

**RURAL WATER RESOURCES:  
AN EXPLORATION OF ACCESS, USAGE, CHARACTERISTICS AND  
IMPLICATIONS FOR RURAL HOUSEHOLDS AT IVUNA NONGOMA  
KWAZULU-NATAL**

THESIS

BY

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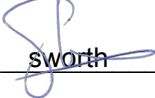
## DECLARATION

I hereby declare that this dissertation is my own original, authentic and independent work. All the sources used have been acknowledged by means of complete references.

It is being submitted for the Degree of M Agric. (Rural Resource Management) at University of Kwa-Zulu Natal. It has not been submitted before for any other degree of examination at any other university.

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Date 16/03/2018

## **Dedication**

This dissertation is dedicated to my late grandmother

Bellina Sizaka Mnguni

My late parents

Allian and Paulinos Kunene

and my late brother and sister

Menzi Romanus & Nokwazi Emmerentia Kunene

## ABSTRACT

Water plays a very important role in our lives as said by the poet, Mazisi Kunene. Water is vital for human survival and livelihoods. In addition, enough supply of clean drinking water for household use and economic development is perceived as an important tool for addressing inequalities of water distribution of the past in South Africa. Improvement in water supply can redress vulnerability experienced by rural communities through water scarcity. An increased understanding of the impact of water on livelihoods of rural dwellers is important for sustainable development.

Although studies on water sources have been conducted in the past, this is the first study in the Nongoma area.. This thesis examines the accessibility and manageability of different water sources to local people with the aim of providing a set of recommendations based on the research findings. It is imperative to note that government has committed itself to the provision of free basic water for those who cannot afford to pay for the service. In reviewing existing studies on present water coverage by the government, particularly in rural communities, it is clear that this goal will not be achieved in the near future. Itshodo area at Ivuna, where the research for this thesis was conducted, is even worse of in terms of water scarcity. Thus, this study attempts to fill the gap in current research by investigating water sources and their impact at Ivuna area in Nongoma.

The Zululand municipality as a whole is stricken by a severe water shortage, as evidenced in current studies. Through a literature review, focus group sessions with the local people and interviews with key informants, the researcher discovered that the Ivuna community is vulnerable to water scarcity. Urban-biased development, a high unemployment rate, and exclusion of water beneficiaries in the decision making processes are contributory factors to both scarcity and management of water resources. Study findings confirm that the ability to access clean water locally promotes local production of agricultural produce and other income generating projects.. It has a direct proportional inverse to food security, improvement of living standards and poverty eradication in rural areas worldwide. Improvement in water supply and management will have a positive bearing on rural communities if decision makers involve water beneficiaries who will use this resource productively.

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This thesis is dedicated to my late grandmother Bellina Mnguni. I am what I am because of you and still continue with what you wished me to do. To my late mother Allian, my father Paulinos, my brother Menzi, my sister Nokwazi, Hlengiwe, and Mrs Hildegard P. Ngcobo, may the Lord God find a peaceful rest for you in His Heavenly Kingdom.

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## ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune deficiency syndrome
AusAID	Australian Agency for International Development
CISR	Council of Scientific & Industrial Research
DFID	Department of Foreign and International Development
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWARF	Development Welfare and Research Foundation
FAO	Food and Agriculture Organization
HDR	Human Development Report
HIV	Human Immunodeficiency virus
IFPRI	International Food Policy Research Institute
IWMI	International Water Management Institute
KZN	Kwa-Zulu Natal
DPLG	Department of Provincial and Local Government
MDG's	Millennium Development Goals
MTN	Mobile Telephone Network
NENA	Near East and North Africa
NGO	Non- Governmental Organizations
OXFAM	Oxford Famine Relief Agency
RDP	Reconstruction and Development Program
SAPA	South African Press Association
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihood Framework
UN	United Nations
UNICEF	United Nations International Children's Fund
UNHCR	United Nations High Commissioner for International Development
UNFPA	United Nations Fund for Population Activities
VIP	Ventilated Improved Pit Latrine
WHO	World Health Organization
WRC	World Resource Commission
WWDR	World Water Development



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## CHAPTER ONE: THE PROBLEM AND ITS SETTING

The provision of clean water supply is among the most critical challenges for achieving global sustainable development over the next decade. However, South Africa is one of those few countries worldwide that enshrines the basic right to sufficient, clean water supply to all people in its Constitution, stating that, “Everyone has the right to have access to clean sufficient food and water” Constitution of the Republic of South Africa 27 (1) (b). However, much remains to be done to fulfil this right. South Africa is a country where water is very scarce and a precious resource. Many parts of South Africa, such as the KwaZulu-Natal Midlands, do not have sufficient rainfall and many prolonged droughts pose ever-present threats of water scarcity in all regions of the country. Further, “although their time has lapsed, water was intrinsically interconnected with the Millennium Development Goals and basic sanitation was added to the catalogue at the 2002 World Summit on Sustainable Development in Johannesburg (Bosch, Hammann, Rubio, Sedaff & Travers, (2001:126). They further stated that one of the numerical and time-bound targets defined for the MDG’s was to halve the proportion of people without sustainable access to portable water and basic sanitation. The World Health Organization (WHO) estimated that globally, in 2004, 1.1 billion people, the majority living in rural areas, did not have access to sufficient safe water, others set this at 1.3 billion (Bosch, Hammann, Rubio, Sedaff & Travers, 2001:126). “In South Africa this constituted 1% of urban and 17% of rural dwellers” (WHO, 2008). Thus, access to clean water supply is a critical development issue, globally and in South Africa, especially in rural areas.

### 1.1. Background

South Africa is a country consisting of nine provinces (as seen [Figure 1](#)) where water is very scarce and a precious resource. Many parts of South Africa, such as the Ivuna area of KwaZulu-Natal, where the study was conducted, do not have enough water due to prolonged droughts.

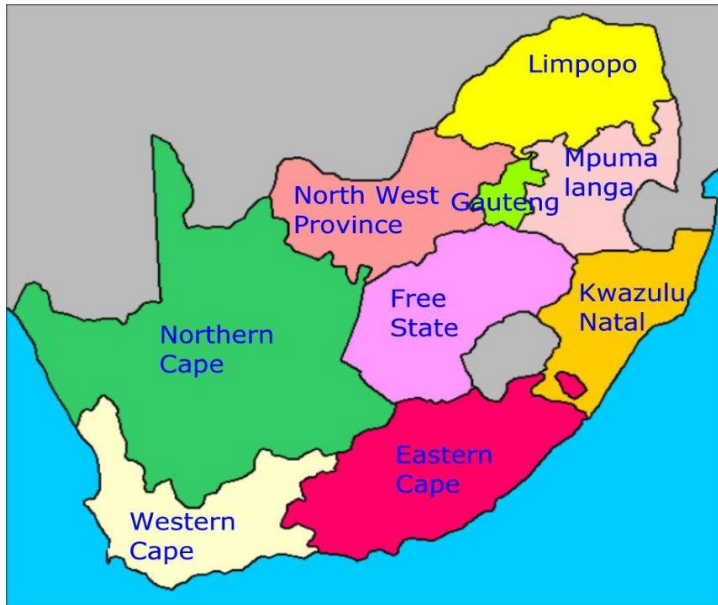


Figure 1: Map of South Africa

Ivuna is a rural area located in KwaZulu-Natal Province within Nongoma Local Municipality. Nongoma is in the Zululand Region, situated in the North-Eastern part of KwaZulu-Natal. The Nongoma district lies between the North Coast region of Ulundi in the East and Pongola village in the West. Ivuna is dependant directly on water from natural sources.

The water scarcity situation at Ivuna suggests a link between water issues and livelihoods. Some researchers focused on approaches that put emphasis on the community water resources rather than putting people centre-stage as expected by the livelihoods (Calow & Nicol, 2005). They further state that previous studies were primarily concerned with the water sources themselves, which tended to divert attention from the more important issue of how people access and use water, in combination with other assets, to sustain their livelihoods. Developing an understanding of the role water plays in supporting livelihoods through health, economic (production and income) and environmental effects and linkages, makes it easier to predict the effects of water interventions on different groups (DFID, 1999). This in turn may indicate which types of water interventions can do the most to reduce poverty (Majale, 2002: 94; Calow & Nicol, 2005). This study will investigate how rural water resources impact on rural households.

Although the provincial water agency, Umngeni Water, does have small water projects such as construction of dams and boreholes at Zululand, there is no information available documenting these interventions to provide access to clean water. At the time of this research, a larger water scheme from the Black Umfolozi river, including the Ivuna area to Ezilonyeni was in its implementation stage. The researcher felt that such a project may not be of benefit to the people in the study area. Black Umfolozi is frequently affected by drought, and therefore not reliable.. Research was supposed to be conducted before its implementation because of the low water levels in the Black Umfolozi (core to the project) which, if verified, would result in the continuing need to transport water to the area from the Uphongolo River, suggesting that the proposed water project would not be solving the present water scarcity problem.

Many rural households then continue to rely on unsafe water sources such as rivers, streams and dams. Therefore, if possible, tap water should be supplied, although Itshodo under Ivuna area is the only area where piped salt water is available. More coverage to other areas needs to be improved as presently there are no opportunities for home-based income generating activities like pottery (izinkamba) due to water scarcity. If there was sufficient water supply, there would be increased opportunities for home-based activities which would lead to improved employment, productivity and income. Non-water income-generating activities such as dress-making and baking are still improbable due to the travelling of long distances to water sources, queuing for water and the physical strain of carrying water back home. Therefore the Ivuna community remains vulnerable to food insecurity through economic insecurity.

However, the issue is broader than mere access. The supply of safe drinking water and basic sanitation contribute to sustainable improvements in people's lives regarding their health and education, both pre-conditions for productive employment, as well as for the reduction of extreme hunger and the empowerment of women. 'Conditions such as dysentery, diarrhoea, fevers and hepatitis are water-borne and can be classified as faecal-oral diseases since they are transmitted by the consumption of polluted water with faecal matter (WRC Report, 1998:2). According to WHO and UNICEF, 2003 (cited in Human Development Report, 2006:112), "coverage on sanitation programmes is still backwards while studies indicates an unavoidable linkage between water-borne disease and child mortality on one side and lack of water and adequate sanitation on the other".

Water related issues also have a gender dimension, as women and female children are largely responsible for collecting and managing household water worldwide (Forster 1994: 80). As a regular and clean water supply is essential for human health survival and for food security, poor water access can perpetuate gender and other inequalities (e.g. class, race). The relationship between gender and water is complex and dynamic (Wallace & Coles, 2005). Efforts to improve water access should be grounded in gender analysis as social relations will influence the outcome of water policies and programs.

Further, securing a water supply for the household has significant consequences both in terms of time and monetary costs. At the same time, insufficient and inadequate water supply result in increased health risks for the population and a higher morbidity and mortality due to water related diseases (Kariuki, 2008:91-105). Improving the water supply will have a positive impact on individual income and will alleviate the overall poverty of the beneficiary household. By reducing the time and energy burden of water collection and by providing safe water at a closer distance, household members will be free to engage in productive and income generating activities. (Khoza, 2000:5-6). Improved water quality will reduce the health risks and associated costs of prevention and treatment of family member's. Furthermore, the reduction of working days lost to water-related diseases will have a positive impact on the household's income situation (Khoza: 5:6).

Access to clean water supply for survival and basic needs is particularly a rural problem, as infrastructure coverage is less in rural than in urban areas. Arguably, water for livelihoods may be most critical in rural areas where formal employment opportunities are limited, and people are forced to draw on available assets, including the natural resource base, and engage in a wide range of activities to make ends meet. It is, thus, important to take livelihood uses into account when planning rural water service provision.

Improved water supply has a positive impact on primary education through several channels. Relieving girls from their water fetching duties can improve their school attendance. Both boys and girl's school attendance and educational achievements improve significantly with reduced health-risks and better nutritional status from improved water supply as well as reduced injuries and strain from water carrying in particular for girls (Khoza, 200:12-15). It is stated that early childhood diarrhoea can result in permanent effects on brain development with the resulting impact on a child's learning achievements (Khoza, 2000:24-28).

A reduction in maternal mortality depends strongly on the water supply, as poor water systems are a major contributing factor to poor maternal health caused by contaminated water and poor hygiene practices which can lead to infection, slow postnatal recovery and even death. Good water supply facilities will reduce the number of miscarriages by reducing the need to physically carry water and by making home birth safer. (Kerr, 1989:196-202). Therefore, sufficient water supply can improve the living standards of Ivuna area and decrease not only maternal death rate but the community death rate as a whole. A clean water supply can have a positive impact on the country as a whole. The South African water service providers are faced with a number of key challenges mentioned above. (Hall, Leatt & Monson, 2006: 58).

## 1.2. Definition of terms

To facilitate the reading of this thesis, a number of terms are defined as they are used in this study.

<b>Absolute water scarcity:</b>	According to Falkenmark, (1986), a country faces absolute water scarcity when water resources are below 500m <sup>3</sup> per capita.
<b>Acceptable water:</b>	WHO (2010) stands for water facilities and services, which are culturally appropriate and sensitive to gender, lifecycles and privacy requirements.
<b>Accessible water:</b>	WHO (2010) defends that the water source has to be within 1km of the home and the collection time should not exceed 30 minutes.
<b>Disadvantaged:</b>	In this study disadvantaged refers to not having fair access or opportunity to water supplies.
<b>Drought:</b>	Is “a period of abnormally dry weather which persists long enough to produce a serious hydrologic imbalance” (Cech, 2010:66).
<b>Elderly:</b>	In this context elderly refers to those who may suffer from lack of mobility due to age.
<b>Food Security:</b>	Viljoen (2005:199) defines food security as a condition whereby people’s economic as well as physical access to a supply of food, sufficient in both quality and quantity at all times, regardless of climate, harvest, social level and income. Food security is an objective of every family and household, whether in urban or rural areas. A household is food secure if it can reliably gain access to food of a sufficient quality and in quantities that allow all its members to enjoy a healthy and active life. The FAO (2002: 2) defines food security as “a situation that exists when all people, at all



times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. Food security can be measured at different levels from the household to the national. It has been observed, however, that even in food-secure households, individuals may still have deficient or unbalanced diets (IFPRI, 2004).

- Groundwater:** Refers to water found within the pore spaces of geologic material beneath the surface of the earth (Cech, 2010:104).
- Household:** A household consists of one or more people who live in the same dwelling and also share meals or living accommodation and may consist of a single family (Moser, 1989:21).
- Livelihood:** A person’s livelihood refers to their “means of securing the basic necessities such as - food, water, clothing and shelter” (Elasha, Ahmed, and Zakeildin, 2005: 27). Livelihood is defined as a set of activities, involving securing water, food, medicine, shelter and clothing. It must have the capacity to acquire the above necessities working either individually or as a group and be capable to use endowments (both human and material) for meeting the requirements of the self and his/ her household on a sustainable basis with dignity. The activities are usually carried out repeatedly (Elasha, Ahmed, and Zakeildin, 2005: 27).
- Portable water:** In this study, it refers to water suitable for drinking.
- Safe water:** Is water free from chemical substances and micro-organisms in concentrations which could cause illness in any form (WHO, 1989: 9).
- Sufficient water:** Means that people have access to 50-100l per day to ensure the most basic needs (WHO), (2010).
- Water pollution:** Water is considered to be polluted if it is unusable for a particular purpose.
- Water quality:** Is a term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for an intended purpose. These characteristics are controlled or influenced by substances, which are either dissolved or suspended in water. Natural processes such as chemical reactions between rocks and water, erosion and sedimentation caused by flowing water, percolation of surface water into groundwater aquifers, and the residence time of water stored in rivers, lakes and wetlands, and aquifers- can all create or compound pollution. In some locations, water is naturally of such poor quality that plants and animals cannot survive (DWAF 1996:2).

**Water Resources:** These are sources of usually fresh water that are useful, or potentially useful, to the society, this water is used for household tasks, agricultural production and industrial use. There are various sources of water like groundwater, rivers, lake and reservoirs (Cech, 2010: 5).

**Water Scarcity:** Is the lack of sufficient water resources to meet the demands of water usage within a region. In South Africa, like everywhere else in the world, water is becoming a scarce resource and a crucial one (Stone, 2009:46-53). This is particularly because both people and industries need water and electricity for their survival. However, moving water over long distances from dams or rivers to sustain industries and people living in towns and cities is often no easy task, due to the fact that such dams are not conveniently located.

### **1.3. Research Problem**

Worldwide, the availability of water is rapidly becoming a major issue. Referring to work done by Schmandt (2001) and Sigenu (2006:1), “Water stress and water scarcity will increase as global population increases. Sigenu (2006:1) argued further, citing research done by the International Water Management Institute (IWMI (2000:1) that by 2025, 1.8 billion people will live in countries or regions with absolute water scarcity (Sigenu 2006:1). The fact that the majority of the countries expected to be affected are Sub-Saharan Africa clearly suggests that South Africa will be among those countries. Sigenu (2006:1) citing research done by Ravenga and Cassar (2002), finally posits that those mostly likely to experience water shortage and water scarcity will be people who live in the “remote rural areas in Africa”. Ivuna is one such area.

Statistics suggest that efforts to an improvement in water supply, such as in progress in the study area, will have limited impact. Although the government has made efforts in the study area to increase access to water supply through provision of shallow wells and boreholes, these services are not repaired once broken, and the water scheme from Black Umfolozi to supply Ivuna area is only for domestic purposes. This suggests that the Water Service Act does not address wider livelihood issues and therefore is not a sustainable livelihood strategy. DFID (1999) suggested that it is essential to develop an understanding of the role water plays in supporting livelihoods through health and economic empowerment to inform water strategy policy.

By use of an in-depth case study, this thesis will highlight how rural water resources impact on rural households, particularly in the context that the problem is escalating at an alarming rate as less and less rainfall is experienced in the Zululand region in which the study area is situated. The findings will help formulate strategies that will assist Ivuna and communities similar to it that rely on unsustainable water sources and of which they themselves will need to develop resilience to face the challenges ahead

As a corollary to this main problem, two other issues emerged. First is the effect of water shortages on food security. Agriculture is vital for food security, rural development and poverty alleviation but is one of the most vulnerable sectors to water scarcity. Second is that water shortages limit economic growth at household and community levels. Decreased amounts of cattle and reduction in, and often full abandonment of, agricultural food production are the result of lack of water for irrigation. This has forced large numbers of rural dwellers to agree on minimal prices when selling their products. With reduced income, rural dwellers' purchasing power decreases, ultimately leading to undesirable change in diets and nutrition value of food they consume (Machete 2011).

#### **1.4. Research question**

It is acknowledged that water scarcity causes a poor supply of adequate clean water to rural communities. Water scarcity further exacerbates poverty. Poverty is further compounded by high unemployment rate which is prevalent in rural communities. The climate appears to be changing, increasing water scarcity. Impact on water availability is unpredictable. It is acknowledged that rural communities are lacking in industries. Therefore, potential employment is only farming. Seasonal rainwater falls appear to be lessening. Investing money on agriculture is unreliable. Farming is dependent on water. Therefore, water scarcity exacerbates vulnerability of rural communities to all the factors of the deprivation trap. The primary question of the study is: What is the impact of water scarcity on the people's life? The study further addresses the sub-problem: How does water scarcity impact on rural households?

#### **1.5. Objectives**

The overall intention of the dissertation is to understand the impact of water scarcity in the study area. It seeks to identify and understand the different water sources available. It aims at

exploring the usage of water, such as income generating activities, from these water sources, based upon availability, quality and accessibility. It goes further to identify priorities for usage such as domestic tasks, health considerations and income generating activities.

The dissertation also aims at contributing to documented work in the study area, it intent to getting urgent attention directed to relevant stakeholders.. Attention of the study area could improve clean water supply. It can further improve people's quality of life. Presently it is even hard to get a map showing infrastructure such as water sources in the study area. Understanding and knowing that some rural communities are still experiencing hardships in getting water is vital. Such knowledge to decision makers can speed up implementation of water supply projects. Rural communities can also get sustainable development projects. Those projects can release rural dwellers from deprivation trap.

The specific objectives of the study were as follows:

- a) Establish the extent of water scarcity at Ivuna including investigating water resources and their use;
- b) Determine the impact of water scarcity on the households at Ivuna;
- c) Establish what aspects of the households are particularly affected and to what extent they are affected; and
- d) Establish the nature of vulnerability at Ivuna.

A key element is how these factors affect vulnerability. Results will provide recommendations for Ivina area to be incorporated into the decision making process by the local municipality with regards to water supply. Although the data cannot be generalized, the information from the study could shed light to other water service providers in solving water supply problems.

## **1.6. Ethical considerations**

Babbie and Mouton, (2005:520) contend that ethical issues arise out of interaction with other people, other beings (such as animals), and the environment, especially where there is potential for, or is, a conflict of interests. They further explain that ethical conduct entails conforming to the standards of conduct of a given profession or group. It can be seen that, fundamentally, ethics is concerned with morality, that is, with what is right or wrong. The researcher approached local traditional authorities in order to conform to cultural standards of the rural

setting. The targeted traditional authorities and Mr. Nsele in [Figure 2](#), were asked for permission to conduct the study. Permission was granted to conduct such a research within Ivuna area demarcation. Therefore, there was no un-lawful intrusion in the study area.



*Figure 2: Mr M Nsele, a local headman*

### **1.7. Structure of the dissertation**

In addition to this chapter, the thesis consists of four chapters focusing on the following:

**Chapter 2: Literature review:** The literature in this study focuses on the Water Act of 1998, the Water Service Act 108 of 1997, Free Water Act of 2000 and the Constitution Act of 1996, the role of water in society and within households. It is further sub divided into water from a social perspective which covers the following: water and tradition, beliefs and attitude, water and gender, water and age, water and conflict, and water and its impact on development. Water on an economic perspective is also discussed in this chapter, which is further subdivided into water and food security, and water and income generation. The literature further looks at water and health perspectives where the following sub-headings are discussed: the burden of carrying water, human activity where hygiene behaviour, personal hygiene, household hygiene and community hygiene are discussed including water and sanitation. This review will use literature from other scholars to interpret and make sense of the findings in the area of study.

