritize and allocate appropriate resources	Dedicated adequate resources to implement plans at all levels	Investigate budget allocated to disaster management in municipality	Desktop study
<b>HFA 2. Improving Risk Information and Early Warning</b>	Establish an initiative for country wide risk assessments	National risk assessment based on hazard and vulnerability info/data and include risk assessment for key sectors	Investigate the existence of a Risk Assessment	Desktop study
	Review availability of risk related info and capacities for data collection and use	Systems are in place to monitor, archive and disseminate data on hazard and vulnerability	Investigate the availability of a database where monitoring of hazards and data storage exists.	Desktop study
	Assess capacities and strengthen early warning	Early warning in place for all major hazards	Analyse the early warning system that is in place at Local Municipality Level	Field Work
	Develop communication and dissemination mechanisms	Early warnings reach and serve people at community level	Review early warning system as implemented at community level	Field work

<b><u>Hyogo Framework for Action Priority Areas</u></b>	<b><u>Core Tasks for Disaster Risk Reduction (DRR)</u></b>	<b><u>Key Indicators</u></b>	<b><u>Researcher Actions</u></b>	<b><u>Researcher means to attain data/information</u></b>
<b>HFA 3. Building a culture of safety and resilience</b>	Develop a programme to raise awareness	Municipal awareness strategy exists that reaches all communities and people of all education	Investigate if SLM has an awareness strategy/programme in place	Desktop study
	Include DRR in education system and research community	School curricula includes DRR elements and instructors are trained in DRR	Examine the awareness of Disaster Risk Reduction within Schools in Kayamandi	School - Field work
	Develop DRR training for key sectors	Have plans in place where training of key stakeholders are priority	Investigate if SLM incorporates DRR training with their awareness programmes/strategy	Field work
	Enhance the compilation, dissemination and use of DRR info	Incorporating DDR information into skills development.	Analyse the perception and understanding of DRR of stakeholders	Community - Field work
<b>HFA 4. Reducing the Risks in Key Sectors</b>	Environment: incorporate DRR in environmental and natural resource management	Environmental protection and natural resource management and climate change policies include DRR elements	Investigate the existence of DRR in other policies and plans such as Environmental Management Policies	Desktop study
	Social needs: establish mechanisms for increased resilience of poor and most vulnerable	Specific policies and plans are implemented to reduce vulnerability of impoverished groups	Investigate the existence of institutional coping mechanisms that are in place, e.g. Social Grants	Desktop study
	Physical planning: establish measures to incorporate DRR in urban and land use planning	Land-use development zoning, plans and building codes exist, include DRR elements and are strongly enforced	Analyse land use planning, building plans and codes and if it concentrates explicitly on DRR	Desktop study

<b><u>Hyogo Framework for Action Priority Areas</u></b>	<b><u>Core Tasks for Disaster Risk Reduction (DRR)</u></b>	<b><u>Key Indicators</u></b>	<b><u>Researcher Actions</u></b>	<b><u>Researcher means to attain data/information</u></b>
	Structures: strengthen mechanisms for improved building safety and protection of critical facilities	Long term programme to protect schools, health facilities and critical infrastructure from common natural hazards	Investigate the existence of Operations and Maintenance documents/plans/programmes, in order to ensure structural longevity	Desktop study
	Stimulate DRR activities in production and service sector	Procedure in place to assess the DRR implications of major infrastructure project proposals	Investigate the projects and plans of major infrastructures and assess whether concerns of DRR exist within these plans	Desktop study
	Financial/economic instruments: create opportunities for private sector involvement in DRR		Investigate the role of private institutions in DRR	Field work
	Disaster recovery: develop a recovery planning process that includes DRR	Plans that incorporate relief, recovery and rehabilitation into DRR	Study Local Municipality Disaster Management plans and highlight existence of relief, recovery and rehabilitation	Desktop study
<b>HFA 5. Strengthen Preparedness for Response</b>	Develop a common understanding and activities to support preparedness	Disaster preparedness and contingency plans at all levels with regular training drills and rehearsals to test and develop disaster preparedness and response	Examine the operations and schedule plans of Disaster Management team and if training and test take place to equip the department with proper preparedness	Desktop study – existence of plan. Field work – are departments prepared properly.
	Assess preparedness, capacities and readiness	Independent assessment done, responsibilities for implementing recommendations and resources schedule assigned	Investigate the existence of monitoring plans of the department, if actions are made with regards to assessments and if they have adequate resources to fulfil these actions	Desktop study