The literature goes on to cover an environmental perspective which is subdivided into water as a natural resource discussing springs, lakes, rivers and streams. It covers artificial catchment and distribution where dams, boreholes wells and water harvesting are covered. Also discussed is methods of artificial distribution such as reticulation (taps) and storage tanks (fixed and mobile). It discusses water and climate change including floods and droughts. This chapter further investigates and discusses livelihoods to include the concept of livelihoods, framework livelihoods, assets and vulnerability and the interplay between livelihoods and water.

**Chapter 3: Research Methodology:** Chapter three outlines the research methodology applied in this study. This chapter presents the research design highlighting the research approach. It further discusses sampling methods applied and how study population was selected. Selection of focus groups is also discussed and how data was collected. Data analysis method is also discussed in this chapter. The research instruments are discussed covering how the pilot study and field visits were conducted. The study area is discussed in this chapter together with the rationale of the study followed by the conclusion.

**Chapter 4: Data findings and analysis:** Chapter four is a detailed analysis of the data collected on the impact of rural water resources on rural households. The first section covers the demographics of respondents and employment status. It is followed by sources of water that they normally use, managements of different water sources, hazards at water sources, conflicts and resolutions, gender and water, elders and disadvantaged, water and culture and also social activities taking place during water collection process. A conclusion is drawn.

**Chapter 5: Discussion of findings:** This chapter reviews the findings of the study and discusses them in the light of the conceptual framework and the livelihoods framework discussed in Chapter 2. It also presents the initial key findings of the study.

Broadly speaking, seven key findings emerged from the study: traditional natural water sources are drying out; water is scarce, increasing vulnerability of rural communities; pressure to pay for water; limited use of water harvesting; men collect water; and means of carrying water has changed from head to wheel-barrow.

**Chapter 6: Conclusions and recommendations:** The chapter summarises the findings of the study and revisits the research question and objectives. It draws conclusions and makes specific recommendations relevant to dealing with water scarcity and its impact on the households and livelihoods of rural communities.

More specifically, the study revealed a number of critical findings related to water sources, water collection and usage, water management, and increased vulnerability. These are presented in summary form as follows:

### **Water sources**

- The findings show that only tap water supplied by the municipality is safe and protected, and that people are vulnerable to pathogenic diseases due to unprotected water sources.
- This study confirms that women are still the main water collectors, but that, increasingly, men are participating in activity.
- Policy focus should be on the protection of water sources, purifying water, and ensuring accessibility.

### **Water collection and use**

- Gender and water is a sensitive issue.
- There is an increasing number of female-headed and child-headed households.
- Although culture plays less of a role in water issues than in the past, it is still present.
- Collecting water still has a strong social component.

### **Water management**

- The study found that there are serious challenges related to managing water quality, managing access and off-take quantities, and the management of 'used' water.
- Lack of proper sanitation is the main factor.
- There are no visible structures to control water sources except municipality supplied water.
- The existence of water committees was not clear.
- All of the respondents conserve water, but are limited by storage facilities.
- Local leaders are not visible enough in terms of their role in water management.

- Conflicts over water occur because of differing interests and values, and are unresolved because there are no strategies in place.

**Increased vulnerability**

- The area under study is vulnerable to health hazards.
- Health hazards can be expected to continue into the future.



## **CHAPTER TWO: LITERATURE REVIEW**

The purpose of the literature review is to examine information on what other scholars did before with the same subject. The theoretical framework for studying water sources is introduced as based on the literature reviewed. The chapter begins with the role of the state and water supply in South Africa, followed by KZN and water. It further reviews government documents relevant to water within the South African context. The implications of water in society and at household level are studied as is water and tradition and beliefs. The chapter further discusses water from an economic perspective. The relationship between water and food security is highlighted in this section. Water from a health perspective is also discussed. Water from an environment perspective is studied which leads to the exploration of water sources. The concept of livelihoods is also discussed which leads to the theoretical framework followed by the conclusion.

### **2.1. The State and Water**

One of the first changes the new government wanted to make from taking office in 1994, was to transform the water situation in South Africa. As will be discussed later in this section, the right to water and the subsequent regulations to transform the sector are entrenched in the Constitution of South Africa.

The water transformation process started in 1994, but it has not yet reached its intended purpose of supplying every individual with safe, clean drinking water. According to the then Department of Water Affairs and Forestry (DWAF) (2002a:3) South Africa was facing huge backlogs in the provision of basic rural water and sanitation services. The South African government was committed to backlog elimination by 2008 (DWAF 2002b: ii). A substantial part of this backlog can be found in KwaZulu-Natal.

#### **2.1.1. KwaZulu-Natal and Water**

The study was conducted in KwaZulu-Natal (KZN). Therefore, literature on KZN and water will highlight the water situation in general. It will enrich the study for the analysis of findings.

KZN is one of South Africa's nine provinces. It is located on the south east coast of the country. It is bordered on the north by Mozambique, the south by the Eastern Cape Province, the west

by Lesotho and the Free State Province, the north east by Mpumalanga Province and Swaziland.

It is predominately Zulu-speaking with a population of 10, 267,300. The main urban centres are Durban and Pietermaritzburg with several secondary municipalities. Much of northern KZN is considered rural and is subtropical to arid in climate. Figure 7 shows the District Municipalities of KZN. This study was conducted in the Zululand District Municipality.

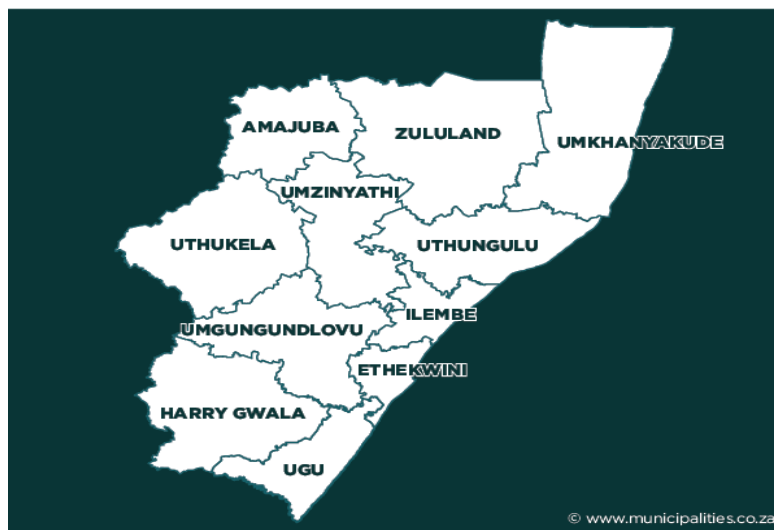


Figure 3: KZN MUNICIPALITIES (Source: [www.municipalities.co.za](http://www.municipalities.co.za))

In KZN, the basic water backlog referred to earlier affected 3, 66 million people comprising of 38, 2% of backlog in water supply is in KZN (Gombert, 2003). The Gombert study stated that targets set by the government to remove water backlogs were ambitious. The argument of the study was based on planned programmes to eliminate basic water backlog and sanitation within 12 years. The earliest and longest water supply programme ranges from 5 years to 20 years, while the sanitation programme ranges from 6 years to 33 years. In order to eradicate the water backlog, R4, 87 billion was required. The study further highlighted that financial budgets were a problem as was lack of institutional capacity at Water Service Authority (WSA) level in ensuring sustainability of water schemes in the post-construction phase.

Progress on the water supply programmes is dependent on the Municipality Act (No. 32 of 2000). It enables Local Government to implement a range of public and private water service

provider options that can assist with the needed institutional capacity building, to render operations, and to maintenance services on a contract basis.

A noticeable intervention in KZN is the Presidential project which supplies water to rural KZN (UNESCO, 2015). The Umkhanyakude District Municipality in KZN (just to the east of Zululand District Municipality; see Figure 7) has a sustainable solution with the assistance of Veolia Water Technologies South Africa. The water technology company was contracted to design and build Shemula Water Treatment Plant to address the severe water scarcity in Umkhanyakude and surrounding district municipalities, including Zululand. The project is part of Ingwavuma Bulk Water Jozini Scheme- a key priority of the National Department of Water and Sanitation. The project will be capable of producing 20 mega litres of portable water a day. Phase 2 is planned to commence in 2017 to expand the plant to 40 mega litres per day.

### **2.1.2. The National Water Act (No. 36 of 1998)**

The National Water Act (No. 36 of 1998) highlights the aims and the intentions of the state about the South African citizens and their right to water. As such, it provides parameters for data interpretation and analysis.

The National Water Act aims at putting in place those items regarding water recognised in the South African Constitution. One intention of the National Water Act is to educate water users about the Act so that they can participate meaningfully in decision-making processes on matters that affect them. The Act recognizes that water is a natural resource and belongs to all the people of South Africa. Water is a basis for life, therefore, access to safe water is every human's right. It is also a prerequisite to the realization of other human rights.

The Act further states that water resource management aims at achieving the sustainable use of the water for the benefit of all South Africa. It puts emphasis on the efficient use of water. Water should not be wasted but be used in the best possible ways for both social and economic advantage. It is emphasising that all South Africans should participate in decision making-processes that are water related. By so doing every South African will use water to his advantage with an economic attitude. It reinforces the understanding that for water, as a diminishing resource, to be constantly available, it is also every one's responsibility to manage water wisely.

The National Water Act of 1998 reformed past laws which were discriminatory on water sources. Those laws were inappropriate to South African's conditions. The old act was drafted in 1956 and applied the water rules of European countries to South Africa. It favoured a small, dominant group who had privileged access to land and had economic power. The new Water Act recognizes the scarcity of water as a precious resource that belongs to all the South Africans - not just a privileged few. Thus, the goal of water resource management as denoted by the Act is to achieve the sustainable use of water to benefit all South Africans. Further, the old Water Act used an authoritarian, centralised approach making all the decisions. Through the 1998 Act, national government committed itself in ensuring the effective participation of all stakeholders in water resource decisions which affects them with a special focus on helping South African citizens understand effective participation (Water Act 1998).

### **2.1.3. The Constitution Act of 1996**

The Constitution Act states that everyone has the right to have access to sufficient food and water (chapter 2:27). In section 7(2) of this Act it is clearly stated that the state must respect, promote and fulfil the people's rights listed in the bill of rights. The right to equality is entrenched in the constitution. The Constitution emphasises that everyone is equal before the law irrespective of ethnic group, sex, gender, language or social group. Section (10) states the right to human dignity. The right to health care, social security, food and water is stipulated in this Act. The Act entitles everyone to have safe, clean, sufficient, affordable, easy accessible water and for all other personal uses. Right to access to sufficient water and food is in section 27 (1) (b). Adequate safe water is needed in prevention of high death rate due to water related disease or to scale down the risk of water borne diseases. Safe and clean water provision for cooking, drinking and hygiene purposes is indispensable. In subsection (2) the government commits itself by saying the state has full responsibility to see to it that all these rights are progressively realised. Therefore, it is the responsibility of the state and office bearers to see to it that water is accessible even to the poor. Section 152 of this Act indicates the responsibility of local government in ensuring sustainable provision of services to communities. Office bearers should ensure encouragement and involvement of communities and local community organisations in local government matters. Also in section 154 (1) of this Act National and provincial government are directed to support and strengthen the capacity of municipalities for optimal community services (Constitution of RSA, 1996).

#### **2.1.4. Water Service Act 108 of 1997**

This act contain the rules dealing mainly with water services or portable water and sanitation services supplied by municipalities to households and other municipality water users. As the surrounding biophysical environment affect water resources, this Act makes it clear that water, land and environmental resources must be managed properly. The Act states that there must be integrated water resource management. It takes into account the amount of available water use, water quality, environmental and social issues as an integrated whole to ensure sustainable, equitable and efficient use. To implement the Water Service Act, the National Water Resource Strategy was developed and set out strategies, objectives, plans guidelines and procedures for the management of the national water resource (DWAF, 2003).

##### **2.1.4.1. Free Water Policy of 2000**

The South African government introduced the Free Water Policy in 2000. Developed as a part of the wider poverty alleviation initiative, the Policy aimed to ensure that those who cannot otherwise afford it (especially poor households) would have access to a basic level of safe, clean water services for free. The policy states that water must be supplied within easy reach (no more than 200m) of any household. Each household should have access to a minimum of 6000 *litres* of clean, portable water per month (Department of Provincial and Local Government (DPLG), 2007). DWA (2002: 8) further defines the basic level of water as 25 *litres* per person per day, which is regarded as sufficient to promote healthy living. Local authorities do have discretion in water supply over the minimum of 6000 litres. Depending on availability and affordability, individual municipalities can supply more or less than the minimum (DWA, 2002:8). Nkuna (2012) highlights that in spite of the role of municipalities trying to meet community needs especially of water, supply progress is slow and still full of challenges that need attention.

#### **2.1.5. The role of water in society and households**

This section discusses water from a social perspective, water from an economic perspective (including food security), water from a health perspective, and water from an environmental perspective.

##### **2.1.5.1. Water from a social perspective**

Whatever is done by a community within its water catchment area “ends up in the river” and is reflected in the quality of water. Thus, the quality of water is a reflection of the community’s

attitudes and lifestyle and of the community's "socio-economic conditions". (Phillander, 2012). This suggests that social conditions could be improved by the development of a community water supply that includes a reduction in the effort and time required to collect water. The workload of women, which is often heavy, as they are usually the collectors of water, could be reduced. Improving the availability of water may have economic benefits as well as social benefits. "Increasing the quantity of water that is available and bringing the water closer to the point of use can help productive activities such as crops, crop washing and crop processing, small scale gardening, the dyeing of cloth, and other income-generating activities" (Davis, et al, 1993:9).

Ensuring a sustainable supply of water is crucial as water is a fundamental requirement of any society if it is going to survive and grow socially and economically. Thus, every community needs a sustainable water supply system. A water supply system is effectively "a comprehensive system" comprised of water users, water sources, and the systems of treating and transporting the water" (Chung et al, 2008: n. p.). It can be argued that all of these elements of the water supply system are influenced by the actions and behaviours of the community. As a part of the sustainability of the water supply system, it is important that the users of a water supply system understand their water supply system. Part of this is understanding that changes in water quality are significantly influenced by human activities (Davies *et al*, 1993). To explore the social perspective of water, this section discusses: water and tradition and beliefs; water and gender; water and age; and water and conflict.

#### **2.1.6. Water and tradition and beliefs**

Many people grow up with traditional beliefs about what can be considered 'good' and 'bad' water which for example, some people believe that water taken directly from a spring is 'good'; while others may see such water as 'bad' because it has not been treated. These beliefs will have been passed down from generation to generation. Similarly, people may reject water with no harmful organisms because of its taste. As noted by Davis *et al* (1993:48), "People's beliefs can determine whether an improved supply is eventually used, or not. The beliefs that water taste a certain way is very important, because, for most people, they will have been used to drinking the same water all their lives. When the taste of water is suddenly changed, it seems only natural to be concerned about its quality".

Another example is that when a water source has been “improved”, such as through the installation of a pump, some cultures will not use this source if certain other customs have not been observed (Davis et al, 1993). An example of this is the case of Southern Sudan where people believed that “all water sources had a water spirit associated with them. If the spirit was disturbed, the source would dry up. Failure to perform an appeasement ceremony would upset the spirit. Some people, who strongly held this belief, refused to participate in the deepening of a well in the case the water has dried up” (Davis et al, 1993:48).

### **2.1.7. Water and gender**

“Everyone is entitled to free basic water supply” (Department of Water Affairs (DWA), 1994:34). Improved water supply exerts a positive impact on primary education through several channels. If girls are relieved from their water fetching duties, improvement in school attendance can be achieved. Both boys and girl’s educational achievements can improve significantly with reduced health risks and stronger nutritional status from an improvement in water quality and accessibility. WWDR (2009) noted that many girls who go to schools do not have gender-specific bathroom facilities which creates unique difficulties for them. Building sanitary latrines will allow girls to go to school when they have their periods, without worrying about hygiene issues; this will contribute to increasing literacy rates for young female in developing countries.

Although in the South African Constitution it is stated that, “Everyone has the right to have access to sufficient food and water”, much remains to be done to fulfil that right. Then President Thabo Mbeki, in his State of the Union Address in May 2004, promised that all households would have running water within five years, but this goal has not yet been fully achieved to date. Women are often the providers of household water, but their needs are not given priority in decisions on domestic water supply, provision, use, technology (e.g. windmills) and management. This suggests that research related to water and water supply should incorporate vulnerable groups, especially women and girls so that their knowledge and needs are known and understood to help identify sustainable solutions regarding water supply issues. The time women spend collecting water has value, but little or no information is available to evaluate this time from a productivity standpoint. It is noted that there is an opportunity cost of time used for fetching water. The farther away a source of water is located from the house and the longer one must queue, the less water from that source will be used with several consequential effects discussed later (DWA, 1994).

Supplying better quality water may not benefit everyone if improvements are insufficient to provide easy access to all households. For example, it may be more advantageous for a woman who has little time to spare, to collect water from a poor quality source than to spend time standing in a queue for better quality water (Davis *et al*, 1993:30). Children may be given a greater role in collecting water where new water points are closer to homes. This may relieve hard-working mothers, but increase the workload of children. Improved water and hygiene impacts on the socio-cultural position of women and has the potential to provide them with privacy and dignity as well as increased status within the family and wider community.

An important factor in improved water supply services in rural areas allows women “free” time to pursue productive endeavours such as adult education, empowerment activities and leisure (Panda, 2007). Therefore, investment in community-based organizations for water management can improve social capital for women through leadership, networking opportunities and solidarity building which can enhance their empowerment in society (Lenton, Lewis & Wright, 2008). Efforts of improved water access should be grounded in gender analysis, because social relations will influence the outcome of water policies and programmes.

#### **2.1.8. Water and age and disability**

In areas where there is no reticulated water, the elderly and people with disabilities often have difficulties getting water. They are found in every community. Further, their status often affects their involvement in decision-making and even their right of access to water sources. Thus, they mostly rely on commercial water sellers who often charge a high price for water (Davis *et al*, 1993). Kanyoka *et al* (2006) argued that elderly household heads could be willing to pay for various uses of water because they have already accumulated a lot of assets. Also their unfavourable experiences combined with strains of walking long distances to water sources can make them pay. Mehta and Ntshona (2004: 156) stated that families with sick people may need a lot of water for washing their laundry, bathing and other household’s needs. Understanding the difficulties people encounter accessing water and their water use priorities is fundamental in making more water more accessible for livelihoods.

#### **2.1.9. Water and conflict**

Conflict in relation to water is well documented. As early as 1993, Gleik (1993:79) anticipated that water was going to be “an increasingly salient element of interstate politics, including



violent conflict”. Further, in their policy brief on the UN and Environmental Security, Carius, Dabelko and Wolf (2004:64), again highlight the increasing danger of conflict - even at local levels - related to water, and, in particular to water management.

Relevant to this study, water conflicts may result when communities are sharing a very limited resource. An example of this is the case of South Africa and its trans-boundary rivers. Turton (2005) highlighted that the series negotiations about trans-boundary river basins ended a ‘cold war’ between South Africa and neighbouring countries. South Africa shares four international river basins: Orange, Incomati, Limpopo and Maputo. The Orange River basin runs through four countries: Namibia (25%); Botswana (9%), Lesotho (4%) and South Africa (62%). The Limpopo River basin runs through Botswana, Mozambique, Zimbabwe and Swaziland. The Incomati and Maputo River basins are managed as one entity as their river basins are the same. These two river basins represent the most developed trans-boundary water courses in the whole SADC (Basson 1999 and Chenje & Johnson, 1996). Turton A.R. (2002b) highlights that the conflict on these river basins lead to the signing of the Incomaputo Agreement in 2002.

Conversely, cooperation over water can be key to resolving conflict over other issues. An example of this is the Indus River Commission and the Indus Water Treaty. In the midst of at least two wars between India and Pakistan over other issues, the commission and treaty helped resolve conflicts by “providing a framework for consultation, inspection and exchange of data” (Nagarajan, 2009:214).

## **2.2. Water from an economic perspective**

Water is one of several resources without which a nation cannot satisfy the fundamental needs of the people or achieve its important national goals and economic development. Deterioration in the quality of surface water and groundwater becomes more likely and more critical as nations become more industrialized and urbanized. Competing demands for water increase and the use of water resource plays an important role in overall economic development in all countries. Machete (2011:24-25) argued that “people need water for a variety of reasons - daily consumption by households, agriculture and industries, all these projects demands water- and this leads to scarcity of water.” Machete (2011:25) noted further that scarcity of water has a knock-on effect of depressing livelihoods and economic activity stating that water scarcity can

“damage economies by diminishing production in both the agricultural and the industrial sectors”.

Water demands range from domestic uses to the trade and industrial demand, including farming, dry-land agriculture and forestry plantations, all of which are important parts of the economy. Water scarcity is also a hindrance to a variety of development projects such as the construction of roads, institutions of learning, and economic/commercial complexes. Natural capital is increasingly the limiting factor to development and any investment in economic development should take cognizance of the limitations. In farming, scarcity of water may lead to fewer crops, a situation that has a negative impact on the economy. Blignout and Van Heerden (2009:2) affirm this noting, “Shortages of rainfall have resulted in the decrease of crop production”. The results of reduction in yields will be poverty and retrenchments (Schmitt, 2010:2). Both of these statements show that water shortages may impede economic growth.

### **2.2.1. Water and food security**

Viljoen (2005:199) defines food security as giving populations both economic and physical access to supply of food, sufficient in both quality and quantity at all times, regardless of climate and harvest, social level and income. Food security is an objective of every family and household whether in urban or rural areas.

Water scarcity is one of the most urgent food security issues facing countries of the Near East and North Africa (NENA), with fresh water availability in the region expected to drop by 50% by the 2050 (FAO, 2014). Wenhold (2007:327-336) also stated that water is one of the essential resources required for food production, making it a critical factor in food security. Achieving food security for a growing population with the same amount of water, therefore, becomes important. These statements confirm that food production is the most intensive activity in society but water is the most limiting resource in South Africa and many other parts of Africa. Agriculture accounts for 70% of the worldwide human fresh water use (Hoddinot, 1999) and this figure can be higher in developing countries. The FAO (1990) identifies agriculture as the largest single user of water, with about 5.5% of the world’s freshwater being currently used for irrigation.

Household food security exists when all members at all times, have access to enough food for an active, healthy life. UNICEF UK (2008) noting that the world’s poorest and most vulnerable

children are being hit the hardest by the impacts of climate change, further stated that access to clean water and food supplies will become more difficult, particularly Africa and Asia. Individuals who are food secure do not live in hunger or fear of starvation. Food insecurity, on the other hand, is a situation of “limited or uncertain availability of nutritionally adequate and safe or uncertain ability to acquire acceptable foods in socially acceptable ways” (Coleman *et al.*, 2014:8). Food security incorporates a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors including droughts, shipping disruptions, fuel shortages, economic instability and wars. Food availability relates to the supply of food through production, distribution and exchange. But food production is determined by a variety of factors including livestock breeding and management, land ownership and use, soil management and crop selection. Crop production can be impacted by changes in rainfall and temperatures. The use of land, water and energy to grow food often competes with other uses, which affect food production.

### **2.3. Water from a health perspective**

Studies conducted affirms that water is life, people can't survive without water and the quality of life depends on the quality of water. Diseases flourish and are transmitted through unhygienic disposal of both human and household waste. Water can be safe at a source but may be contaminated during collection, handling and use. Improvements in hygiene usually depend on the supply of sufficient water quantity for washing, irrespective of the quality. Therefore, safe water provision is not in itself adequate to ensure an improvement in the health of the community. Safe water supplies could be effective if it is accompanied by effective sanitation coupled with emphasis on good hygiene practices through complementary hygiene promotion activities (Blignaut 2009:698).

Over 2.5 billion people globally live without water and that leads to a decrease in people's productivity levels and increase health issues. It is noted for example that waterborne diseases cause the death of more than 1.5 million children each year (FAO-WATER, 2010). Water pollutants constitute a risk to human health and has a negative impact on water quality. According to UN WATER (2010), the environment is degraded through decreased productivity of biomass, loss of biodiversity and vulnerability to other stresses. In South Africa, “poor water and sanitation conditions” account for 30% of child deaths (Hall, Leatt and Monson, 2006:58).

Whereas “safe and clean water promote a healthy living environment for human beings, lack of water may lead to malnutrition and may be severely dangerous to children and people living with HIV and AIDS” (Wenhold & Faber, 2009:61-63). Wenhold and Faber further argue that diseases like diarrhoea often result from water shortages. Improved water quality will reduce many bacterial or viral infections, but when water is scarce, people may be forced to drink unhealthy water which contributes to health and social problems.

Two other aspects of water and health are burden of carrying water and hygiene behaviour.

### **2.3.1. The burden of carrying water**

One of the most common methods of transporting water is on the head. Women can suffer deformities, headaches and exhaustion due to heavy carrying work they are required to do. These water containers can be clay pots, gourds, plastic buckets, drums, jerry cans and many more. With regards to low-income women’s working day is excessively long. In Sub-Saharan Africa, the collection and carrying of water and fuel wood over considerable distances can result in women having only a few hours’ sleep at night in the dry season. Accidents while carrying water can have tragic consequences. In mountainous regions it becomes difficult to balance water containers on the head and an alternative is to carry a container on the back, which can cause spinal damaged (Kerr, 1989:196).

### **2.3.2. Hygiene behaviour**

Poor hygiene behaviour, such as not washing hands, leads to health issues and spread of disease and illness. Health related programmes, should consider engaging more in hygiene practices needed to complement improved water and sanitation facilities; for example people in Ivuna area do not have easy access to safe water, clean toilets and the practise of washing hands with soap, leading to a high occurrence of diarrhoea and other health related diseases resulting to death which could be prevented through clean hygiene behaviour. According to Nealer (2009:74), “water is an indispensable commodity that people may not do without and according to water is said to be an indispensable commodity, without which, life would be impossible”.

To explore the issue of hygiene further it is necessary to discuss personal hygiene, household hygiene, community hygiene and sanitation.

**Personal hygiene:** Many water-related diseases are transmitted through inadequate body and hand washing. Regular washing can reduce the chance of contracting skin and eye diseases. Washing hands after defecation can reduce the transmission of micro-organisms which cause diarrhoea. How would the situation be if there were no water in the house? Everything would be dirty and a person would not be in a position to prepare food acceptable for human consumption (Davis *et al* 1993: 15).

**Household hygiene:** According to the research conducted by the UNICEF (2016), “It is ... true that without water there is no hygiene,” and that “the less readily available water is, the less likely it is that households will practice good hygiene”. McCoy (1991) determined that hygiene is not well understood including the common inability to identify potential household health hazards. It is common for people consider the biggest risk to be bathrooms, but, in reality, kitchens present a far greater potential risk.

Improvements to existing methods of water handling and of its use in the home could make a big difference to people’s health. Storage of water is important as reserve in times of failed supply. There are often constraints on storage owing to the cost of containers (Davies *et al* 1993:15).

**Community Hygiene:** Water from an improved supply may be safe but can become contaminated during collection and carrying. Communal water points need to be kept in a sanitary condition and used hygienically if health benefits are to follow from safe supplied. The recognition of existing poor hygiene behaviour is a first step in developing hygiene education aimed at reducing water- and sanitation -related diseases in a particular community. It should be the main aim of hygiene education as to why improvements encourage a community’s interest in improvements to water supplies and sanitation through a greater understanding of why improvements are necessary (Davis *et al*, 1993:9).

### 2.3.3. Sanitation

The need for waste management arose as human settlements grew larger, when the health and environmental complication from the practices of open defecation and littering became too large to ignore. Hygiene is a concept closely tied to the matter of sanitation defined as “removal of dirt and disease-causing elements from the humans and their surroundings” (Rylander, 1991:91), and thus targeting user behaviour in the sanitation system to manage human body

waste. This resulted in an evolution of waste management systems (the most hygienic being water-based systems) and in developing various cleaning products designed to enhance human hygiene. Essentially, waste management systems are of two kinds; those that treat waste as waste, and those that treat waste as a resource. Drop-and-store and flush-and-discharge systems treat waste as something to be removed. Ecological sanitation is an alternative approach of dealing with sanitation, where excreta are viewed as a resource; it has systems that are designed to recover and recycle valuable nutrients into fertilizers for food production (Rylander, 1991:92)

#### **2.4. Water from an environmental perspective**

Water is important to life on all levels. Quality of life is affected by the quantity of water, water source typologies and the quality of water. Land-use, pollution, and changes in the weather are among the environmental factors which can affect water sources and which need to be considered when developing water supplies. Control of the use of land near water sources, such as reservoirs, can help to protect them from damage and pollution.

Water quality can be affected by pollution upstream and by underground infiltration of pollutants. Water supplies can be polluted by a variety of sources like agro-chemical run-off from fields, the casual disposal of human excreta, industrial effluent and the poorly treated sewage from municipal works. Ncube (no year) in his study shows that Vaal River water was polluted by high concentrations of fertilizers especially phosphates. It further shows that direct pollution from agrochemicals can put Vaal River at risk unless its use is restricted. Findings also show that local population especial in Standerton access water of poor quality which produces a foul smell at times. Bad odour can be attributed to dead algae. Results further show that there was a general lack of knowledge on fertiliser application responsible for nutrient enrichment.

Evidence shows little commitment in achieving compliance as seen in the destruction of buffer zones which assist to reduce amount of nutrients indirectly entering the river. Findings highlighted that environmental degradation is caused by resource exploitation by humans. All these may result in insufficient safe/clean water for domestic use (FAO, 1994:34). Wells and springs are open to contamination from pit latrines, septic tanks and other waste sites. Polluted water can travel long distances underground when conditions allow. The watering of cattle

from a drinking- water source can cause a major environmental health problem. Drainage from improved supplies, such as springs and wells, and household wastewater drainage can create localized environmental problems.

## **2.5. Water sources**

There are seven types of water sources common to most rural areas in South Africa (Kariuki 2008: 105). These include: dams, rivers and lakes, springs, streams, boreholes and wells, community tanks, taps (i.e. reticulated water), and rainwater harvesting. Rural communities are usually vulnerable to disruption of water supplies in disasters as their supplies are based on simple technologies. Floods and droughts can lead to water disasters.

This section will briefly discuss each of these types of water sources.

### **2.5.1 Dams**

Dams are manmade storage systems to manage water. They enable the control and regulation of water delivery. Since rivers and other surface water are not always reliable, especially non-perennial rivers, dams offer the possibility of ensuring a year-round supply of water. Dams range in size and complexity of construction from low earth embankments constructed to impound or divert water in small streams to massive earth concrete or concrete structures built across major rivers to store water for irrigation, municipal use, hydroelectric power generation, or flood prevention. “Dams and reservoirs have enhanced the health and economic prosperity of citizens around the world” (Cech, 2010:217).

Yet dam construction alters both natural and human environment. These changes results in reduced stream flow and poor water quality. For centuries, this has been a serious problem to aquatic animals worldwide including the United States as fish have to migrate to better sources. (Cech, 2010:217). Both humans and animals have died due to the unlined walls of the excavations collapsing on them. Also, various diseases are transmitted through dirty containers and feet while climbing down the water table (Kerr, 1989:99).

### **2.5.2 Rivers**

Rivers refer to runoff from rainfall which collects in channels and eventually pools in lakes or finds its way to the ocean. As a source of water for human consumption, rivers are considered

a last option due to its potential for contamination, including high E coli counts (Dangerfield, 1983; Faechem, 1980). Wisner and Adams (2002:112) “It should be assumed that all surface water is contaminated and should be treated before consumption”. If groundwater is unavailable or insufficient, surface water often needs some form of pre-treatment to reduce turbidity before filtration and/ or disinfection. The greatest water-borne risk to health in most unsafe water is the transmission of faecal pathogens, due to inadequate sanitation, hygiene and protection of water sources (Wisner & Adams, 2002). Magadza (2000: 203) affirms that unsanitary environments increase the risk of water-borne infectious diseases including diarrhoea, typhoid, cholera, dysentery and infectious hepatitis.

### **2.5.3 Streams**

According to Cech (2010:82), a stream is that intermittent flow of water both after events and during wet seasons when fed by ground water. Springs also commonly occur as seepage from marshy areas, sponges or vleis (Chapman, 1991).

The ground water flows through rock and soil layers and can discharge as a spring or a seepage into a stream, river or ocean. Quality is good for mountain streams, poor for lowland streams and treatment is necessary. Shallow and unconfined aquifers like streams are more likely subject to contamination from discharges associated with agricultural practices. FAO, 1994 concur in the study that 50% of the shallow ground sources supplying over one million rural residents in Lithuania are not fit for human consumption because of a wide range of pollutants like pesticides and nitrates. Quantity is moderate, seasonal, variation likely and some dry up in dry season. Accessibility is generally good, need for intake for both gravity flow and piped delivery (Degrémont, 1991, AusAID, 2005b).

The amount of water available will not be sufficient to cover the total water demand for the entire village therefore the stream or river water would have to be used as a complement.

### **2.5.4 Springs**

A spring by definition is a flow of natural water. It usually forms after heavy rains. The water seeps comes from the ground and this can occur due to geologic, hydrologic or man forces separate underground soil layers and a rock and water forces its way through, thus pushing up the water out to the surface (Erfurt-Cooper & Cooper, 2009:131). The flow of the spring sets the potential yield.



In rural areas, good quality water is commonly outsourced from springs. Water purification is done by filtering action of the soil while flowing. If the land is humid, springs are a reliable source. Thus, making springs ideal sources of water for a community water supply. (Cairncross, 1993, WHO, 2004). “In Africa, outside the desert areas, springs are commonly found at the heads of drainage regions, within rolling topography, carved out by rivers of (sic) streams” (Dindar, 1996:3-2). Some rural communities have settled next to springs so as to access water easily. In such conditions, it is normally necessary to construct a covered tank to extract water to a depth of 1m or more, and drive a supply pipe away from it (Dangerfield, 1983).

Kerr (1989:3) stated that, spring water tends to be rich in minerals found underground. Kerr also state that although water coming from a spring is usually pure and unpolluted, it does not necessarily mean its water will be pure and unpolluted, the indiscriminate use of springs as a source for collecting water, bathing, washing clothing and watering animals pollutes the source and its surrounding area. Further, its exposure to the atmosphere renders it more susceptible to microbiological contamination. Activities such as washing clothes, bathing and watering stock in direct contact with the spring are among those that could lead to permanently dirtying the spring’s water. Therefore, it is important to protect springs, such as by enclosing the eye (CISR, 1988), “including, for example, a gravel pack that allows the water to pass through it with a tank or spring box constructed alongside the gravel pack with an outlet pipe and an overflow pipe, to collect water” (Watt & Wood, 1977:11). In some areas spring water is contaminated because the spring has not been adequately protected against cultivation, and flow is restricted by the planting of water-hungry tree species like Eucalyptus or by permitting wild vegetation to grow that interferes with the function of the spring.

### **2.5.5 Boreholes and Wells**

A well is any manmade hole dug in the ground in order to access underground water. Digging wells is an ancient practice carried out all over the world. Most wells are lined in some way to prevent them from collapsing. Hand-dug wells are limited in terms of depth. A borehole is essentially a well that has been bored or drilled by drilling a machine into an underground aquifer. It is usually drilled in a way which prevents contamination. Boreholes will have some form of pumping mechanism, such as a motorised or hand-operated pump to draw groundwater to the surface for collection and use. Boreholes vary in depth depending on the water table

and/or location of the aquifer. Drilling enables accessing water that is deeper underground, this is usually matched with motorised pumps to cope with the depth.

**Table 1** presents a comparison between hand-dug wells and drilled boreholes. Hand-dug wells have been used for a variety of purposes, thus the design will vary accordingly. They are widely used for irrigation, stock watering, and, of course for human consumption. Depending on the purpose of the well, the pumping equipment should be capable to extract required amount of water. When larger quantities are required, devices such as windmills, shadufs or animal driven ‘Persian wheels’, are often fitted.

Kerr (1989:162) stated that the bucket and windlass is the most common technique for raising water from wells in many parts of the developing world. It is perhaps the most successful water-lifting device, but often allows water to be contaminated when transferred from one container to another. Pumping is required unless it is artesian well. Reliability depends on regular good maintenance on pump and must not pump aquifer.

**Table 1: Comparison between a hand dug well and a drilled borehole**

<b>HAND DUG WELL</b>	<b>DRILLED BOREHOLE</b>
<ul style="list-style-type: none"> <li>• There is high participation by the community in construction</li> <li>• It has a low to medium construction cost with medium cost community contribution</li> <li>• No hand pump needed to lift water</li> <li>• Completed as a closed well, fitted with a hand pump and the water quality is high</li> <li>• Completed as an open well and liable to pollution</li> <li>• It has a maintenance cost</li> </ul>	<ul style="list-style-type: none"> <li>• There is low participation by the community in construction</li> <li>• There is high construction cost with high cost community contribution</li> <li>• Hand pump needed to lift water</li> <li>• Fitted with a hand pump and the water quality is high</li> <li>• If hand pump breaks there is no other alternative</li> <li>• It has a high maintenance cost</li> </ul>

(Source: Davis *et al*, 1993)

Watt and Wood (1995:11) stated that well water can become contaminated through various means including by being open without a wellhead. The soil distorts and changes the slope towards the shaft, thus permitting rains and spillage to flow into the well including any of a number of worms and insects, particularly those that use water as part of their life cycle.

Use of unclean buckets to collect water, defecating or washing themselves or their clothes near the well, and allowing animals to approach the well opening can all contribute to polluting the water. Kerr (1989:97) argued that wells are liable to contamination even when covered. WHO advises testing water for the presence of chemicals which may be harmful to humans and otherwise affect water quality (United Nations High Commissioner for Refugees, 1992a). Water with a history of problems should be monitored for subsequent contamination, and, if necessary, new wells dug.

### **2.5.6 Reticulated water**

One way to reduce the workload of rural women would be to have a tap in or near every household. As stated earlier, the provision of an adequate and safe water supply to all people is one of the goals of the South African government. In addition to the physical supplying of water, providing water requires that attention be given to the water being potable.

Drinking water, or potable water, is defined as water that meets acceptable parameters in terms of its physical, chemical, bacteriological properties so that it can be safely used for drinking and cooking (WHO, 2004). WHO defines drinking water to be safe as long as it does not cause any significant health risks over a lifetime of consumption, and argues that an effort should be made to maintain drinking-water quality at the highest possible level.

Different developing countries maintain different guidelines for what constitutes safe drinking water (Gadgil, 1998). Although the World Health Organisation is the principle international health Organisation, it does not promote the adoption of international standards for drinking water quality, but recommends guidelines for a risk-benefit approach in establishing standards and regulations for each national situation. This approach is the comparison of the risk of a situation to its related benefits. For guidelines to be effective, consideration of relevant local conditions (including economic, environmental, social and cultural conditions) and financial, technical and institutional resources is required.

Among the established guidelines is AusAID's, *WHO Guidelines for drinking-water quality* (3rd edn). AusAID's Safe Water Guide is considered an authority on water quality in developing communities (WHO, 2004). Bearing in mind national circumstance the following covers the basic standards for potable water:

- It should be acceptable to the consumer. Bad taste or colour, staining, or unpleasant odour can cause a user to choose an alternative source;
- It should be free from disease-causing organisms;
- It should be free from toxic chemicals; and
- It should not cause corrosion or encrustation in piped water systems or leave deposits.

The guidelines suggest effective water testing for disease-causing organisms needs to be conducted routinely (e.g. monthly) and any points of contamination encountered require a sanitary survey to be undertaken in order to identify the contamination source. The guidelines also recommend appropriate prevention steps be taken to isolate the contamination. The approach adopted by these guidelines involves reducing potential contamination of a water source through effective protection structures and storage systems. The guidelines are limited by several constraints, primarily the lack of funding and human resource capacity for water quality testing and monitoring programmes, as well as operation and maintenance of treatment process to improve drinking water quality. The guidelines suggest prevention and boiling before consumption as the minimal steps to be taken to ensure drinking quality water. These are very minimal barriers to water contamination.

### **2.5.7 Rainwater harvesting**

Runoff is the amount of water that flows across the land surface after a storm event. (Cech, 2010:32). Collecting rain water that runs off from a structure or other hard surfaces into a storage for future use is known as rain water harvesting. Traditionally, it involved collecting the rain from a roof using gutters that channels the water into downspouts and then into some sort of storage vessel. Rainwater harvesting systems is simple; collecting rain water into a rain barrel or by harvesting rainwater into large cisterns in order to meet household demands (Innovative Water Solutions 2016: np). Rainwater harvesting depends on rain and some maintenance of the equipment is required. Cisterns are best located in yards of users. Quantity is moderate and variable. Supplies are often unavailable during dry season (Hall, 1990).

The idea of rainwater harvesting is that rainwater is becoming a viable alternative for supplying households and businesses with water. As most catchment systems depend on weather conditions, they generally can only be used to supplement water supplies. Corrugated metal and tile roofs are best for such purpose, but even thatched roofs can provide good water, if

debris is filtered out (Hall, 1990).

Properly filtered and chlorinated, roof-catchment water can make a good independent or supplementary/reserve source for household activities. Rainwater is better for irrigation because it is not chlorinated. The water is often relatively clean (low content of both minerals and bacteria) especially in rural areas. However it easily becomes contaminated during collection and handling (Brikké & Bredero, 2003).

Rainwater harvesting systems are also becoming more economically feasible. All that is necessary to take advantage of this resource is to capture the free water falling on ones' roof and direct it to a water storage tank. Kerr (1989:87) stated that harvesting water from thatched roofs affects the water collected negatively as the water discoloured and becomes dirty and unsuitable for various purposes. Therefore, water pollution is dependent on the catchment and storage facilities and disinfection is vital.

### **2.5.8 Water tankers**

Water tankers may be used in times of water shortages for the short term if there are no other suitable options. There are many ways to transport water including water-tank trucks and trailers designed especially for the task. Informal, improvised systems are also common - such as the use of tanks secured onto the back of flatbed trucks. However, they can be difficult to transport when filled with water, especially on poor-quality roads.

In relief situations, the UNHCR (1992a) suggests that special care be taken to ensure there is sufficient water being provided through tanks - generally tanks should provide enough water for a normal day's consumption, but at the very least one-sixth of the daily water demand. Of course, meeting these standards depends on the reliability of the water source, the availability of equipment (including tanks), security considerations, cost, and changes in demand (e.g. due to temperature). Delivery for easy community access and there must be storage necessary for community water supply.

Water delivered by tankers needs to be clean and ready to be used. Recharging the tanks to ensure a steady supply of water needs also be considered. To minimise conflict, water should be delivered to public spaces rather than put under private control.

## 2.6 Water and Climate Change

Rainfall is affected by climate change. Climate change changes the distribution of world's water (Zhang, 2007:2) suggesting that water availability is susceptible to climatic conditions. "Scarcity of water for domestic use may further be linked to low flow periods during summer. High temperatures during these period call for more for agricultural purposes" (Middelkoop *et al*, 2001:123). Similarly, Eriksten, O'brien and Rosentranter (2008:7) agree that the "increasing droughts in Southern African dry land will further increase due to high temperatures and decreased rainfall". According to Van Rooyen, Van Niekerk and Versfeld (2009:7), many factors, including rainfall and run-off, need to be taken into consideration when planning of water resources. Clearly, climate change adds to water supply uncertainties.

South Africa is known to have chronic water shortages, which are exacerbated by climate change and also by the presence of invasive alien plant species. South Africa's unmanaged water resources have gradually shrunk to extremely low levels and there is a high possibility that in next decade water demands will far exceeds the water supply (Blignaut, Ueckerman Aronson 2009: 61-68).

In addition to be hampered by climate change and invasive plants, South Africa's water supply is limited and unevenly distributed (Cullis, Gorgens and Marais, 2007:35-42; Blignaut *et al*, 2007) -making some areas more susceptible to water shortages and creating a reality whereby those who had access to land and economic power had greater access to water (Blignaut *et al*, 2007). Water access is, thus, a highly political and economic issue in South Africa. Degradation and historically skewed allocation of water presents huge challenges and are particularly acute in rural areas where water is used for irrigation, livestock and crop production, rural domestic purposes, wildlife and conservation (DWA, 1994: 910). As a result the water policy established in 1997 attempts to change this imbalance by making water accessible on an equitable basis while protecting the environment which sustains life.