<u>Hyogo Framework for Action Priority Areas</u>	<u>Core Tasks for Disaster Risk Reduction (DRR)</u>	<u>Key Indicators</u>	<u>Researcher Actions</u>	<u>Researcher means to attain data/information</u>
	Strengthen planning and programming for response, recovery and rehabilitation	All organisations, personnel and volunteers responsible for maintaining preparedness are equipped and trained for effective disaster preparedness and response	Investigate whether DM departments or organisations hold training sessions regularly and if assessments are made on organisation, volunteers and personnel	Field Work
		Financial and contingency mechanisms are in place to support effective response and recovery	Investigate the financial budget allocated to the DM department in order to fulfil its daily functions and at times of Disaster.	Desktop study
		Procedures are in place to document experience during hazard events and disasters and to undertake post event reviews	Investigate whether responsible authorities monitor and document experiences throughout hazard events and disasters and if post disaster reviews are done	Desktop study

## **Appendix B.1 – Informative Consent form for Community/Residents**



### **UNIVERSITY OF THE WESTERN CAPE**

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Private Bag X17 • Bellville, 7535 • South Africa

Tel +27 (0) 21 959 2421 Fax +27 (0) 21 959 3422

Email: [fdewet@uwc.ac.za](mailto:fdewet@uwc.ac.za)

A research project on Water Accessibility and Social Vulnerability is being conducted by Winston J. Harris in the Department of Geography and Environmental Studies at the University of the Western Cape. The purpose of this study is to find out how households cope when they are vulnerable to water shortages caused by nature, people or government.

You are being asked to take part in this study by answering the following questions honestly and to the best of your knowledge. Your participation will take approximately 30 minutes of your time. Please be aware that you may stop the interview at any time. You do not have to answer any questions or discuss any issues that may arise during this conversation/interview if you do not want to.

Your responses will be provided anonymously to protect your privacy.

If you are experiencing any discomfort while participating in this study due to the questions that you are being faced with, please be aware that you may contact Prof. Sally Peberdy of the University of the Western Cape on 021 959 2626.

The study aims to promote a greater understanding of the threats that the community faces and the coping mechanisms they set in place. Your participation contributes largely to the

understanding of the researcher and the relationship the community has with their water resources.

If you agree to voluntarily participate in this research project as described, please indicate your agreement by completing the attached questionnaire with supervised assistance. Please retain this consent cover form for your reference.

\_\_\_\_\_  
Reference Number

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Date



## Appendix B.2 – Informed Consent form for Responsible Personnel



### UNIVERSITY OF THE WESTERN CAPE

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Tel +27 (0) 21 959 2421 Fax +27 (0) 21 959 3422

Email: [fdewet@uwc.ac.za](mailto:fdewet@uwc.ac.za)

#### ***Consent to Participate in Research Study: Experiences of Social Vulnerability in Indigent households related to Water Service Delivery in Kayamandi, Stellenbosch***

Dear Sir/Madam

You are asked to participate in a research study conducted by **Winston Harris**, enrolled for the **MA in Geography and Environmental Studies** degree at the University of the Western Cape. You were selected as a participant in this study because you are involved or share a relevant interest in service delivery.

**Purpose of the Study:** The study examines problems associated with service delivery or the lack thereof. The research will concentrate on how these problems are mitigated by role-players of the community. Role-players include responsible authority (govt. institutions), other organisation, and community residents. The researcher aims to answer the question which asks: ***What are the existing social and institutional mechanisms that reduce the cause's social vulnerability within Kayamandi, Stellenbosch?***

**Procedures:** By volunteering to participate in this study, you consent to an interview focused on your interest in service delivery. There might possibly be a follow up interview, for which consent given applies as well.

**Potential Value of Study:** The nature of this study would bring value to society with regards to highlighting areas in need of attention and thus reduce unnecessary repetition.

Identification of role-players that are highly concentrated within water service delivery and general service delivery would produce an organogram of personnel, which provides more inclusive and informed action. Findings and information gained through this study can serve as a reference to future research, specifically pertaining to social vulnerability and social and institutional networks involved in water service delivery.

**Confidentiality:** Any information that is obtained in connection with this study and that can be identified with the interviewee will remain confidential and will be disclosed only with the permission of the participant

**Participation and Withdrawal:** Please be aware that you are not required to participate in this research and you may discontinue your participation at any time without penalty. You may also omit any items on the questionnaire(s) if you prefer not to answer.

I, \_\_\_\_\_, hereby voluntarily give my consent to participate in this study.