Worldwide, similar efforts have been made. According to the United Nations MDG report (2011), more people have access to clean drinking water, and the global target is expected to be surpassed. However, rural areas are lagging behind and, at the time of this study, it was anticipated that by 2015, 10% of the world's rural population would still not have full access to safe drinking water by the then 2015 deadline. Developing countries suffer the most by not

having access to sanitation facilities and where over 1 billion people practice open defecation, which exposes themselves and their communities to considerable health risks. In particular, sub-Saharan Africa remains far behind; only 24% of the rural population uses formal sanitation systems.

Climate change often leads to extremes of floods and droughts. Each has its unique impact on water availability and water quality. For example, floods can cause water to become contaminated leading to serious health issues (Uitto & Biswas, 2009: 205). Droughts, particularly prolonged droughts, can lead to substantial social pressures, including migration away from the drought stricken area. Populations do not migrate during prolonged droughts searching for food but they will seek new or other water sources. During droughts, water quality is usually a problem because water sources remain under pressure and many of which may lack protection (Oats, Conway & Carlow, 2011:3). It may be dirty. It may be inadequate in volume and it may be several hours walk but never the less, some water must be available. This is of particular concern for South Africa because it is predicted that the region will experience increased incidents of drought due to climate change (increased temperatures) (Erisken, O'Brien & Rosentrater, 2008).

## **2.7 Livelihoods**

This study is grounded in livelihoods as they are impacted by water and water sources, therefore this section briefly discusses the concept and framework of livelihoods. This will be followed by a more detailed discussion of the concept of vulnerability.

### **2.7.1 Concept of livelihoods**

Drinkwater and Rusinow (1999) indicate that a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. They further asserted that a livelihood is sustainable when it can cope with or enhance its capabilities and assets and provide sustainable livelihoods and opportunities for the next generation, and which supply benefits to other livelihoods at both the local and global levels in the short- and long-term (Chambers & Conway, 1991: 6).

### 2.7.1.1 Livelihoods framework

Within the discussion on livelihoods there is much focus on what influences the sustainability of a livelihood. This resulted in the creation of a sustainable livelihoods framework that enables one to examine these different influences. [Figure 4](#) presents the most commonly used version of the framework.

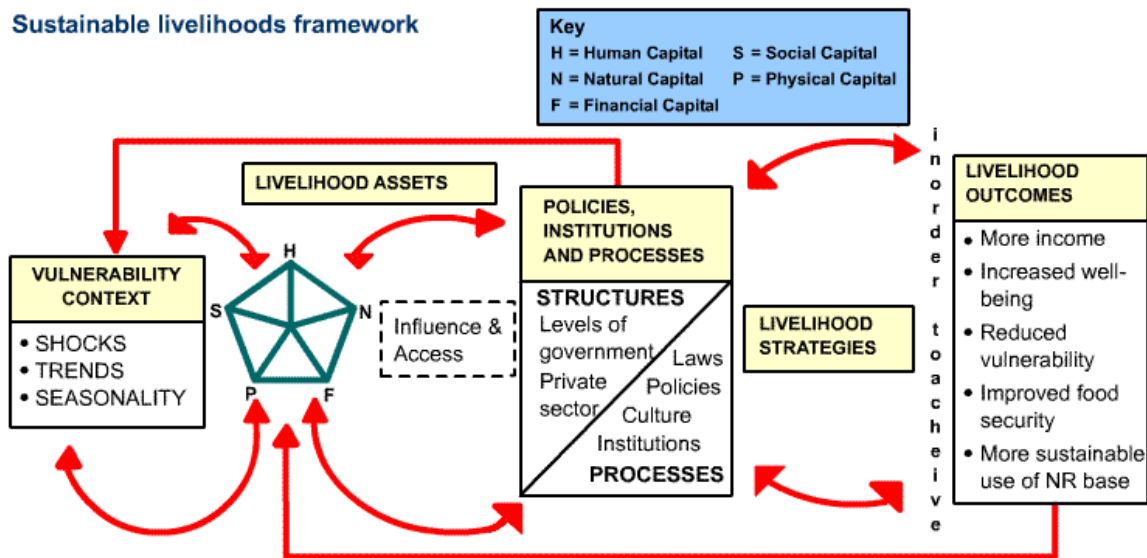


Figure 4: The sustainable livelihood framework (Source adapted from DFID, 1999)

Central to the concept of livelihoods is the notion of assets which form the basis for a livelihood. These are captured in what is referred to as an ‘asset pentagon’ which denotes the five key livelihood assets: Physical; Natural; Financial; Human and Social. According to Carney (1998:2), the main point of the asset pentagon is to encourage “users to think holistically rather than sectorial about the basis of livelihoods”. Water and water sources touch on each of these asset groups and thus the framework is useful for the research under review.

Assets at household level affected by varying access to water resources. Like food, water is indispensable. If it is not freely available, household income will be spent on acquiring it. But, even when it is ‘free’ it is still paid for in terms of the human asset of labour time spent - and thus has an opportunity cost to the household (Carney, 1998). Water is also a key asset used in the production of income (e.g. through irrigated agriculture) in combination with other livelihood assets (Clarke, 1998). Thus, the availability or scarcity of water (through whatever cause) directly affect livelihood strategy options - particularly in relation to producing income in combination with other livelihood assets.



The sustainable livelihoods framework is comprised of five elements: the livelihood assets; the vulnerability context; policies, institutions and processes; livelihood strategies; and livelihood outcomes. As noted earlier, the livelihood assets form the basis for a livelihood and they are used to determine livelihood strategies which are employed to achieve a range of livelihood outcomes. However, the livelihood assets, and thereby the livelihood strategy choices, are influenced by two fundamental processes. The first is the vulnerability context. This examines what is happening to the asset(s) itself. Is it increasing or decreasing? Is it growing or declining in strength or value? Is this change sudden (shock), gradual (trend), and/or seasonal (i.e. recurring at predictable times)? Such vulnerabilities affect the availability and efficacy of the assets (DFID, 1999).

The second key influence is the range of policies, institutions and processes (PIPs) that govern access to and place limitations on the use of assets. These may come in the form of environmental laws and social practices that regulate access and use of natural resources. They may also include institutions and processes that act as gate keepers, such as banking and credit institutions. Depending on the nature and strength of these PIPs, assets are more or less available to use (DFID, 1999).

In application to water issues, analysing livelihoods helps to get a broader understanding of the multiple ways in which people use water. The livelihood analysis also enables one to separate the 'household' which is made up of members with different interests in water usage and is often the site of power struggles (Hazell, 2008). Therefore, the livelihood analysis is a useful tool for better understanding water issues in rural settings, with the primary concern as seeing vulnerability in context, which includes determining the relevant livelihood assets, identifying the specific vulnerabilities and the PIPs which impact livelihoods activities and their outcomes in relation to water.

Specifically, the UNDP, (2006:173) states that rural livelihood strategies are strongly dependent on the natural resource base, with water playing an important role. It is further states that "Most poor and malnourished people still live in rural areas and depend on agricultural production for employment, income and food. Water security is vital to their livelihoods - and to their prospects for escaping poverty" Farming in return is directly dependent on water - whether through rainfall or irrigation. Thus, a sufficient water supply is important to their

livelihoods; and to their possibilities to break poverty cycle. Therefore, a livelihood framework is a useful tool to analyse access to water and water use (UNDP, 2006:173).

### **2.7.1.2 Relationship between water and livelihoods**

Natural assets include wild animals, land, wild food and fibres, water and aquatic resources, biodiversity, trees and forests products, and environmental services. Water in its natural form is a natural asset, although access and use of water involves other capitals, e.g. financial (income and savings) and physical with respect to dams, taps, pumps and other infrastructure and equipment. However as viewed, it is considered a vital livelihood asset, particularly in rural agrarian communities.

This was highlighted in a study conducted in Zimbabwe (called The Tsovani Case) where a community was economically classified and studied. Among other assets identified, irrigation water was regarded as a key asset particularly in areas that are otherwise dry. It was seen as the bearer of good fruits in improving the livelihoods of rural farmers. The study also found that water was not a stand-alone asset, but was linked to other assets such as incomes, social and political networks. Access to all of these, including water, varied among different classes. Poor farmers were unable to afford the high cost of running and maintaining electrical pumps and thereby failed to utilize optimally their irrigable pieces of land. Marginalised people cannot afford interests rates from finance institutions. The study argued that government policies regarding land redistribution needed to reconsider irrigation support - ensuring practical, affordable access by marginalised people (Mombeshora, S. 2003).

The vulnerability context consist of floods and drought, seasonality and long term trends like climate change which affect natural resources. Institutions at different strata influence access to water and water use which are likely to be context specific. At the household level, these could be rules and norms assigned by the household head, governing who collects, and who has access to water. At community-level, these are local practices like norms and traditional authorities, e.g. izinduna are likely to be decision-makers (Adams et al, 1997; Rangan & Gilmartin, 2002: 636-640). Regional level local/regional government, political bodies, legislation and organisations are authorised to govern the regions. At the National level, the legislative framework, government, political processes and major water users are the influencers. At international level, there is the legislative framework, government, political processes and major water users. At international level the legislative framework, multi- lateral

agreement and processes for example globalization and privatization (Bond, 2003). Cornwall & Nyamu- Musembi, (2004) suggest that support to the marginalised, especially women as water carriers and disadvantaged groups, be actively involved in participation in decision making processes. This should be applied at different levels including the poorest of the poor to ensure their concerns are heard and addressed.

Mogane-Ramahotswa (1995) analysed three case studies where emphasis is on the importance of community involvement at an early stage of the project. Findings show that if the community initiated the project, they will manage it properly to ensure its sustenance. Therefore, government should not impose projects.

According to Nichol (2000) water issues were introduced primarily in relation to health issues which lead to the expression of water as an economic good, thus opening a gap for it to be recognised as a livelihood asset. Investigating water using a livelihood spectrum has implications for the approach to policy making and provision. If health is the focal point, water quality is likely to be the core issue. However, if the main objective is the optimal availability through the supply mechanism, even distribution is vital. (White et al, date) argued that water quality is not more than important than the quantity even from a health perspective. If people have insufficient amount of water, the possibility to neglect hygiene is very high. This does not oppose the importance of safe water for consumption but if the aim is to enhance livelihoods, this alone will be far from sufficient. Mehta and Ntshona (2004) stated that people usually use varied water sources for different purposes e.g. water sources such as taps for consumption, borehole water for irrigation, unprotected sources such as rivers, wells, stream and dams for laundry and livestock. Several factors including available infrastructure, finance, preference and institutions determine the quantity to be used, from what source and the specific purpose (Mehta & Ntshona 2004: 156). Thus, understanding the difficulties that people go through in the process of accessing water and their water usage is fundamental to improve the water availability and easily accessible for livelihoods. Literature review highlights a trap forming link between water and other assets particular land, human beings, livestock and food (Derman & Hellman, 2007, 664-667).

Approaching rural structures with an aim of addressing their needs, livelihood analysis seems to be an appropriate approach. Water is the fundamental asset and is interwoven with all other assets. Poverty rate is high in rural communities. The majority of rural communities are

unemployed. Therefore, agriculture is a solution. Farming is directly water dependent. Decisions on land redistribution without sufficient water access is a problem for the poor. Rethinking from policy makers at all levels of the government with regards to irrigation scheme to dry-land is needed. Poor people cannot secure loans from financial institutions because of their economic status. They are considered as high risk. High interest rates are also a hindrance in attaining funding in order to run their agricultural programs. Therefore, water is vital to their livelihoods in order to break the poverty cycle (UNDP, 2006:173). Inclusion of the poor in decision-making processes is essential as they are isolated and voiceless in all the government sectors with regards to livelihood framework. People use water differently and have different interests even within household levels. Livelihood analysis assists with a clear broad spectrum in understanding the ways in which people with diverse usages and interest share water. While livelihoods are not an end to themselves, modification is necessary in order to make it suitable to different local communities. This could be achieved if all local people are involved in the decision making processes that directly affect them.

### **2.7.2 Vulnerability**

Vulnerability is of particular concern in the matter of water sources. As noted earlier, every water source is susceptible to factors that affect access, availability and/or quality of water. Thus, it is valuable to discuss vulnerability (from the livelihoods perspective) in some greater detail.

The classical livelihoods definition of vulnerability are factors that have a “direct impact upon people’s asset status and the options that are open to them in pursuit of beneficial livelihood outcomes” (DFIF, 1999: np). According to Swanepoel and De Beer, (2015:6) “vulnerability could be observed in the lack of reserves and choices, and the ease with which less advantaged people can be coerced”. Biggs *et al*, 2004:22, affirmed Pelsler’s (2001:55), definition of vulnerability as susceptibility resulting from exposure to dangerous or threatening environmental, social, economic and/or political conditions and which exposure can potentially reduce capacity to cope with or recover from the impact of a harmful change.

In the context of water (which is a vital asset that has aspects of all five asset groupings), vulnerability is particularly important. Poor supply or insufficient provision of water, and poor waste management services (physical asset) pose a threat to health problems (human asset). An inadequate supply of safe drinking water is one of the indications of poverty (financial and

social asset). People, and especially children, suffer poor from health as a result of drinking contaminated water. Poor or lack of proper sewage system (e.g. pit latrines), rainwater washes unmanaged waste on the surface into streams, rivers and stagnant pools. Diseases multiply and spread under such conditions. Prolonged and repeated illness leaves the victims vulnerable to physical weakness (human asset).

As argued by Swanepoel and De Beer (2015:6), “At another level, the poor are also vulnerable to exploitation by people in position [social asset]. As they have nothing to bargain with the poor are powerless”. They argue further that the conditions of “poverty, powerlessness and physical weakness” increase vulnerability, and subject them “the destruction of self-esteem” [social asset].

Unemployment (financial asset) often results from factors such as lack of acquired skill through education as well as from “isolation, physical weakness and vulnerability” (Swanepoel and De Beer, 2015:7). In developing countries, as noted by Sigenu (2006:20) “women and children, especially girls, are the most vulnerable to water scarcity” as they are the main water collectors. Citing the work of Onyango (2003) and UNFPA (2001) Sigenu notes further that women and especially girl children “are generally the ones responsible for almost all water related chores within the households and they often have to travel long distances” to collect water. This often takes precedence over attending school.

At the household level, vulnerability is likely to be determined by socio-economic status and means of securing a livelihood. The National Population Unit (2001) estimated that about 1.1 billion people do not have access to clean water, noting that this is more manifest in rural areas, where, at the time, 29% of the population lacked access to clean water.

It is evident that vulnerability in water increases insecurity in livelihoods resulting in poverty. Poverty is the main determinant of other factors of the deprivation trap (Chambers, 1983:111).

According to Pelsler (2001:24), Sub-Saharan Africa has more rural people who are mostly vulnerable to water scarcity as a result of prolonged droughts. He further stated that approximately 75% of the population in African countries especially in rural areas are small farmers and these farmers of sub-Saharan Africa are largely poor. Therefore, people who have no real security against adversity also often experience water scarcity. An example of this is

the fatal 2015 attack on 15-year-old Qiniso Mhlongo at Osuthu in Nongoma due to water scarcity. Qiniso was stoned to death at the water source by other boys who were thirsty (Ukhozi FM Ezisematheni 10-November 2015).

## 2.8 Towards a theoretical framework for studying water sources

An analysis of the literature presented in this chapter suggests vulnerability as a key area of focus when examining rural water sources and exploring, in the context of access, usage, characteristics, the implications for rural households, which is the focus of this study. The analysis of literature further suggests four key areas related to vulnerability in the context of rural water: Health; Livelihoods; the State; and Water Resources. Together, as captured in [Figure 5](#), these elements create the theoretical framework for this study.

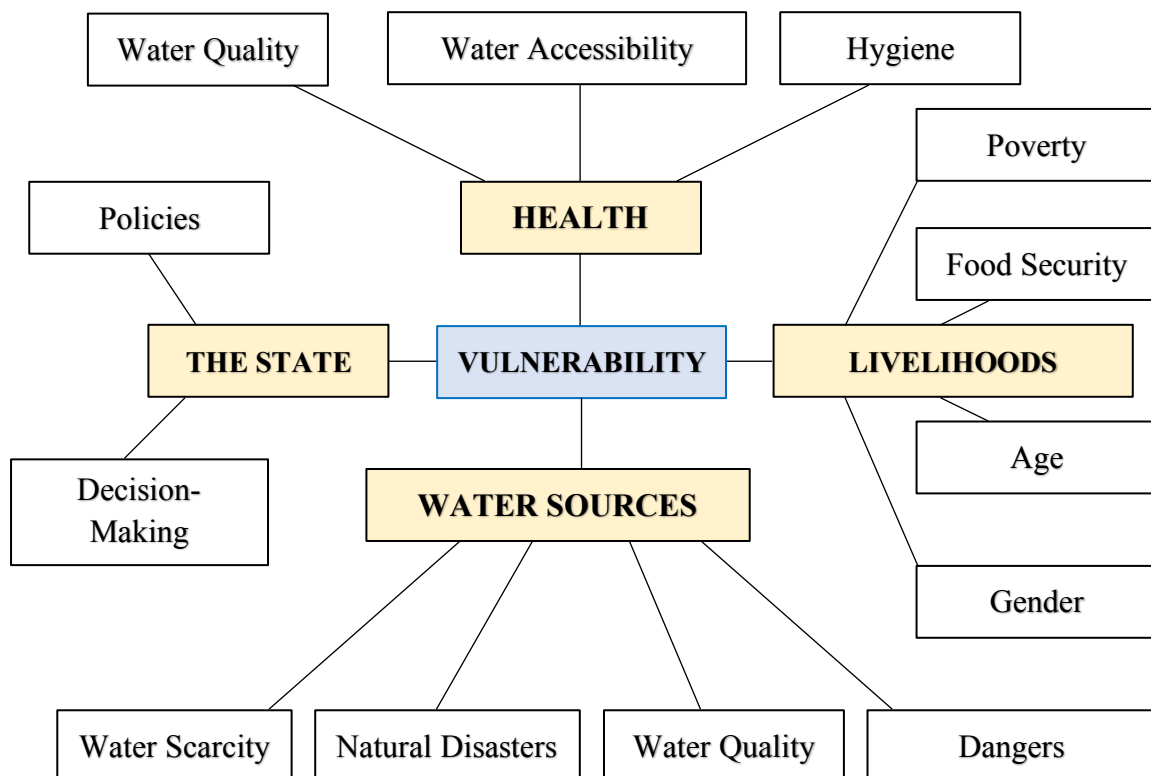


Figure 5 Theoretical Framework centred on vulnerability to examine the impact of water sources on rural households

### 2.8.1 Health

The literature discussed in this chapter suggests that one of the main impact of water sources is the potential to impact on the vulnerability of the health status of rural households. Specifically, this vulnerability is particularly affected by water quality, water accessibility and water hygiene (DFIF, 1999: np; Swanepoel and De Beer, 2015; Biggs *et al*, 2004).

### **2.8.1.1 Water quantity**

The literature reviewed underscored the common-sense understanding that water is essential for life. Water is life. People cannot survive without water. The suggestion is that the quality of life, as measured by health, is greatly influenced by the quality of water. Clean water promotes a healthy environment, whereas poor water quality, particularly polluted water has a negative impact on human health which increases vulnerability to diseases. This relationship is reinforced by the WHO guidelines that set standards for acceptable water quality. Communities where these standards are not met are more vulnerable to diseases (WHO, 2004; Gadgil, 1998).

### **2.8.1.2 Hygiene**

The literature reviewed highlighted the connection between health and hygiene. Without water, there is no hygiene. Good hygiene practices are water dependent. These include bathing and sanitation. Many water-borne diseases are transmitted through inadequate body and hand washing. Washing of hands after visiting the toilet reduces the transmission of micro-organisms that cause diarrhoea, but the lack of water exposes communities to and makes them more vulnerable to water-borne diseases (Rylander, 1991:91; Davis *et al*, 1993).

### **2.8.1.3 Water accessibility**

Water accessibility refers to the ease with which people can access water. In many rural areas, the oldest common method of carrying water is carrying water container on the head. Transporting water from mountainous regions make it problematic to balance water containers which place water carriers into dangerous situations. Women as are usually water collectors could be vulnerable to deformities, miscarriages from heavy water containers, still borne, and or can have tragic consequences or accidents (Green, et al, 2010).

## **2.8.2 Vulnerability and livelihoods**

A second area of vulnerability was vulnerability in relation to livelihood. The literature reviewed suggested that water sources affected the vulnerability of livelihoods from the aspects of poverty, food security, age and gender. Rural livelihoods strategies are mostly dependent on natural resources and water as a natural asset playing a vital role. As argued by Mwakalila (2011), there is a direct relationship between the availability of water and the vulnerability of

livelihoods in rural areas -especially those dependent on rainfall. Four factors emerge as relevant issues when considering the impact of water on rural households: poverty; food security; age; and gender.

### **2.8.2.1 Livelihoods and poverty**

The literature reviewed highlights a close relationship between the role of water in economic development and poverty reduction. As noted by Sullivan, et al (2003) water is often the beginning point for food and other productive activities. In many rural communities, water is an essential part of livelihoods based in agriculture.

The majority of people in rural communities are not formally employed and are dependent on agriculture for survival. Agriculture depends on natural assets being mostly land and water. Lack of access to such assets expose rural dwellers to be vulnerable to poverty which further activate all the factors of the deprivation trap.

### **2.8.2.2 Livelihoods and food security**

Food security is a primary outcome of livelihoods. The majority of the rural dwellers mostly depended on subsistence agriculture. Agriculture is water dependent. Severe drought and heavy rains impact negatively on food security. Poor farming production expose the rural dwellers to be vulnerable to famine and under nutrition/ malnutrition. As noted by Gowing (2003: 2.1), “Planning for future food security requires integrated analysis of land-use and water resources issues”. It is suggested that water directly influences the vulnerability of many rural household.

### **2.8.2.3 Livelihoods and age**

Literature suggests that age is linked to water in the livelihoods context. Children may be given a greater role in water collection, which may also increase the workload for children thus affecting their school performance. On the other side of the age spectrum, the elderly people often find it difficult to access water unless they have money to pay for water collectors and transport. When doing so, they put themselves materially at risk. When assessing the impact of water sources on rural households, age is an important factor in measuring vulnerability - with the understanding that children and the elderly are likely to be more vulnerable than the rest of the community (Hazell, 2008).



#### **2.8.2.4 Livelihoods and Gender**

As with children and the elderly, the livelihoods of women are generally more vulnerable than those of men. It is highlighted in literature that women and girls are seen as water collectors. Poor water supply affects girls negatively as their school attendance and educational achievements are impaired. Poor water supply in rural communities increases illiteracy rate for young females which make them vulnerable to unemployment which exacerbates poverty. It increases women's workload which further hinders women from participating in community based organizations and networking opportunities or any empowering activity. Thus, gender vulnerability is another factor to track in analysing the impact of water sources on household livelihoods (Hazell, 2008).

### **2.8.3 Vulnerability and water sources.**

The third element of the theoretical framework shown in Figure 5, is the direct impact of water sources on vulnerability. In this, four factors emerge as particularly useful when analysing the impact of water sources on rural households: water scarcity; natural disasters, water quality; and dangers associated with collecting water (DFIF, 1999: np; Swanepoel and De Beer, 2015, Biggs *et al*, 2004)

#### **2.8.3.1 Water scarcity and its impact on vulnerability**

The literature reviewed suggests that a strong link between water scarcity and economic growth is real. As populations expands, the use of ground water and surface water for household purposes, industrial sector and agricultural production increases which can lead to severe pressure on the environment and conflict between users. Therefore, water scarcity seems a threat in food security and in future interventions on poverty alleviation (WHO, 2004).

#### **2.8.3.2 Natural disasters**

Rural communities are mostly the victims of natural disasters especially during droughts in dry season and during floods in spring. During drought, water is usually a problem because water sources remain under pressure and many of which may lack protection. During floods, springs dug next to the river are usually washed away and be filled with sand soil thus reducing clean

water availability. Climate change also impacts negatively on natural resources as they depend on rain.

It is highlighted in the literature reviewed that during relief situations ensuring sufficient water supply through tanks should provide enough water for a normal day's consumption. Water should be disinfected. To minimise conflict, water should be delivered to public spaces then to be privately controlled. The MDG's report anticipated that 2015 would be the deadline for rural communities to have full access to safe drinking water but the majority of rural dwellers remain vulnerable to water scarcity, and thereby prone to be vulnerable to the factors of the deprivation trap (MDG report, 2011).

#### **2.8.4. Water sources and water quality**

Literature reviewed suggests a connection between untreated water for human consumption and contraction of water-borne disease. Sharing of water sources with livestock and wild animals creates a poor quality water thus placing the rural community vulnerable to diseases. Unprotected water sources can be contaminated through the well head, the lining or through the water entering the intake. Rain and spillage can wash into unprotected sources where guinea worm is endemic. Also, various diseases are transmitted by dirty containers and feet while climbing down the water table which further reduces the quality of water at water sources thus exposing water collectors at health risk (WHO, 2004).

##### **2.8.4.1 Water sources and safety**

According to the literature sources, water collection in rural areas exposes communities at risk to many dangers as water sources are difficult to access. Rural dwellers are at risk to wild animal attacks, physical and sexually assault, and inclement weather while travelling long distances to water sources. (WHO, 2004). Both humans and animals have died due to the collapsing of the unlined walls of the water source excavations. Hookworms flourish around the source to be picked up by the bare feet of the rural dwellers. Routes to water sources may be rocky and dangerous increasing the potential for living threatening injuries and long term disabilities.

#### **2.8.3 Vulnerability and the State**

The literature analysis suggests the link between vulnerability and the state. The state in its hierarchical policy structures are expected to protect and fully support the fulfilment of water

rights and make remarkable progress towards the realization of the right to water. This section discusses two factors which came up that need attention for the benefit of rural communities. These are vulnerability and policies and vulnerability and decision making.

#### **2.8.5.1 Vulnerability and policies**

There is further connection between vulnerability and policies such as South Africa's Constitution, The Water Service Act, The National Water Act and Free Water policy as highlighted by the literature reviewed.

Policies at institutional levels determine access and use of water. Even at household level rules and laws determine water accessibility and use. While government institutions govern the water supply and manageability of water resources, the National Water Act of 1997 recognises that water is a natural resource that belongs to all South African citizens, the imbalance has not yet been rectified. Rural communities continue to be vulnerable to degradation and the historically skewed allocation of water. In the South African context, water is a highly political and economic issue which exacerbates the vulnerability of rural villagers of whom many are without employment to pay for water and are unable to make decisions for themselves with regards to water availability and accessibility.

#### **2.8.5.2 Vulnerability and decision making**

The majority of the people live in rural areas are illiterate and therefore are usually not part of the decision-making process (WWDR 2009). Women form the majority of rural communities but are generally excluded from water decision making processes although they are regarded as water collectors. Water collection is a time-consuming, physical hardship which presents long term consequences for the health of the women and their families. By denying women a voice in the planning processes of water projects and the like, the community will be hampered in its ability to develop economically and sustainably.

Water is the basis of life for every human being. Given the population growth and the occurrence of climate change that has a negative impact on the availability of water, an understanding of the impact of water and water source typologies as related to the vulnerability of rural households is essential, and together with an understanding of the power of inclusiveness will enable more effective planning in the future.

This chapter has sought to set out a workable framework for examining the impact of water sources on rural households. It has suggested that the key element to track is vulnerability, and to do this tracking by looking at the indicators outlined in [Figure 5](#).

## **CHAPTER THREE: RESEARCH METHODOLOGY**

This chapter presents the research design and highlights the research approach and location of the research.. It discusses sampling methods applied, the selection process for sampling , the data collection methods used, the research instruments used, how the pilot study and field visits were accomplished, the methods used for data analysis, and how validity and reliability were assured. All of the above was done in order to achieve the study objectives. The study area is also discussed together with the rationale of the study.

### **3.1 Research Design**

The population of this study comprised all households at Ivuna area. Due to the large population to be studied, a sample was drawn to obtain the data needed. A sample is defined by Seaberg (1988), as cited by Strydom and Venter: 199), as a small portion of the total set of objectives, events or persons that together comprise the subject of the study. Purposive sampling was used to select a portion or sample for this study. “Purposive sampling is described as a random selection of sampling units within the segment of the population with the most information on the characteristics of interest” (Guarte & Barrios, 2006: 177).

#### **3.1.1 Research Approach**

Both quantitative and qualitative research methods were used in this study to achieve the set objectives.. Some parameters being studied could be measured quantitatively such as water quantity collected per household per day. Other parameters, like causes of conflict at water sources, could not be measured in a quantitative measure. Qualitative methods were mostly applied in data collection and quantitative methods were used, where relevant, primarily to create descriptive statistics derived from the analysis of numerical data and the application of statistical tests (Tonono, 2008:40). Quantitative research is more focused and aims to test assumptions, whilst qualitative research is more exploratory in nature. Quantitative research concerns aspects that can be counted which is one of its most common disciplines, that is the use of statistics to process and explain data and to summarise research findings. Quantitative research is concerned with systematic measurement, statistical analysis and methods of experimentation (Fox & Bayat, 2007:7).

Qualitative research originated from the ethnographic methods. There were a number of reasons for choosing a qualitative research methodology for this study. Firstly, qualitative methodology particularly is suited to research in the social sciences where a 'holistic' or intensive description of contemporary phenomenon is desired.

Secondly, qualitative research is used in investigations amongst individuals or groups within a given community, group, or organisation. It focuses on the behavioural regularities of everyday situations, for example, relationships between individuals or within group attitudes, rituals and so on.

Thirdly, qualitative research questions lead towards an inductive or 'data driven' approach.

Fourthly, this design was chosen because it relies on verbal reporting characterised by similarities and differences in order to explore, analyse, compare and solve problems. Qualitative research seeks to understand human behaviour through observing and interacting with people in order to try to understand the world as they understand it. Wellman et al. (2008:193) state that the primary task of ethnographic research is to uncover and explicate the ways in which people in particular settings come to understand, account for, take action, and manage their situations as well as problems and difficulties they encounter. These processes of uncovering and explicating are typically based on successive observations and interviews. Other researchers choose qualitative interviewing because it provides the means to fully describe a phenomenon not solely for the researcher's view point but also from the reader's perspective (Miller & Glassner 1997: 100).

Qualitative researchers do not, therefore, seek to test a theory through formulating a hypothesis and examining their data. This does not mean they approach their subjects 'devoid of theory' but rather that this theory is not fixed. Qualitative research is generally used to study matters such as people's understandings and interactions (Silverman 2005:9) and is thus highly relevant for studying the nature of water conflict and cooperation. Common methods within the qualitative approach are semi-structured interviews, observations, discussions and other participatory approaches, often a combination is applied in order to create an in-depth picture of a situation (Mikkelsen 2005:348).

This study involved two stages of data collection from two related but separate samples. Focus group discussions were held with 18 participants from KwaNsele, Kwa Ndasi (sub-section at Ivuna), Esgangeni and Evuna to develop themes for the main survey. Participants in the focus group discussions were selected by purposive sampling. The main survey involved 100 respondents sampled from the population of the study area by means of random sampling within cluster sampling.

### **3.1.2 Case study**

Studies that use qualitative method aim at providing an-in-depth clarification (Mouton, 2005: 149; Leedy & Ormrod, 2010:187). The main goal of its application is to get an insight about a large population. The strength in using a case study is high constructive validity assisting with the provision of in-depth insight about the greater phenomenon under scrutiny. This approach may, however, pose a threat of using cases that may vary from the larger population. Another weakness is that of the potential bias of the researcher. The researcher prevented such occurrence by avoiding much focus on individual-ness of the unit of analysis, meaning that although data was collected from certain individuals the main focus was at the large community but being aware of the population under study.

### **3.1.3 Focus Group Discussions**

The Ivuna area was selected for this study because it is within the catchment area of Nongoma municipality in Nongoma. Nongoma falls under Zululand District Municipality. Nongoma consists of three tribal authorities, namely Matheni, Bhanganoma and Mandlakazi under Inkosi Bhekintinta and Usuthu under His Majesty King Zwelithini ka Bhekuzulu.

Focus groups were selected from four different areas of the study area. They were from kwaNsele, Esigangeni, Kwa-Ndasi (sub-section at Ivuna) and Ivuna areas. Five members from each group were purposively selected based on being more vocal in the area. Another five were voluntarily involved, while the other eight members from each section were chosen by the community.

Focus group discussions were undertaken in June 2013 to validate the attributes gathered from literature. Each group comprised people of the different genders and different ages. Discussions were facilitated by the researcher asking mostly open-ended question so as to allow people to speak freely. The main purpose of the group study was to validate the findings from secondary

sources as well as to identify the present multiple uses of water in the area, the existing and desired water services and the most relevant attributes to characterize them. This was also applied so as to understand the real situation in connection to water sources in the study area so as to avoid conducting the study with pre-conceived ideas. This enabled the researcher to formulate relevant questions for the study.

Kitzinger (1995:299) explained that focus groups are used as a data collection method where information can be shared and discussed between research participants in order to produce data. Sometimes group interviews are used to speed up data collection process from different people simultaneously while focus groups demonstrate clearly the use of group interaction as part of the method.

According to Bless and Higson-Smith (2000:110), the advantage of using focus groups is that when the participants disagree on a particular issue, the whole group will explore the disagreement in detail. Thus, the researcher will gain a deeper insight into the topic. Such discussions can be very useful in constructing questionnaires (Struwig & Stead 2004:100).

## **3.2 Survey**

### **3.2.1 Survey Sampling**

The Ivuna area is a remote area with limited population data. Therefore, cluster sampling would be more appropriate. Some of the strengths of cluster sampling when compared to simple random sampling include less time for travelling in highly dispersed rural communities such as the one being studied in this project, less money and labour, permitting subsequent sampling and the estimation characteristics of clusters as well as the target population.

To reduce sampling bias the researcher ensured that an adequate sample was selected. Therefore 100 subjects were selected by cluster and random sampling approaches. In each cluster every household had a chance of being chosen. Ivuna Area is divided into four (4) sub-sections, namely Ivuna, Mahlombe, Esigangeni and KwaNsele. Twenty-five (25) subjects from each section were randomly chosen. In each home, one (1) member of the family was chosen whether it was from extended or nuclear family type, until the required number was obtained. Another sample of 20 key informants was purposively selected in terms of accessibility. Five (5) from each trial area were chosen. Key informants were composed of local leaders like



izinduna, local senior citizens with relevant knowledge, key controllers for community tanks, and active youth members.

### **3.2.2 Data Collection by Survey interviews**

The study used the survey technique to collect data for analysis. This technique was chosen based on the fact that it is a popular and ideal mode of observation in the social sciences. Babbie (2001:237) is of the opinion that surveys are suitable for descriptive, explanatory or exploratory studies. They are especially ideal for studies that have individual people as units for analysis. In this study both the individual and household were units of investigation and analysis. The survey method used in the present study involved administering questionnaires to respondents. In the case of this study, due to the high illiteracy rate in the community, it was advisable to engage in-depth, open-ended interviews so that the problem of water could be used to generate research themes. Secondary considerations were time and the cost involved in undertaking such interviews. The main disadvantage of using interviews was the risk that the lack of anonymity which might discourage respondents to respond freely to sensitive questions. To compensate for this, the respondents were reassured, both personally and formally through a signed consent form that whatever they shared with the researcher and/or the research assistants would remain confidential.

The advantages of interviews were clear. Key among them was that interviews yield rich insights into people's biographies, experiences, opinions, values, aspirations, attitudes and feelings (Timothy, 2013:120). Therefore, data was collected by means of personal interviews using an interview schedule. After visiting focus groups, questions were formulated based on the discussions with focus groups. Then a pilot survey was conducted over a period of 2 weeks where after relevant changes were made to the questionnaire. The field work took place from June to September 2014. This period was chosen because the researcher had more time to be on site. The researcher was assisted by two research assistants who were well trained before assuming duties.

In this study, the survey questions were drafted in English and translated into isiZulu for the sake of the convenience of the respondents. Where permission was obtained, interviews were also electronically recorded as a means verifying accuracy of capturing data.

### **3.2.3 Testing of Interview Schedule**

As noted above, the interview questions were tested before the interviews were held. It is important for the researcher to know before-hand whether the study will deliver the information she is seeking. Pre-testing enables the researcher to understand what preparations should be made prior to undertaking the research (Van Kammen & Stouthamer-Loeber, 1998:379). As part of pre-testing, the researcher identified 10 respondents at Ivuna area. Pre-testing focused on the interview schedule and its ability to produce data which would assist the researcher in achieving the objectives of the study. Testing looked to establish the logic of questions, the degree to which the questions were interpreted correctly as well as their simplicity, especially in accommodating community representatives with low levels of education. Neuman (2000: 241) believes that after a pilot test the researcher should interview the pilot respondents to uncover aspects of the data gathering tool that need refinement.

In this study, the pilot test permitted the respondents to comment on the manner in which interviews were conducted. Valuable comments with regard to interpretation of questions asked were discussed with the researcher's supervisor and used to make the necessary adjustments to the interview schedule.

### **3.2.4 Data Analysis**

Data analysis is the process of moving from raw data to evidence-based interpretations that are the foundation for published reports (Cresswell, 1998: 201). In qualitative studies, the goal of data analysis is to find themes that explain the study. De Vos (2002: 340) describes data analysis as a process of bringing order, structure and meaning to the mass of collected data. Henning, Van Rensberg & Smit, 2004:127 emphasise that analysis should reflect a respondent's perception.

The researcher found that due to the limited frame of the thesis, applying a narrow focus was more appropriate than spreading over too much. Even on the local level the researcher omitted to include a number of relevant issues, e.g. questionnaires for local municipality. This is partly due to the sensitivity of the issue to politicians and somehow the accessibility with regards to water issues. This was evident when the researcher discussed water issues with other community members, they could give valuable information, but refused to be recorded as they were afraid of local structures even if they were ensured of anonymity. This showed how sensitive water issues are to community members.

Quantitative data was analysed using Excel to generate simple percentages and descriptive statistics.

### 3.2.5 Reliability and Validity

Field visits and observations were done to triangulate the information and to get additional information which could not be gathered through the other methods mentioned in the study. Their advantage was that the researcher had direct contact with the situation and permitted tests on reliability of responses to questionnaires as seen in [Figure 6](#).



*Figure 6: Researcher observing community at a water point.*

Participative observation enabled the researcher to gain an in-depth appreciation and understanding of rural water source typologies. Participative observation was able to affirm and corroborate some of the information that was collected using the questionnaires.

Durrheim (1999b:88) defines reliability as the dependability of a measurement instrument; that is, the extent to which the instrument yields the same results on repeated trials. Delport (2002:169) affirms that reliability is primarily not concerned with what is being measured but rather with how well it is being measured. This author goes on to say that reliability refers to whether a measuring instrument is consistent or stable and whether it measures exactly the same way each time it is used.

According to Durrheim (1999a: 46), qualitative researchers reject reliable, objective measures as invalid and argue that social phenomena are context-dependent and that the meaning of whatever it is that the researcher is investigating depends on the particular situation in which an individual finds him or herself.

In as far as validity is concerned, Durrheim (1999a: 46) notes that qualitative researchers regard information as being valid according to the degree to which the researcher can produce observations that are believable to him or herself, the subjects being studied and the eventual readers of the study.

In this study, the researcher regarded data as valid when collected information produced similar themes and sub-themes. Those themes that were unique and inconsistent have been recorded and reported as such. To ensure validity of the study, one focus group from Kwa-Nsele area was used informally where the researcher concluded that what was previously investigated produced similar results. The researcher also visited some sources of water for observation purposes to validate results.

### **3.3 Description of the study area**

The study was conducted at Ivuna area. Ivuna is located in KwaZulu-Natal Province within Nongoma Magisterial District of former KwaZulu. Nongoma is in the Zululand Region (See [Figure 7](#)). The Zululand Region is situated in the North-Eastern part of KwaZulu-Natal. The Nongoma district lies between the North Coast region of Ulundi in the East and Pongola village in the West.

Ivuna is bordered by the Black Umfolozi and Ivuna rivers in the South and North. It is 15 km from Nongoma village and 30 km from Ulundi plaza. The Zululand municipality is one of the municipalities with water problems. This area is a rural place governed by His Majesty King Zwelithini Zulu. It consists of about 1200 homes. There is no published information on Ivuna's population.

# Zululand District Municipality



	<b>eDumbe</b> Local Municipality		<b>uPhongolo</b> Local Municipality
	<b>AbaQulusi</b> Local Municipality		<b>Nongoma</b> Local Municipality
		<b>Ulundi</b> Local Municipality	

Figure 7: Study area (Source: <http://www.zululand.org.za/>)

The region's economy and settlement pattern are largely rural. During the apartheid era, Zululand was defined as a "homeland", and for that reason was severely deprived of governmental infrastructure and services for many years. Today, Zululand remains one of the poorest regions in South Africa. Most of the households do not have access to piped water. Nongoma community is not an exception to Tomlison Commission of 1955 (households were removed from settlements and relocated) which recommended for the establishment of a betterment scheme whose main objective was to divide areas occupied by Blacks into grazing portion, arable areas for planting and human settlement. In that given area, there was a portion

reserved for cattle farming, portion for planting and another portion for human settlement (CGTA, nd).

Many families were affected by such removal and the Ivuna area was not exempt from relocation. Many were removed from the areas where their ancestors had settled to the areas reserved for human settlement. This movement affected people in different ways. Some households had been next to water sources and were forced to move to rocky dry areas. Some people lost their tract of land and in return the household was allocated a field of 30m x 40m in a new settlement. The picture in Figure 8 shows KwaNsele which was part of the study area.



*Figure 8: A small portion of the study area*

Gombert (2003) note the lack of a basic water supply in KwaZulu-Natal. Accordingly, there is a high shortage of water at Ivuna such that the community depends upon the mercy of the rain in summer, and for those who lack sufficient water storage containers, it is very difficult to withstand the winter droughts.

As is the case in many former homelands in South Africa, infrastructure development at Ivuna area is very low and access to clean water is very poor. Households in the study area are dependent on diverse sources of water including salty community stand taps, boreholes, springs, rain tanks, river/streams, community tanks, water vendor and stagnant water like dams. Without proper human waste management in the study area usage of dams especially those

within household is not possible. At Ivuna, there are public standpoints where households collect water, but water supply from this source is very low and sometimes affected by drought, such that households have to depend on other sources like rivers and dams. Figure 9 shows an example of an unprotected water source.



*Figure 8: Example of an unprotected Water source; the water is used for human consumption (Ebuchobo).*

Before the community was removed to their current location, the community settlement was nearer to rivers and woods. However, that original area was converted to grazing for livestock. Now, community members have to walk long distances from where they are situated sometimes to the very sources they used before to search for water.

### **3.4 Why Ivuna was selected as the study site**

Ivuna was chosen for the study primarily because of the researcher's understanding of the community's suffering which developed interest of rural water supply and its impact on rural households.

The researcher had stayed in the area for several years as a teacher. Over the years, while on the road to or from school before sunrise or sunset the researcher often saw many Ivuna community members passing the road with water containers. Collecting water either in the early hours (before sunrise) or late hours (after sunset) seemed a normal practice at Ivuna area. Sometimes it was very dark in the evening with assistance of lights where one could notice

passing shadows. Among the community members carrying the water would be children of school going age. Sometimes very young girls carried containers that out-weighed their age. Some adults were also carrying very large containers. The Researcher was deeply touched in seeing such practices. Seeing some adults carrying 10-litre containers drew interest.