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Reference Number

## Appendix C – Questionnaire for Community Residents

### Section A: Sample Demographic

#### 1. Demographic Table

		Household Members							
		1	2	3	4	5	6	7	8
Age									
Sex									
Employment Status	Full Time								
	Part Time								
	Unemployed								
Employment Type	Formal								
	Informal								
Education Status	No Schooling								
	Some Primary								
	Completed Primary								
	Some High School								
	Completed High School								
	Tertiary								

	<b>Participation</b>								
<b>Social Grants - Type</b>									
<b>Household Type</b>	<b>House in separate yard</b>								
	<b>Flat</b>								
	<b>Semi-detached</b>								
	<b>Backyard</b>								
	<b>Informal</b>								
<b>Tenure Status</b>	<b>Own Fully Paid</b>								
	<b>Own Not Paid</b>								
	<b>Rented</b>								
	<b>Occupy Rent Free</b>								
	<b>Other</b>								

**Section B: Water Accessibility**

**1. Where do you access your water from?**

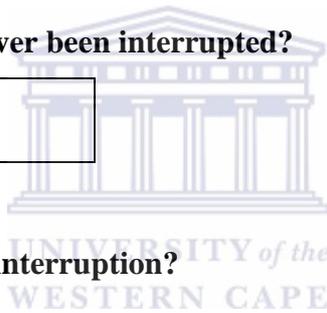
Inside Dwelling	Outside Dwelling	Community Standpipe	None	Other

**2. What do you mainly use your water for?**

<u>Water usage</u>	Yes	No
Bathing		
Dish Washing		
Clothing Washing		
Cooking		
Gardening		
Car washing		
Other: _____		

**3. Has your water supply ever been interrupted?**

Yes	No
-----	----



**a. What caused the interruption?**

---

**b. What did you do get water?**

---

**4. Have you ever used water from the river for the following purposes:**

<u>Water usage</u>	Yes	No
Bathing		
Dish Washing		
Clothing Washing		

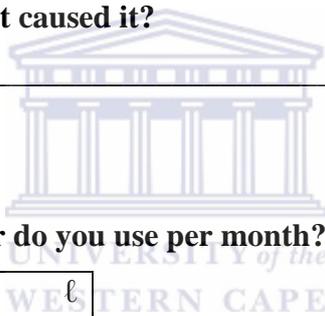
Cooking		
Gardening		
Fishing		
Swimming		
Other: _____		

5. Do you know any other households that went without water for a while?

Yes	No
-----	----

a. Do you know what caused it?

---



6. How many litres of water do you use per month?

R	ℓ
---	---

### Section C: Experiences of Disaster

1. Have you ever experienced the following:

Type	Yes	No	When	Duration
Flood				
Fire				
Sickness				
Broken Water Pipes				
Leakages				

2. What did you do to decrease the severity of the problem?

---

**Section D: Public Participation**

1. Has anyone in the household ever attended community meetings?

Yes	No
-----	----

a. Who arranged the meeting?

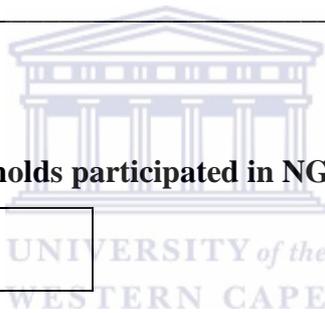
---

b. What was the meeting about?

---

2. Has anyone in the households participated in NGO projects?

Yes	No
-----	----



a. What activities took place?

---

b. Did you experience any problems?

Yes	No
-----	----

c. Rate your overall experience

Awful	Bad	Fair	Good	Excellent

**3. Has anyone in the household participated in government projects?**

Yes	No
-----	----

**a. What was the project about?**

---

**b. Did you experience any problems?**

Yes	No
-----	----

**c. Rate your overall experience**

Awful	Bad	Fair	Good	Excellent



## **Appendix D – Non Profit Organization Questionnaire**

### **Section A: Organization Background**

- 1. Could you tell me more about your academic background, the position and how you came about attaining this position and generally what your position entails within the organization.**
- 2. Considering the rest of the organization, what other roles does the organization fulfil?**
- 3. What type of projects does the organization mainly concentrate on?**
- 4. How does the organization ensure that the intended benefits of these projects reach the communities that it is intended for?**
- 5. When these projects are implemented, what are the community's perceptions of these benefits?**
- 6. If the organization relies on funding, where does the funding come from?**