During the day, long queues at water sources were also noticed. Ivuna is also a big area. Water sources are not the same throughout the area. Through observation or enquiry from Ivuna residence others would tell that they get water by digging holes from the river sand. That alone is time consuming, as is the wait for the water to seep from the ground until the container is full. Others would use springs as a source of water. Containers took too long to fill up resulting in very long queues. In some parts of the area there would be noticeable boreholes but there would be no water pumped out from the ground due to dryness. Big rivers are far from households; they are often not a walkable distance. Some of Ivuna residents were fetching water either from the Ivuna river, which is also very far from households. Others were using the Black Umfolozi as their source of water, which is also too distant from their residence. Having no choice, going to the river was the only solution. All these mentioned rivers would dry up in severe droughts. Rivers which were resistant to dry quick even in severe droughts are very far and water needed to be transported to Ivuna community.

Further, when school going age children asked why they were not attending classes, the children cited long queues at water sources. Another factor was the lack of safety at some water sources. Even if one's container was full, one had to wait for others so they could travel in groups.

These continued occurrences and observations triggered an interest in the researcher. Therefore, many questions ran in the researcher's mind about water scarcity in the area. If drinking water was such a problem, how do they perform other household chores which need water? For example, sometimes one would notice an individual carrying a large washing basin with laundry. That alone would mean that the person would spend most of the time at the water source trying to dry the washing. What was seen through cursory observation triggered many questions and suggested that there was more to uncover.



### **3.4.1 The Rationale of the Study**

The main objective of this study was to focus on the impact of water scarcity on rural households in the Ivuna area in Nongoma. The study was conducted at the following sections of Ivuna: Kwa-Nsele, Esigangeni, Mahlombe and Evuna. This study identified that all these sections are water scarce.

The provision of safe drinking water and basic sanitation contributes to sustainable improvements in people's lives regarding their health and education, the preconditions for productive employment as well as for the eradication of extreme hunger and the empowerment of women. Sanitation is a key factor. In South Africa, an estimated 9 million people or 85% of the country's population live in rural areas with limited water resources (DWARF, 1994). The average child mortality rate in rural areas for children under the age of 5 years is estimated to be 12%; and 50% of deaths between the age of one month and one year are faecal related (DWARF 1994). A large group of the water-related infections such as dysentery, diarrhoea, fevers and hepatitis A are water-borne and can be classified as faecal -oral diseases since they are transmitted by the ingestion of water contaminated with faecal matter (WRC, 1998). The majority of those affected are the poor (Kariuki, 2008). According to WHO and UNICEF (2003, cited in Human Development Report, 2006), the sanitation backlog indicates an undeniable linkage between water-borne disease and child mortality on one side, and lack of water and adequate sanitation on the other side. Thus, if basic clean water and sanitation issues are not properly attended to, water-borne diseases are going to continue to affect the country, including the study area.

Assuring a water supply for the household has significant consequences both in terms of time and monetary costs. At the same time, insufficient and inadequate water supply result in increased health risks for the population and a higher morbidity and mortality due to water related diseases (Kariuki, 2008). Improving water supply will have a positive impact on the individual income and poverty situation of the beneficiary household. Reducing the time and energy burden of water collection by providing safe water at a nearer distance will enable household members to engage in other activities, among them productive and income generating activities. Improved water quality will reduce the health risks and also the costs of preventing and treating ill family members. Furthermore, the reduction of working days lost to water-related diseases will also have a positive impact on the household's income situation (Mathew, 2005: 44).

Dernman & Hellman (2007: 664-667) also highlighted that piped water is a prerequisite to rural development. Poor supply impacts negatively on health, economic development including poor performance at school, thus reducing employability and exacerbating poverty. They further show that the most vulnerable are the poor or the marginalized and suggest that water supply facilities should be rural friendly, i.e. infrastructure should be easily repaired by rural communities if anything goes wrong. Thus, the study sought to establish the extent of vulnerability in terms of livelihoods.

Finally, as suggested above water issues are also gender issues. The relationship between gender and water is complex and dynamic. Worldwide, women and female children are largely responsible for water collection; and women for managing household water. Water supply is essential for human health and survival, for food security, the reduction in productivity losses due to morbidity and malnutrition - most of which falls under the stewardship of women. It is argued that poor water access can perpetuate gender and other inequalities (e.g. class, race), partly because women and girls are often over-occupied with water-related responsibilities and are not able to pursue other avenues in life (Wallece & Coles, 2005).

This suggests that efforts to improve water access should be grounded in gender analysis, because this will influence the outcome of water policies and programmes. Thus failure to understand the gendered nature of accessing water can promote inequality. It can further mean that some people are disadvantaged. This study seeks to establish what aspects of the household are particularly affected and its impact because studies such as this one highlight the importance of taking gender and gender roles into consideration in the planning of water related policies and programmes.

## **CHAPTER FOUR: PRESENTATION OF FINDINGS**

This chapter presents the findings of the study based on the data gathered using the methods described in Chapter Three. Analysis will be directly based on the findings throughout the chapter. Where applicable, the findings will be interpreted and integrated with the literature discussed in Chapter Two. The chapter will conclude by drawing together what has been learnt in conjunction with the key research question. Relationships will be explored between water scarcity and rural households, water scarcity at water sources and their use, aspects of the households that are particularly affected, and their impact. The study will further evaluate the nature of vulnerability.

This chapter first presents the demographic characteristics of the respondents, including gender, age and citizenship, education, marital status, household size and employment status. Demographic information provides a vivid picture of community members in the study area. It presents the substantive findings of the study including sources of water supply, factors affecting effective water supply in the area, socio-economic impacts, health impacts, sustainability of water supply systems, and the role played by the local municipality. Finally, the relevance of the measuring tool will be evaluated to explore the extent to which the study succeeded in addressing the research question and vulnerability at large.

To assist with the assimilation of the very detailed nature of the findings, the key learning points are summarised as follows:

Broadly speaking, seven key findings emerged from the study: Traditional natural water sources are drying out; Water is scarce increasing vulnerability of rural communities.; Pressure to pay for water; Limited use of water harvesting; Men collect water; and Means of carrying water has changed from head to wheel-barrow.

More specifically, the study revealed a number of critical findings related to water sources, water collection and use, water management, and increased vulnerability. These are presented in summary form as follows:

## **Water sources**

- The findings show that only tap water supplied by the municipality is safe and protected, and that people are extremely vulnerable to pathogenic diseases due to unprotected water sources.
- This study confirms that women are still main water collectors, but that, increasingly, men are participating in this.
- Policy focus should be on protection of water sources, purifying water, and ensuring accessibility.

## **Water collection and use**

- Gender and water is a sensitive issue.
- There is an increasing number of female-headed and child-headed households.
- Although culture plays less of a role in water issues than in the past, it is still present.
- Collecting water still has a strong social component.

## **Water management**

- The study found that there are serious challenges related to managing water quality, managing access and off-take quantities, and the management of 'used' water.
- Lack of proper sanitation is the main factor.
- There are no visible structures to control water sources except municipality supplied water.
- The existence of water committees was not clear
- All of the respondents conserve water, but are limited by storage facilities.
- Local leaders are not visible enough in terms of their role in water management.
- Conflicts over water occur because of differing interests and values, and are unresolved because there are no strategies in place.

## **Increased vulnerability**

- The area under study is vulnerable to health hazards.
- More health hazards can be expected to continue, even in the near future.

### **4.1. Demographics of the respondents**

This study included 100 respondents from Ivuna in Nongoma. This section will briefly describe the respondents in terms of gender, age and citizenship, marital status, educational level, household size, who is the household head, and employment status. The findings will help in analysing the data from the main element of the study. Unless otherwise indicated, the

frequency indicated is the same as the percentage, for ease of reading the percentage is not included unless the sample population (n) is less than 100.

#### 4.1.1. Gender

The majority of the respondents were female (71%), the balance was male (29%). This made the results of the household survey more credible because it was observed and confirmed by the household survey and focus group discussions that women fetch water more frequently than men. The women were, therefore, in a better position to give accurate information.

#### 4.1.2. Age and citizenship

There was a relatively wide distribution of ages among the respondents. [Table 2](#) shows the distribution by age.

Table 2: Distribution by age

Age distribution	12-20	21-40	41-60	61-80	81>
Respondents	19	35	30	12	4

n=100

The oldest respondent was 93 years old, and the youngest was 12 years. The majority of the people available for interview were between the ages of 21 to 60 years old (65%). It is not uncommon for a 60-year-old rural dweller to still be active in water collection as seen in [Figure 9](#).

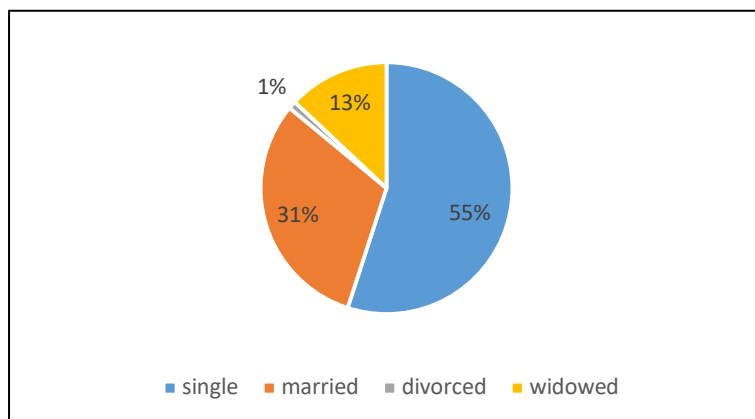


Figure 9: 60-year-old woman collecting water

All of the respondents were South African citizens, but one of the respondents was originally from Swaziland. Languages spoken was not tested as isiZulu is the commonly used language in the study area.

#### 4.1.3. Marital Status

**Figure 10** shows that 55% of the respondents were single (i.e. had never been married). Another 13% were widowed, and only 1% was divorced. Thirty-one percent (31%) of the respondents were married. This is significant because 69% of the respondents in this study were without an adult partner, suggesting that they are alone in taking care of their families. This will be discussed further under the section presenting the demographics of household heads. The low divorce rate is due to the fact that, in rural areas, divorce is not likely to be easily entertained comparatively as is the case in urban areas. In cases where it is imminent, it is strongly discouraged, especially in large families where extended members have a strong say (UN-OHCHR, 2016; Soyapi, 2014).



*Figure 10: Marital status*

#### 4.1.4. Educational level

As shown in **Figure 11**, only 2% of the respondents have diplomas or degrees, while 20% have not received any school education. Twenty-three percent (23%) had primary-level education, and 55% secondary education. This suggests that the majority of the respondents were functionally literate. The high percentage of respondents with grade 8-12 suggests that the respondents have at least some knowledge and understanding of water issues as a part of their life orientation or health education training. The education level beyond grade 12 or with tertiary education was very low; more than 98% of the household heads did not go beyond

matric. However, there is high possibility that this group did not embrace learning as a life-long experience. Job opportunities were still available for grade 12 and subsistence agriculture was still possible as a supplement to low income groups.

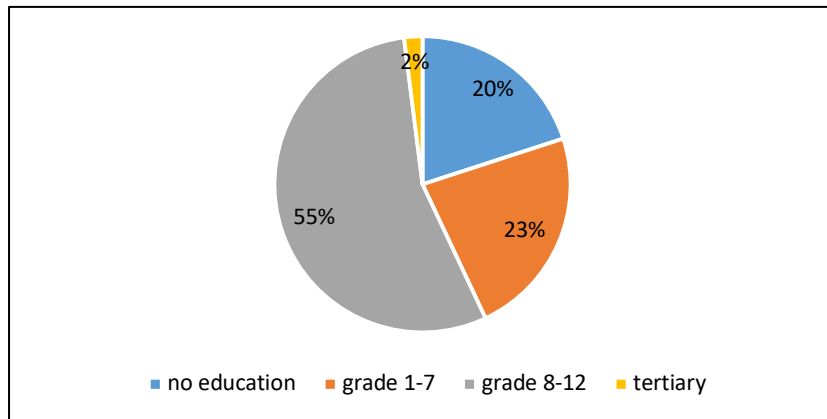


Figure 11 : Educational level

#### 4.1.5. Household heads

This study was done in a rural setting where adult males remain the main decision-makers in the community. As discussed in Chapter Two (Section 2.1.1.2), this extends to community-level decisions about water, which are made by committees that are comprised mostly (if not entirely) by adult males, thereby excluding women and children. Thus, determining the head of household was important because other than being responsible for collecting water, women and children have no authority over the water within the household, nor any voice over water matters in the community.

[Figure 12](#) uses four terms to indicate who the head of the household is. ‘Child’ refers to households headed by children below age 21 years. ‘Women’ refers to households headed by women without a husband and who are above 21 years, including grandmothers. ‘Father’ refers to households headed by males above 21 years with a wife. (In this study, there were no household headed by single adult males). ‘Grandparent’ refers to households headed by a married couple who are grandparents to the children in the household.

[Figure 12](#) shows that 17% of respondents lived in households headed by a ‘child’; 20% were lived in households headed by ‘women’; 35% were in households headed by a ‘father’ ; 28% were households headed by ‘grandparents’. The respondents were not necessarily the head of household, but were the ones most able to participate in the interview. In fact, 55% of the

households in this study were headed by males (including children, fathers and grandfathers) and 45% were headed by females (including children, single mothers and grandmothers).

Based on the discussion in Chapter Two, this finding suggests that a substantial percentage of the households (37%) – those headed by children and single mothers – were excluded, by customary practice, from decision-making with regard to water management issues outside of the household (i.e. for the whole community). The fact that men are usually the members of committees that deal with water at community level indicates that households without an adult male head have no representation on the critical issue of water. One would expect people directly affected to be directly involved, but this appears not the case.

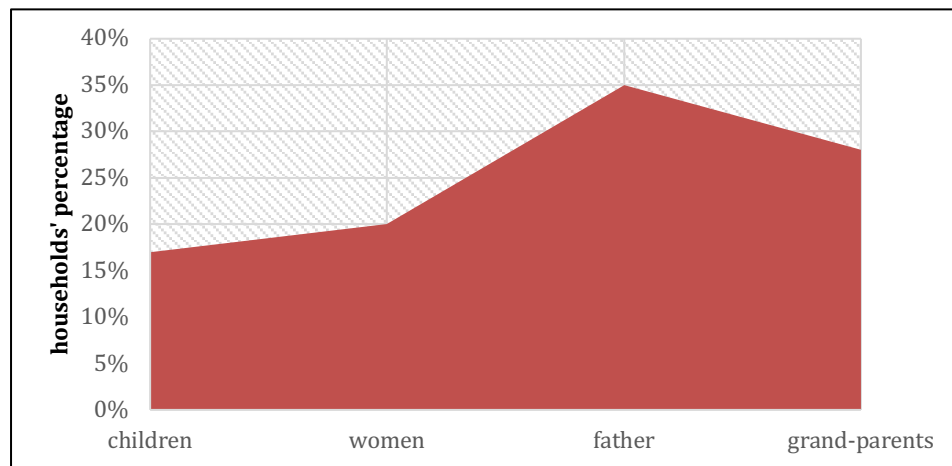


Figure 12: Households Heads: Who is the household head?

Despite the cultural norm, the significant percentage of female-headed (child or adult) households in this study suggests that single parents are effectively forced to take on ‘male’ tasks within the households and have substantial responsibilities in handling the welfare of the families, including water collection tasks. And yet, they are excluded from community-level decision-making.

This further suggests that governments and agencies engaging in water and other development programmes should take into account the extent of socially anomalous households and ensure that households that are voiceless within the patriarchal system are accommodated and given a voice. Further, policies need to take into account that family members in these households (i.e. non-adult-male-headed households) may, in addition to taking on the role of head of household,

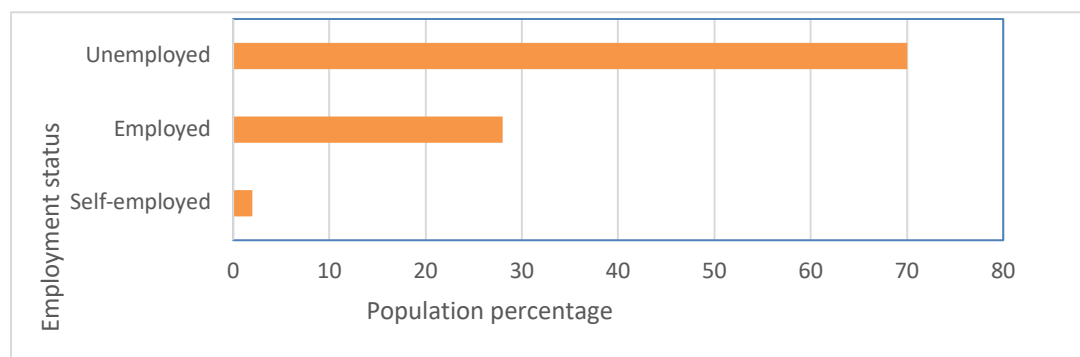


are also still likely to be burdened by caregiving and other responsibilities associated with women and children.

This is particularly true if there is shortage of water. Care-giving demands a lot of water for cooking, cleaning and caring for the sick and (Mehta & Ntshona, 2005). Care-giving within households extend to issues related to alternatives to institutional care with regard to water supply. Without sufficient infrastructure such as old age homes and other care giving facilities, care-giving is an imposed burden within the household. Such care may need engagements beyond the traditional family framework and be tailored to the specific needs and concerns of sub-populations affected by the status of household head e.g. children. In addition, although not specifically captured in this study, it was observed there are many orphans (or effectively orphaned) and vulnerable youth in the study area who are economically and socially marginalized. The change in household demographics, in terms of head-of-household, suggests a review of the gender-biased assumptions made in developing and implementing community-level water policy. Bear in mind that male children who are heads of households will become adults and will gain a voice; the same is not true for female children who are heads of household.

#### 4.1.6. Employment Status

**Figure 13** shows the high prevalence of unemployment in the study. Nearly 70% of the respondents are unemployed, and only 31% of respondents are employed. Only 2% of the respondents are self-employed. This is an indicative of the pervasiveness of economic poverty in the area.



*Figure 13: Economic Status of Ivuna community*

## 4.2. Water sources

This section will present the findings of the study with regard to water sources used by the respondents. It will discuss the respondents' perceptions about water sources in their area, problems experienced with water sources and current solutions, water quality hazards, household access to water services and respondent preferences, and causes of water shortages. For each of these themes, the findings of the study are presented and briefly discussed, primarily for clarification.

Conclusions about water sources are then presented to give an integrated understanding of the data and to provide a context for more detailed discussion in the next chapter.

### 4.2.1. Types of water sources

This section presents the findings regarding the different types of water sources used by respondents. Respondents were asked to list the types of water resources that they normally use. The responses given are summarised in [Table 3](#). This is presented in the context of Kerr (1989:196) who said, "One way to reduce the workload of rural women would be to have a tap in or near every household".

As shown [Table 3](#), there are a number of water sources in the study area. Not all the households in the study area use the same water sources. However, all of the respondents indicated that the dam, rainwater, the river and tanks are normally used as water sources. Fifty-one per cent (51%) and 46%, respectively use streams and taps. Only 8% use boreholes. This could be because in some parts of the study area there are no boreholes or boreholes are not repaired once broken.

Table 3: Types of water sources that are normally used

Water sources	Frequency
Dam	100
Rain water	100
River	100
Tank	100
Stream	51
Tap	46
Borehole	8

n=100

The map in

*Figure 14* shows the different rivers used by the respondents in the study area. It also shows the location of community water tanks supplied by the municipality. Most of the rivers easily dry up if there are no constant rainfall. However, the Ivuna and Black Umfolozi rivers are resistant to drying up unless there are prolonged droughts. During water scarcity, some community members dig water from these rivers, as water sinks in the sand, but on digging, water seeps out. During persistent droughts, even these rivers dry completely, leaving Ivuna area vulnerable to water scarcity.

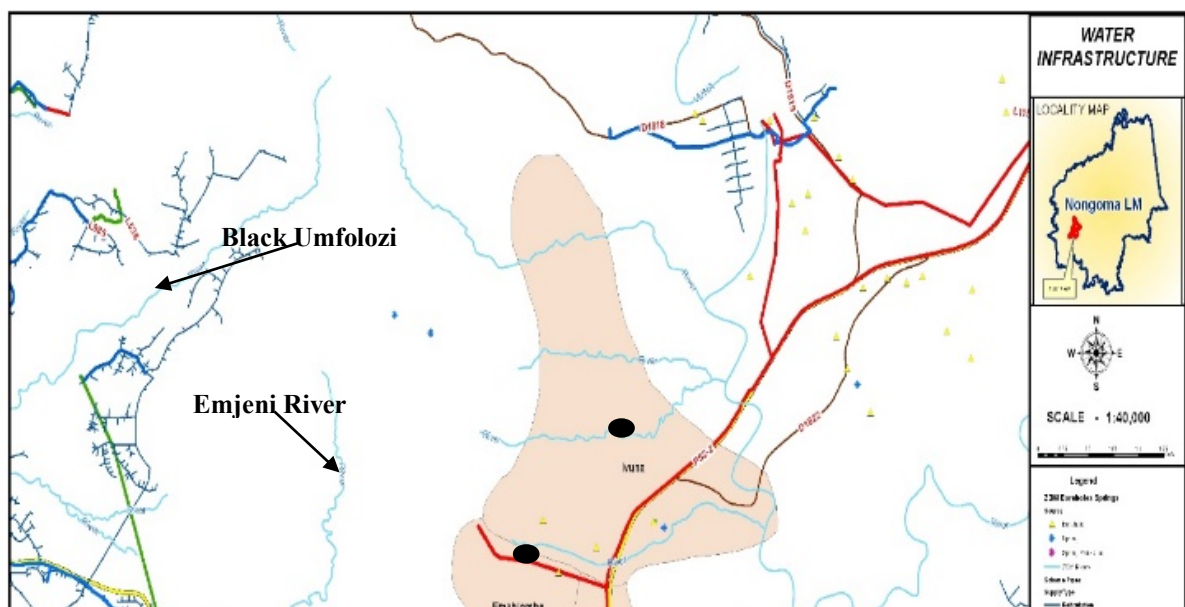


Figure 14: Map of rivers and community tanks stand points in the study area

Community water ‘jojo’ tanks are supplied by the local municipality to supplement the water supply. The tanks are filled by the municipality ‘water cans’ (mobile water trucks) as required. They are intended to help with water during droughts, and feature as a significant factor in this study. Accessibility of water sources differ per area. For example, although all households cited the dam and river as normal sources of water, some households cannot always access water from these sources as shown in [Table 4](#).

Table 4: How and when respondents collect water

Source	Frequency No. of people	Mode of Collection	Frequency	Quantity Collected/ Time (litres)	Availability Issues	Distance	Time of Collection
Dam	41	Wheel barrow	8	50	Always available unless drought	5m-1km	Anytime
		Head	33	25			
River	51	Head	51	25	Sometimes Available	3km-5km	Anytime
Stream	15	Head	15	25	Seasonal	3km-4km	Anytime
Borehole	11	Head	11	25	Sometimes available	1km-3km	Anytime
Tank	88	Wheel barrow	24	25 x 2 times	Sometimes Available	5m-20m	Morning And afternoon
		Head	64	25			
Tap	46	Pipe	3	150	Sometimes	2m-7m	Anytime
		Wheel barrow	9	25 x 2 times			
		Head	34	25			

Source	Frequency No. of people	Mode of Collection	Frequency	Quantity Collected/ Time (litres)	Availability Issues	Distance	Time of Collection
Rain water	97	Gutters	97	Unpredictable	Seasonal	None	-

n=100

In practice, only 41% do get water from the dam as seen in [Figure 15](#), and 51% from the river. Only 15% use stream water, which is available after rainfall, and 11% use boreholes (Esigangeni area as also shown in [Figure 15](#)), even though only 8% cited it as a normal source of water. Eighty-eight percent (88%) receive water supplied to community tanks. Forty-six percent (46%) use tap water, which is only accessible at Etshodo, and which is reported to be salty. Some 58% use spring water, which is accessible only in summer, as springs dry-up in winter. The eldest senior citizen in the study area narrated about a water source that had been in this area since 1960s and is still a source of water to the community. That spring appears to have survived the hardships of the present environmental factors.

Residents recommended spring water saying that it is tastier and drinkable. It could be used for all household chores, while salty tap water cannot be used to make tea or wash white clothes. Rainwater is the most preferred source; 97% of the respondents chose rain water saying that it is clean, tasty and one can use it to perform all household chores requiring water.

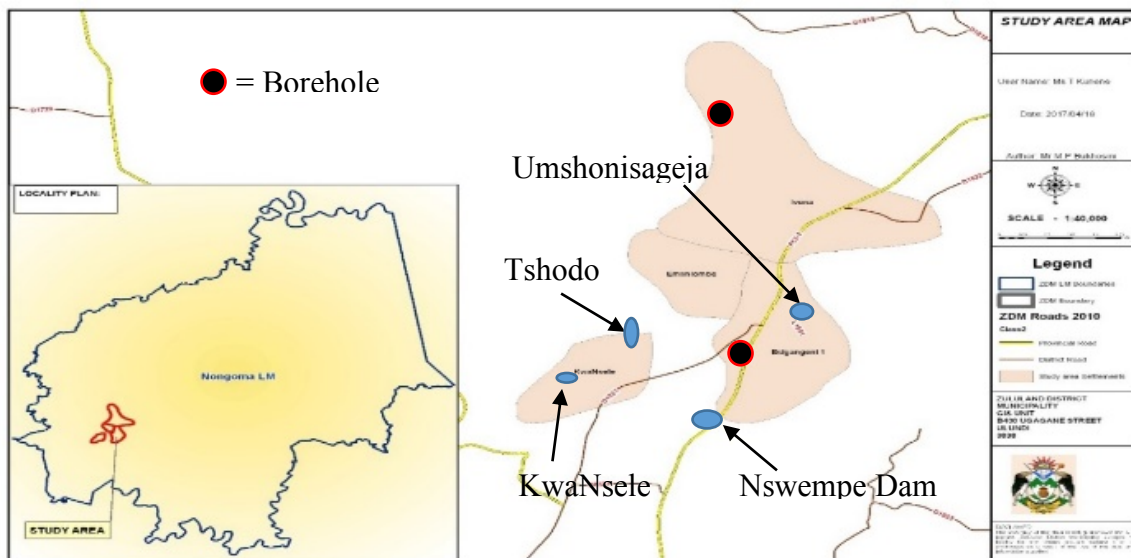


Figure 15: Map of the access site where dams are shared (Bukhosini, 2017)

An obvious fact about water sources is that the people have to travel long distances (as shown in [Figure 16](#)) to access the few water sources available in order to cope with water shortages and continue with their daily chores. Due to severe scarcity of water in the area, there is no choice in usage of water. As discussed in Chapter Two, Mehta and Ntshona (2004:156) argued that rural communities use a variety of water sources for varied purposes.



*Figure 16: A woman pushing a wheel-barrow from the water source, but the household is still too far. She has to push the wheel-barrow for more than 500m.*

However, this does not hold in Ivuna where the community is restricted in using whatever water that is available regardless of the purpose for which the water is needed. This could compromise the level of hygiene practise within a household. Although rainwater is most desirable, is it unreliable and thus, the most commonly preferred water source is the community water tank. Eighty-eight percent (88%) of the respondents would prefer to access water from community tanks which are within the surroundings of households. Although the ‘free water policy’ that requires the supply of 6000 litres of clean portable water per month be within the reach of 200m, this is not the case in Ivuna where many members of the community must travel (walk) distances far exceeding 200m.

Generally, quantities of water used per day for domestic purposes vary from household to household. This variation in water consumption is a function of a number of factors, including the water source, distance to the source or point of collection, household size and the reliability of the water supply. At present, sometimes the municipality supplies community tanks with

water for domestic purposes, but it is very unreliable. The respondents indicated that the tanks are too small, such that water supplied is not sufficient for domestic purposes or sometimes for drinking purposes. Due to the poor quality of present water services in the area, users are primarily concerned with basic domestic uses, and demand for non-domestic water uses is low. Only households already relatively well served are interested in engaging in multiple uses. The long distances and long queues hindered them from getting adequate water to use in their households, thus compromising health and hygiene practices.

In general, domestic water delivery service in the study area is poor. A significant proportion of households consume less than the recommended standard set by the Reconstruction and Development Programme (RDP) which is 20-30 *litres* per day (De Visser, Cottle & Mettler, 2003: 35). Household engagement in water use for productive purposes is limited by scarcity of water; water must first be used for life essentials. The study shows that water is not readily accessible to the whole community, even those who can afford for privately delivered water (in water trucks) as their source, struggle because the water trucks themselves are often not accessible. Those members who opt for private water delivery as their source of water have another problem of limited resources. Some of them cannot buy large water storage tanks which limits them to store only small amounts of water at a time. Actual volumes cannot be determined as different sizes of tanks are used. The volume of tanks is dependent on affordability. Some households use umphongolo (large plastic container holding 2000 litres) for storing water bought from water trucks. Therefore, the water shortage is made severe not only by lack of local sources, poor delivery, but also the inability to afford sufficient storage.

It was noted that, at the time of the study, most of the sources of water were dry, even tap water was not available at all. The municipality had not supplied them with water (in water trucks) in the past three months. The Zululand Region is a dry area. There are no other nearby areas to seek for water. Communities are forced to make up for water shortages fetching from unprotected sources, namely muddy dams (if they are not dry) or to pay for transport to collect water, which further impoverishes the households.

#### **4.2.2. Household access to water services and respondent preferences**

This section presents the findings regarding access to water and the respondents' preferences. As a preface to this discussion, the concepts and terms used and the definitions applied in this study are set out below:

- Access: Refers to the ease of getting water within a household.
- Availability: Refers to water that is reliably available whether from surface or undergrounds sources. It includes distribution networks for getting water to the households.
- Taste: Refers to the freshness in relation to factors such as saltiness or other mineral tastes.
- Cleanliness: Refers to the presence or absence of floating debris or coarser solids.
- Preference: Refers to a water source that is mostly favoured by respondents.

Further on the factor of ‘taste’: the presence of a ‘taste’ is objective, but its rating as ‘good’ or otherwise is subjective. The taste of water is influenced by its source, the introduction of minerals, and the method used to treat water (as in the case of water provided by the municipality). The rating of that taste is understood to be a function of personal preference.

Magnesium and calcium are examples of minerals which give water a distinct and often desired taste. Disinfection methods for tap water include chlorine, chloramine, ultra violet light and ozone. Chlorine and chloramine are used because they are both inexpensive and efficient (EPA, 2005). Unfortunately, the taste of chlorine is a common complaint regarding tap water taste. Under certain conditions, algal growth may be present and, if so, may impart objectionable tastes and odours to the water. Therefore, if water tastes ‘good’ in this study it refers to water without distinct bad smell, unacceptable odour, and/or not salty.

[Table 5](#) shows that water sources vary markedly per areas under study. Ivuna has four sub-sections. Water availability differs in each of these sub-sections. An example of this difference in water sources is demonstrated in

[Figure 17](#) and [Figure 18](#). Only 2% of the respondents have no community tanks available, but most households (98%) have community water tanks available at their disposal. Only the Itshodo area has tap water, although it is very salty; other areas are still waiting for another water scheme which could source its water from Black Umfolozi. There is cause for concern over this proposal as the Black Umfolozi already dries very quickly without the proposed scheme drawing additional water from it.





Figure 17: (left) A tap delivering salty water

Figure 18: (right) Community members collecting water from the community tank

Households in the study area are dependent on diverse sources of water, including salty water from community stand-taps and boreholes, ‘sweet’ water from springs, rain-tanks, and rivers/streams, community tanks, and water vendors, and stagnant water from dams. As shown in [Table 5](#), the study found that the respondents prefer rainwater, water from tanks (municipal water) above other sources of water because they are always clean and always taste good. Unfortunately, although preferred, they are both unreliable. Next in preference is water from rivers, streams, springs and taps. While the water from these sources always tastes good, it is not always clean and the sources are also not reliable or always available. Least preferred is water from boreholes and dams. Borehole water is not always available, it is clean but sometimes oily and usually salty. Dam water is primarily seasonally available and not always clean. Community members do drink water from the Nsele, Umshonisageja and Nswenmphe Dams, despite the fact that animals also use the dams. The respondents said that they do not drink water from Tshodo dam because it is too polluted by its proximity to the households. Thus, in this case, taste is not a factor.

Table 5: Water sources by availability, preference, cleanliness and taste (Ivuna area)

Source	Frequency	Preference	Availability	Cleanliness	Taste
Rainwater	100	Preferred	Unreliable	Always clean	Always good
Tank	100	Always preferred	Unreliable (98) Not available (2)	Always clean	Always good
River	54	Preferred	Available after rainfall (54)	Sometimes clean	Always good

Source	Frequency	Preference	Availability	Cleanliness	Taste
	46		Availability unpredictable (46)		
Spring	46	Preferred	Unreliable	Sometimes	Always good
Stream	12	Preferred	Seasonal	Sometimes; not always clean	Always good
	88		Unpredictable		
Tap	46	Preferred	Unreliable	Always clean	Salty
Borehole	21	Preferred	Always not available (41)	Always clean	Salty
	20	Not preferred		Clean, but sometimes oily	
Dam	11	Preferred	Always available	Not always clean	Not applicable because not consumed
	89	Not preferred	Seasonally		

n=100

The issue of cleanliness of water was found to be particularly important. Irrespective of age or level of education, the respondents equally understood the relation between clean water and health. But this knowledge did not seem to stop some residents from using natural water sources as latrines, as a place to bathe or do other washing tasks – all of which contaminate the water source. In addition to the misuse of water sources by humans, livestock present an additional challenge. As noted above, KwaNsele Dam in the study area (see [Figure 19](#)), for example, is used for household use including cooking, drinking and by livestock. Livestock even rush for clean spring water next to the dam where water is pooled for human consumption. (See [Figure 20](#).) It was noted that there are no reservoirs where water is treated in order to kill micro-organisms before reaching communities. These findings suggest that, despite claimed understanding by the respondents, basic health education is needed, as well as water treatment systems.

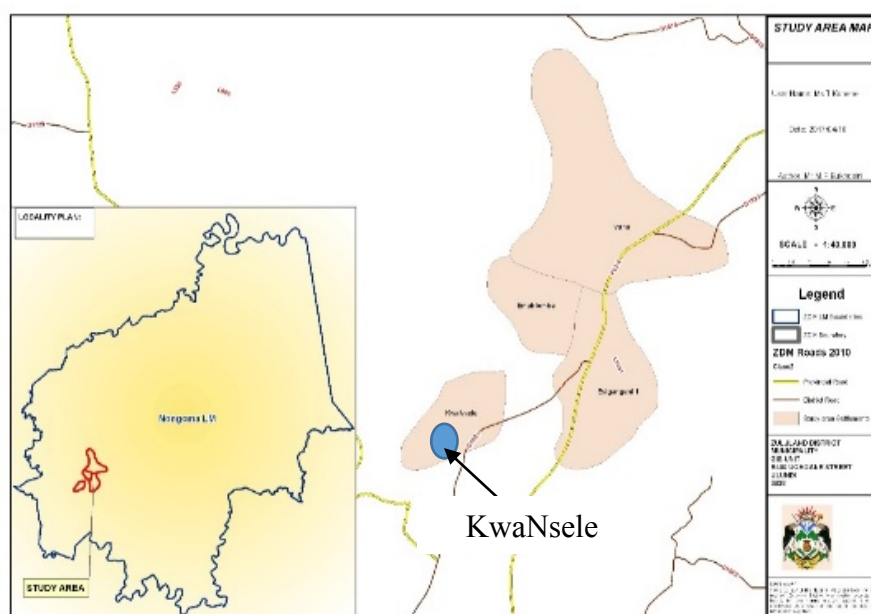


Figure 19: KwaNsele area sharing a dam with livestock (see arrow)

Regarding boreholes, further investigation on the low preference for this source of water, the study found that boreholes were installed, but there was no post-installation checking to determine whether they were still in operation nor any effort to educate/train or equip local people with tools to maintain and repair the boreholes. The result, naturally, is that boreholes fall into disrepair and, ultimately, disservice. Additionally, the study found that some boreholes are heavy to pump (they are hand operated) and the girls and women, who comprise the majority of water collectors, find them difficult to operate.

Regarding the saltiness of tap and borehole water, the study did not investigate the source of this. It is logical that the saltiness of borehole water could be because of minerals underground, but this and the saltiness of the tap water should be investigated in a future study.



*Figure 20: Livestock often use the same water sources as humans (used for intra-household tasks including drinking).*

The study clearly shows that at Ivuna, while there are state-provided stand points (e.g. community tanks, boreholes and taps) where households collect water, the water supply from these sources is limited and unreliable. The water quality is often affected by drought, such that households have to depend on other sources like rivers and dams. These sources are also unreliable and provide water of poor quality. Ivuna residents are still reliant on unimproved sources for drinking water, which is not in line with the MDG guidelines discussed in Chapter Two (Section 2.2.6.3.).

These findings show that the respondents give preference to water sources that are easily accessible. However, due to high water scarcity, community members use any available water to perform household tasks. This is also typical of rural areas in KwaZulu-Natal. Gombert (2003) highlighted that government set targets to remove water supply backlogs, which is substantial in KwaZulu-Natal. Water scarcity renders the community at risk to pathogenic infections due to utilization of unhygienic water. This is further compounded by the lack of toilets in some households. It is further aggravated by the fact that most of the water sources are unprotected. For example, flowing rivers could be another source of water contamination as some community members wash next to or rinse in the flowing water in upper parts of rivers and streams.

#### **4.2.3. Problems experienced with water sources and current solutions**

This section discusses the different problems encountered by respondents at water sources and how they are solved or not.

WHO (2002:1) stated that, “in spite of the literature on women’s role and responsibilities in relation to water provisions and use, little research has been carried out to establish the effects on women of insufficient and poor-quality water in terms of household coping strategies, the health impact of water carrying, or the differential impact on women of water-borne diseases”.

[Table 6](#) shows that Ivuna is no exception to vulnerability to water borne diseases. The table presents problems encountered at different water sources and the action normally taken to address each problem. Of particular interest is that 12% of the respondents use streams, 54%, use rivers, and 11% use dams - all of which sources are unprotected and the water untreated. The respondents indicated that they use simple nets to filter water from these sources. But this

does not kill bacteria or germs (caused partly by sharing water sources with livestock as seen in [Figure 20](#)) that cause illness. Boiling water, reporting problems to authorities, adding substances to the water, digging deeper, creating diversion ponds, changing collection times, and saving water in anticipation of shortages are some of the more commonly used strategies to cope with and otherwise address the main problems faced with the various water sources.

Table 6: Problems in different water sources and solutions

Source	Frequency of respondents using source	Main Problem(s)	Action(s)	Frequency of respondents using action
Dam	36	Muddy or dirty	Call municipality officers to reduce mud	7
			Use cement or other chemical such as ash to seal the floor of the dam	9
			Let collected water stand to settle the particles	6
			Fetch early in anticipation of muddy water	3
			Filter collected water with nets	10
			Boil collected water	1
River	51	Cloudy water	Dig new ponds to divert clean water	15
		River not flowing on the surface	Dig in the river to reach the underground water	31
		Polluted by human and animal waste	Dig ponds away from the flowing river to reach clean underground water	5
Stream	15	Seasonal	Wait until it rains	4
			Dig holes to reach underground water	6
			Stand on long queues	5
Tank	88	Poor water supply	Report to municipality offices	45
		Drought	No action	43
Tap	46	Salty	Add powdered soap (bathing)	9
		Poor supply	Report to municipality	37
Spring	58	Drought	No action	8
		Wait for too long	Wake up at night or very early in the morning	50
Rainwater	41	Smelly	Use water for washing	4
		Seasonal	Save water for drinking	28
		Dead lizards and birds in the container or tank	Add jik or other chemicals	9

n=100

These water sources seem to have problems as stated by the respondents. Thirty-six percent (36%) of the respondents said that the dam water has problem of being muddy or dirty. The solution is to call municipality officers to reduce mud (7%). While 9% of the respondents use cement or other substances, such as ash, to clear water, 6% leave water standing until particles settle at the bottom. This is done to clear water, not to destroy bacteria. The effect on the body of such substances like cement is not known.

Rivers also have their problems as suggested by 51% of the respondents. Fifteen percent (15%) of the respondents dig new ponds to divert clean water when the water is cloudy, while 31% of the respondents dig in the river to reach underground clean water to prevent human and animal waste from entering when the river is not flowing on the surface, while 5% of the respondents dig ponds away from the flowing river to reach underground clean water. All of these solutions taken by the respondents are not for water purification, they merely address only the 'visible' contamination.

Eighty-eight percent (88%) of the respondents indicated that there were problems with the water tanks (municipality supply water). Forty-five percent (45%) stated that the main problem was the poor water, and that their action to resolve the problem was to report to municipality offices. The other 43% of the respondents stated drought as a problem, they do nothing as they felt it is beyond their control.

Forty-six percent (46%) of the respondents stated that tap water also has problems. Of these, 9% felt that the water is salty and add powdered soap to dilute saltiness, 37% indicated the supply from the municipality was poor and reported this to municipal officers.

Fifty-eight percent (58%) of the respondents felt that springs also have problems. Some respondents (8%) stated drought was the main problem, for which no actions are taken. Other respondents (50%) said they have to wait too long at the spring; they wake up very early in the morning or go out at night to search for water.

Even rainwater presented with problems for 41% of the respondents. Four percent (4%) of the respondents said sometimes the water is smelly (it is used for washing). Another 28% of the respondents felt that rainwater availability is seasonal; therefore, they save water for drinking. Nine percent (9%) of the respondents said rainwater is spoilt by dead lizards and birds inside the containers or tanks. Their solution is to add 'Jik' (bleach) or other chemicals. The actions by respondents does not necessarily purify water or improve water scarcity, but are the strategies they have developed to cope with water scarcity – one aspect of which is contaminated water.

It is important to note that it is women who are also in closer contact with polluted water or water of poor quality and are, therefore, more vulnerable to water-borne diseases, such as cholera. They lack time and energy to select clean and safe water for domestic purposes (Sadie & Loots, 1998: 15; Sass, 2002: 3). However, this study reveals that men also collect water, suggesting that the whole community or at least a wider section is affected than as argued by Onyango (2003), Sigenu (2006:20) and UNEPA (2001) as discussed in Chapter Two. These authors shared similar views in stating that women and girls are seen as the only water carriers. Although the results from this study cannot be aggregated, they do suggest that this may be changing.

Further, the study also suggests that the vulnerability is not uniform. It is possible for one rural community (or one part of it) to have consistent, safe water at their doorstep, while another community (or part thereof) in the same area have little or no water availability due to lack of water resources in that area. An example of this is found at Itshodo (small portion) at KwaNsele, where the dam is not used for consumption. (See [Figure 21](#)). Evidence of this disparity within a single community is the fact that 46% of the respondents said tap water is available in their area, while 54% has no tap water available - yet they are all from the same 'community'.



*Figure 21: Itshodo local dam (not supposed to be used for intra-household tasks)*

Of course, vulnerability is also influenced by climate and weather. Streams, springs, rivers, and dams are all dependent on rainfall in their respective catchment areas and commonly have free

water available only after storm events (Cech, 2010:82). People in the study area, where there is significant reliance on these resources, are thus, vulnerable in this regard. Within this high vulnerability context, that they filter water and do not generally use dam water for human consumption, and use a variety of other measures to address water, is an indication that they are taking some steps to protect their families from the potential dangers of their current water situation. However, lack of time and energy and long distances affect selection of water sources and can limit the availability of safe water at home. These findings suggest that pressures created by the high time and energy costs of fetching water govern women's perceptions of the relative importance of hygiene and other factors in disease prevention. As long as it is called water, community members in the study area use it, knowing that they are compromising taste, preferences and potentially putting the future health of their families at risk.

These findings are consistent with the findings of Kerr (1989: 195) who stated, "Long distances limit the amount of water that can be carried back to the household, even if there are daughters who can share the work. A quantity of water, rather than its quality, is generally, more important for the health of a family, at least sufficient quantities per day is needed to keep clean enough to be able to avoid infection. Such quantities are still dependent on the number of household members. Also, for what and how the water will be used for. For an average household of 10 people this would require 20 trips to water sources". Understanding the experience of rural residents will help to determine appropriate and sustainable interventions.