### **Section B: Kayamandi Involvement**

- 1. Where does the majority of the organisations work take place?**
- 2. With keeping Kayamandi in mind, how often does the organisation work with other social/community projects run by other organisations?**
- 3. Can you recall projects ran within Kayamandi that you think made the biggest impact with regards to improving the lives/lifestyle of the people within the community?**
- 4. In your opinion, what are the major problems faced by poor/indigent households in Kayamandi and how do you think such problems could be dealt with to decrease the impacts upon the community?**

### **Section C: Concentration on Disaster Management**

- 1. With the projects that the organisation has implemented and assisted on, do you think that any of them have a connection to reducing potential risks within the community?**
  
- 2. Can you think of any project that were directed to:**
  - a. Disaster Management**
  - b. Health and Sanitation**
  - c. Water Management**
  
- 3. How does the organisation receive notification of possible events that they could assist in?**

### **Section D: Public Participation**

- 4. With regards to public/community meetings, how well has the community attended to these meetings**
  - a. Who arranged the meeting?**
  - b. What was the meeting about?**
  
- 5. Does the organization allow residents of the community to participate within the projects?**
  - a. What activities are mainly**
  - b. Did you experience any problems?**
  - c. Rate your overall experience with working with community residents.**

- 6. Has the organization participated in government projects?**
- a. What was the project about?**
  - b. Did you experience any problems?**
  - c. Rate your overall experience with working with government departments.**
- 7. Is there anything that you would like to add regarding water accessibility within Kayamandi, or any general comments about service delivery**



## **Appendix E – Questionnaire for Responsible Authority**

### **Section A: Department Background (for all)**

- 1. Could you tell me more about your academic background, your position within the department and generally what your position entails?**
- 2. Is it possible for you to give me a brief background of the department and what the objective of the department is?**
- 3. What is the extent of the department's area of responsibility and to whom are you responsible?**
- 4. Could you please mention the different stakeholders and role players that the department normally interact with when planning/implementing a project?**
- 5. What is the overall concentration of these projects?**

### **Section B.1: Disaster Management Centre**

- 1. In your perspective, do you see the intent of the Disaster Management Plan, to engage with other stakeholders, come across as concrete?**
  - a. How often do the stakeholders of Disaster Management get together to discuss matters of interest?**
- 2. When community meetings are held, if any, does the community show any interest to keep Disaster management as a topical issue?**
- 3. What is the early warning protocol that is held within Stellenbosch?**
  - a. Who are the recipients of these warnings**
- 4. Is there any activity in place to monitor the early warning systems and their implementation**
- 5. What would you suggest to improve the penetration of the early warning system within communities?**
- 6. Does DRR training take place concurrently with awareness programmes?**
  - a. Does training occur only for the employees of government institutions, if not, to which other entities does the DMC offer DRR training to?**
- 7. What role/relationship do private institutions have with the DMC?**
  - a. Would it be possible for you to mention which institutions assist the department with disaster management?**
- 8. What equipment does the municipality have in place against shocks such as:**
  - a. Flooding**



- a. **If the WMD was not mentioned: Has the WSA considered to implement a water management device to assist in decreasing over consumption and waste?**
- 10. Taking into consideration the Stellenbosch Municipal Authority, what are the current constraints that the municipality has that may limit water accessibility to Kayamandi?**
- 11. With regards to the social responsibility role that the WSA has with its public, what awareness programmes have been established to bring about water use behavioural change?**
  - a. **What are the themes and interested areas that are addressed within the WSA's awareness programmes?**
- 12. What are the major expenditures with regards to the budget allocated to the department?**

**Section C: Disaster Management Activity within Department (for all)**

- 1. What protocol does the department follow when a disaster is experienced?**
- 2. Does the Department render any assistance to displaced persons?**
  - a. **If Yes – Where are the viable locations that the department suggests people in need should be relocated?**
- 3. Within the awareness campaigns of the department, are there any considerations towards disaster awareness and preparedness?**

**Section D: Public Participation (for all)**

- 8. With regards to public/community meetings, how well has the community attended to these meetings**
  - a. **Who arranged the meeting?**
  - b. **What was the meeting about?**
- 9. Does the department allow residents of the community to participate within the projects?**
  - a. **What activities are mainly fulfilled by the community?**
  - b. **Did you experience any problems?**
  - c. **Rate your overall experience with working with community residents.**

**10. Has the department allowed community organizations to participate in government projects?**

- a. What was the project about?**
- b. Did you experience any problems?**
- c. Rate your overall experience with working with other community organizations.**

**11. Is there anything that you would like to add regarding water accessibility and/or disaster management/risk reduction within Kayamandi, or any general comments about service delivery**



## Appendix F – Database Management System (DBMS)