From the above findings, it could be deduced that municipalities should not design plans and allocate budgets without consulting with their communities, including women and children who are heads of household. Nongoma local municipality, which supplies Ivuna community, supplies 2x 25 litres per household per day sometimes (not always available). 'Sometimes' is an indication that supply does not always occur (see [Table 6](#)). The system of local government should promote community participation in governing (Urquhart & Atkinson, 2000: 33). Rural women and children who are heads of households should, therefore, be given the platform to voice their concerns pertaining to matters that affect their daily livelihoods, such as their role in ensuring water security for their own families and communities (Kuzwayo, 2002: 13).

#### **4.2.4. Water quality hazards**

This section describes the water quality hazards identified by respondents as they collect water.



Part of the management of water quality is related to the physical problems or hazards that people endure when using water from sources that they normally use. [Table 7](#) highlights water hazards in specific water sources in the study area and at what point they occur. It is noted that not all of the hazards cited by the respondents are related to water quality.

The only sources of water that appear to cause no health issues are taps and rainwater. All the others cause at least one problem. The most common concern is cholera, 66%, 58%, 58%, and 6% associate cholera with rivers, streams, springs and dams, respectively. This is followed by skin problems (e.g. dry skin) from tap water because tap water in the study area is too salty (51%), from boreholes (23%) and from springs (3%), and then by itchy skin from dam water (48%). Discussions with both the focus groups and respondents also revealed that tap water is ‘hard’ which makes it very difficult to perform laundry as it does not foam. This water condition also affects the hands.

Table 7: Water hazards

Source	Hazards/ Physical Problems	Frequency	At what point?
Dam	Causes itchy skin	48	On usage
	Cholera	6	On usage
River	Cholera	66	On usage
	Snakes	11	During collection
	Criminals	5	During collection
Boreholes	Skin problems	23	After bathing
Tank	None	100	-
Stream	Snakes	20	During collection
	Cholera	58	During collection
Spring	Skin problem	3	After use
	Snakes	2	During collection
	Cholera	58	After drinking
Tap	Skin problems	51	After bathing
Rain water	None	-	-

*n=100*

The desired improvement in water services which were proposed by participants were both individual as well as collective solutions. Respondents suggested that if household dams could

be separated from livestock dams, health hazards could be minimised, and other sources be protected so as to improve water quality and quantity. The spring in [Figure 20](#), for example, is next to KwaNsele dam and is unprotected. It is for human consumption, but is also used by livestock. Water is available in summer, as summer rains promote underground water availability, and also in the morning before livestock come for drinking. Respondents revealed that if they wake up early to collect water, it is clean but, once disturbed by livestock, it becomes dirty and sometimes animals release excrete in the water.

#### **4.2.5. Causes of water shortages**

An understanding of causes of water shortage in the study area could bring about ways and means of solving some problems. The great majority (82%) of the respondents confirmed that there is a serious water shortage in the area, although they never mentioned the possible causes. The rest of the respondents did offer some ideas. Ten percent (10%) of the respondents said water shortages were due to sharing with livestock and wild animals. The remaining few suggested various ideas: climate change (1%), water availability (1%), lack of trust of water controllers leads to shortage (1%), and municipality being inactive with regard to water supply (2%). Three percent (3%) made no comment about water shortage or its possible causes. In addition, some respondents felt that water controllers gave water to friends rather than to stick to community rules of water rationing.

These results show that causes of water shortages are beyond their current understanding. What emerges is that there is a general lack of awareness that water supply is shrinking due to climate change, but that the population is growing, effectively making our fresh water supply smaller and smaller each year. Another contributing factor to water scarcity is water rights that allow commercial farmers to make use of water from the rivers in the upper areas with seemingly no regard for people lower down the stream – this factor has been mentioned as a primary cause of water shortage in the Black Umfolozi River. Farmers use the upper part of Umfolozi River in sugarcane fields for irrigation purposes (Bate et al, 2011). Another factor is the closing of the river from its source (where it begins) to divert water to St. Lucia to benefit aquatic plants and animals for tourism. This also poses a threat of increased water scarcity (Bate et al, 2011).

Conclusions regarding water sources are discussed in Chapter 5

### 4.3. Water Collection and Use

#### 4.3.1. Water collection

Water collection is a vital activity for every household in the study. Understanding issues related to collecting water will help the people themselves, as well as those responsible for water provision, in assessing the situation. A better understanding of water issues will further assist in planning and implementing policies, programmes and activities that will increase water security. This section will present the findings about water collection and discuss who fetches water for the household, gender and water collection, culture and water collection and social activities during water collection. The aim is to explore the gender roles and their impact on rural households, and to further explore the extent to which these above-mentioned water-related issues have on livelihoods.

##### 4.3.1.1. Who fetches water for the household?

This section presents the findings on how water is collected. According to Sass (2002:1), in the African context, rural women are the first to be affected when there is water scarcity. Women in rural areas are more vulnerable than men because they are more responsible for water related duties. However, in this study area it is different. As the results indicate, 22% of the respondents said they are accompanied to water sources because they are far and that criminals and rapists take advantage of their vulnerability. Although 38% of female respondents go in groups, 40% female respondents are **not** accompanied to water sources, as family composition differs. This could be because the study also revealed that, in some families, children are the head of household and, therefore, they have no one to protect them. [Figure 22](#) shows girls going in a group to a water source because of “criminals and rapists”.

As more (17% in this study) households are now headed by children, it can mean that, besides water collection tasks, other household tasks are performed by girls and that further deprive them education and exacerbate poverty in the long-term. Further, as noted earlier, due to extreme water shortage in the study area compounded by high unemployment rate, men also participate in water collection. (See [Figure 23](#)). This is inconsistent with the majority of literature which suggests that women are the sole water collectors (Sadie and Loots, 1998:15; Sass, 2002:3).



*Figure 22: Girls go in group to water sources because of criminals and rapists*

The respondents indicated that women who are not accompanied to water sources and who have to walk long distances to collect water are often at risk of sexual attack and exposed to crime and snakes on the way to and from their water sources. [Table 8](#) shows the range of dangers had faced by unaccompanied women identified by the respondents.



*Figure 23: Males also collect water; this young man going to a water source*

Table 8: Why going to the water sources is dangerous

Reasons	Crime	Crime & Rape	Far	Snakes
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% of respondents	38	53	5	4
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*n=100*

The greatest single danger is crime (38%). Crime and rape together was cited by 53% of the respondents, but rape was cited by only 13% of the respondents. In rural areas rape is rarely reported. This renders it difficult to come up with estimated figure. Secondly, rape is stigmatised which, in turn, makes it to be rarely reported. Owing to harsh interrogation and exposure of the rape victim during the trial in tribal courts, women tend to not report rape unless the perpetrator was caught “red handed” by adults. Also, during the trial the victim is expected to provide evidence that proves that the incident took place. It is not like the judiciary system as in the formal state court of law where the defendant has to supply information that make him to be exonerated. As a result, official statistics do not provide true reflections of the prevailing situation (Soyapi, 2014; Rape in South Africa, 2017). This is one of the reasons that lead to high single parenthood (Jewkes et al, 2001). Sometimes victims become pregnant and the father of the child does not give support. Such information could be of benefit to this study as more caution could be taken to prevent such occurrences in future in the study area.

In all cases, the respondents indicated that, apart from fetching water in groups, there is little more they can do to protect themselves and must face these difficulties and potential dangers as these are their only water sources. This suggests that no matter how respondents are exposed to dangers, because water collection is a fundamental requirement for survival, they have no choice. This highlights the vulnerability of rural women and children who carry out this mundane, but essential, task.

The study shows that the rural household structure is slowly changing. Previously, elderly males were the household heads, but this study suggests that some households are headed by children. This makes them water collectors. Some government or NGO interventions could be implemented to reduce the water burden for children, as this responsibility could also contribute to poor performance of children at school. Respondents indicated that, due to severe scarcity of water in the study area, males (particularly those who are unemployed) also participate in water collection, further suggests that environmental factors can lead to cultural change.

#### 4.3.1.2. Gender and water collection

This part of the study explored further the level of participation by both genders in water collection. This study confirmed that males collecting water is still not typical of rural areas in KwaZulu-Natal, and that collecting water is still primarily the job of women and girls.

Kerr (1989: 196) stated that the burden of carrying water has other effects which are detrimental to a women's health. He further stated that, in Kenya, doctors tell of broken backs and strangulation caused by accidents with heavy loads. They indicate that the work of water-carrying is at least partly responsible for the distorted pelvises that cause the death of mothers and babies in childbirth.

While most of those collecting water in this study area were female, males in the study area are also involved in water collection. The study attempted to obtain impressions about this phenomenon from both genders. As displayed in

Figure 24, 7% of the respondents perceived that collecting water is a 50/50 arrangement nowadays, so it is everyone's responsibility to fetch water. Twenty-six percent (26%) of the respondents felt that it is not the male's role and is very bad, but if they are compelled by the situation, they have to do it. Thirty-one percent (31%) of the respondents felt it is normal nowadays that unemployed males should fetch water and use wheel barrows. Thirty-six percent (36%) of the respondents (both genders) felt fetching water lowers one's dignity; males were not meant to carry water and it is a bad thing.

Figure 23 and

Figure 25 each show a male collecting water; some use a wheel-barrow to collect water, rather than carrying a container on their heads. Discussion with focus groups revealed also that it is disrespectful, a disgrace, strange and unacceptable, unless a female is sick, as said by other respondents. Such results could mean that water is a serious problem which supersedes culture and may result in change of roles within a household. This is also demonstrated by distribution of water collection by gender shown in

Table 9.

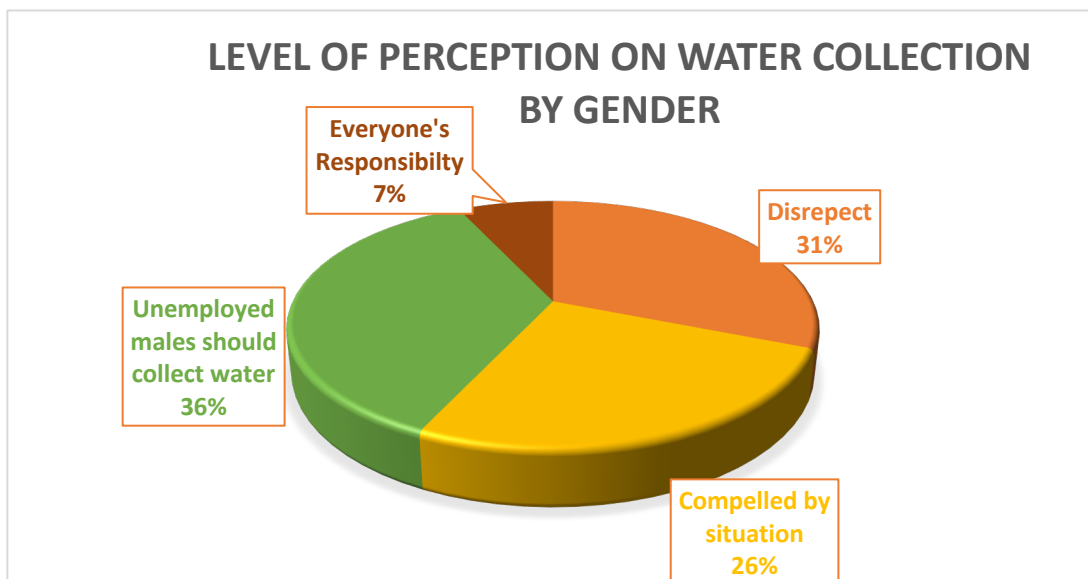


Figure 24: Community perception on water collection by both genders



Figure 25: Male from a water source using a wheel-barrow as it is not easy to carry water on head

Table 9: Distribution of water collection by gender

Category	Traditional role in collecting water	% of respondents by category	What is happening?	When/ How roles change
Minor Females	Females should collect water	65	More females collect than males	Roles change as children grow and spend more time at school
	Water should be collected by everyone	10		
	No response	25		
Minor Males	Boys should collect water	5	Some boys collect water but some are responsible for cattle	As boys grow most boys do not fetch water
	Boys should not collect water	95		
Adult Females	Females should collect water	19	Adult females collect water	As girls grow They take over.
	No response	81		
Adult Males	Males do not collect water	99	Some males collect water	When there is no female / When a male is unemployed
	Males collect water	1		

*n=100*

Another factor about water collection in the context of gender was perception by age. This was a very sensitive subject. All of the adult males and all of the minor males included in the study responded to the questions regarding water and gender roles. Seventy-five percent (75%) of the minor females, but only 19% of the adult females responded to the questions about gender and water.

Only 1% of the adult male respondents and 5% of the minor male respondents felt that males should collect water. That the balance (99% of the adult males and 95% of the minor males) felt that males should not collect water suggests that they continue to see collecting water as the work of females.

When following up on responses, it was found that the reason 81% of the adult females did not respond to question was because gender and water is a very sensitive subject. Apparently, 19% of the adult females who did respond candidly admitted that they hoped responding would somehow help improve the water situation in their area. These respondents were very pragmatic about the situation. They were more concerned about getting clean water than they were about the gender of the person collecting it. They suggested that there are many unemployed men who should be helping with this.

Despite the fact that men are increasingly having to collect water, the basic beliefs about gender role stereotypes are not really changing, except amongst a minority of adult women who seem



to value water over tradition. Men and boys still think women should be collecting water. The majority of the adult women were silent. The minor females who felt they should be collecting water indicated that they did so because it gives them a chance to sing and play. They did not appear to see this from a gender division of labour, whereas the minor boys were clearer about defined gender roles – theirs being to look after livestock, not to collect water. Although water scarcity is a problem, in some rural communities (at least at Ivuna), even where men are collecting water, people are still attached to the culture where women are seen as water collectors. It is noted that it is acceptable for minor males to collect as they are not yet regarded as adults, but as they grow up, they will be expected to behave like men and look after cattle. So, the fact that young boys currently collect water is not a gender issue; it is an issue of age.

#### **4.3.1.3. Culture and water collection**

This section presents the findings about how culture influences water collection. The aim is to explore the extent culture plays on water collection and use. While this study is looking at water at household level, it also tries to find out whether there are any traditional or customary practices, including norms and rules, attached to water collection and use. Some 51% of the respondents indicated that there are still some cultural attachments related to water. [Table 10](#) captures the range of cultural issues that still influence water collection.

Thirty percent (30%) of the respondents indicated that afternoon water collection is not accepted in many families, as the sun may set while a person is carrying water and is still far from home. If it happens, one should first light a match or put a burning wood in the water so as to chase away evil spirits that are believed to stay in the river. It is believed that to do otherwise brings thunder and lightning in households.

The table also shows that 3% of the respondents said there is cultural attachment, about widows. Widows must not pass through livestock carrying water as might bring bad-luck to the livestock and the livestock might even die. This implies that widows have to collect water at dawn before livestock is released for grazing. Five percent (5%) of the respondents believe that on Saturday nothing should be done as it is a Sabbath day, and 13% said culturally it is the women's role to collect water.

Table 10: Respondents perception of the influence of cultural practices on water collection

Cultural Aspect	Description	Influences water Collection (%)
Collection of water before sunset	Water should not be brought home/ household after sunset. If one is late either the container is left outside the gate and will be brought within the following day or light a splinter of wood and through it in the water before entering the gate with water.	30%
Women's role	Gender division of labour. Water collection is assigned as women's task. Women are the only gender expected to collect water for the whole family.	13%
Water collection should not be done on Saturday	No work should be performed on Saturdays as it is a Sabbath day (Religious belief by different religions that Sabbath was made holy by the creator as He rested on the 7 <sup>th</sup> day of the week)	5%
Widows must not pass through livestock carrying water	A widow is not allowed to pass through livestock carrying water container as it is believed that the livestock will die or will not increase in numbers. (Widows are expected to fetch water at dawn)	3%

*n=100*

The results also suggested that cultural attachments surrounding water are no longer emphasized, as 49% believed that there are no cultural attachments. This somewhat contrary to the findings discussed in Section 4.3.1.2, where gender was a very sensitive issue and perceptions were very clear that men are not meant to be collecting water. One possible reason for this is that the question was not directly about gender. It was an open-ended question to which any response was possible. Thus, when confronted directly about gender, as was the case in Section 4.3.1.2, clearer lines are drawn. But when asked more generally about cultural requirements, gender did not emerge as a central issue.

While the association of culture to water appears to be diminishing, it is still significant. If water development projects do not take this into account, or at least determine the prevailing sentiments, the project might be rejected or might not last.

#### **4.3.1.4. Social activities during water collection**

This part of the study sought to determine what social interactions occurred (if any) during water collection. The aim was to determine the impact of water scarcity on the social lives of Ivuna community members.

It is evident from the study that water collection is a strenuous task, but there are other community members with a different view of getting enjoyment in going to water sources; 68%

of the respondents said they meet new people, 32% felt collecting water gives them a break away from tiresome house-hold chores. It creates free time and gives them a chance to ‘hang out’ with other people. Male respondents said they used collecting water for courtship purposes.

More views on the social benefit of collecting water included getting informed about current local issues and developments (8%). Learners revise their school activities to improve performance at school (12%). Some get to know more about available local resources which could assist them in resource management (9%), while others get to know their neighbours and community members better which broadens their understanding of local setting (7%). Some enjoy gossiping, which could be the cause of conflict at water sources, (23%), and children enjoy playing and singing to refresh themselves from hardships of the day (9%). However, there are those that felt collecting water causes problems (32%). Ten percent (10%) felt that water collection is very strenuous and tiresome which suggests that they collect water because they are pressed by the situation; if there were other water supply measures, they would have opted for such supplies. These respondents further said that there are no interesting social activities around water collection.

The findings on activities during water collection showed that, although water collection is strenuous, rural communities have no other water sources, therefore people have adjusted themselves and made this task enjoyable. The study further highlights that installation of piped water supply could be a relief to some community members, but not all of them would be happy with its installation as is suggested by Kerr, (1989: 199) who stated that women have reasons of their own for a particular preference. In some places, they prefer to walk some distance for their water since this provides the only time when they can get together and talk. Also, the results of this study share similar view as 68% of the respondents gave similar response.

While water collection is primarily a household concern and is strenuous task, it is also a social activity where women meet and talk. It offers a break from other daily household tasks.

#### **4.3.1.5. Other aspects of water collection**

In addition to the data presented in the preceding sections, three additional aspects touching on water collection emerged from the study. These were innovations developed during water collection, effect of rainfall on water collection and paying for water.

#### **4.3.1.5.1. Innovations developed during water collection**

This section describes different innovations developed by the respondents as a part of water collection. The aim is to investigate the impact of water scarcity on the lives of Ivuna community members.

Fifty-eight percent (58%) felt that there are innovations, but 44% were not sure. Of the 58% who felt that there are innovations, 10% cited craft work (e.g. crocheting) which assists in their household's economic development. Another 20% cited traditional storytelling which broadens the listener's knowledge and helps develop the skill for their own use. Ten percent (10%) cited new wedding songs. Song practicing develops one's singing skill needed during wedding ceremonies. Also, singing in groups promotes the spirit of togetherness especially to single siblings; 10% practice songs which improve their voices either as a chorister or a gospel singer. All these above skills can later assist in income generation by household members at a later stage. Eight percent (8%) cited courtship (could meet one's life partner) which assists both young men and women to progress to the next developmental stage in life.

#### **4.3.1.5.2. Effect of rainfall on water collection**

Rainfall during water collection is perceived differently by the respondents as only 8% of the respondents think that if it rains heavily there are floods which wash away some sources. Eighteen percent (18%) of the respondents felt that rainfall could cause water pollution. It causes mud, and water becomes cloudy. However, 75% of the respondents said they enjoy rainfall. It supplies them with water which suggests that they do not have to go to collect water. Therefore, results on the effect of rainfall on water collection suggests that water piped all the way to the house could be a relief of burden from water collection. The majority of respondents enjoy rainfall, but 18% of the respondents were more concerned about the negative immediate impact of rain on their health, apparently even in the face of desperately needing water.

#### **4.3.1.5.3. Paying for water**

The study examined the extent to which people are paying for water and why. The key finding was that paying for water is increasing and it could be attributed to climate change. It is evident from the study that the study area suffers from severe water shortage. Therefore, tap water supply (if piping water to the house is not possible) could be another option and water scarcity could be addressed.

Respondents shared different views on paying for water where 46% of respondents showed a willingness to pay from R0 - R50 per month, 6% would pay R51-R100, while 2% would pay from R101- R200. Only 1% would pay from R201-R250 and another 1% would pay from R251-R350. Fifteen percent (15%) was willing to pay whatever price was agreed upon negotiations; all of these respondents were above 50 years old. The willingness of elderly community members to pay for water is affirmed by Kanyoka et al (2006).

Paying for water suggests that, in the midst of a severe shortage of water, money to pay for water is an additional constraint. The study findings on employment showed that the majority of respondents are unemployed. The above results indicate that although there is a severe shortage of water only 15% is willing to pay more than R350 per month, their primary reason being that most people are not working (i.e. they do not have the money to pay more). Although there is a shortage of water in the area, most of the community members are not prepared to pay for water.

#### 4.3.2. Water use

The study touched only lightly on water use, as the focus was primarily on water collection and its related issues and challenges. This section will briefly discuss the traditional role of water use and community perception on improved water supply.

##### 4.3.2.1. Traditional role of water use

This section presents the findings regarding traditional water use practices, with particular reference to gender. [Table 11](#): highlights the findings. Only 31% of those interviewed responded to this issue of the gender roles in using water and how they have changed. As with the previous discussion on gender and water collection, when asked directly about gender, many of the participants did respond, suggesting again that gender is a sensitive issue that can only be discussed indirectly in public.

Table 11: Comparison of gender roles in water usage: traditional and current

Category of water user	Traditional role in using water	What is actually happening	When/How do roles change over time
Minor Females	Minor females use less water than adults	The same as tradition	Once grown up they use more water to take care of themselves and to perform household duties.
Minor Boys	Minor boys use less water than adults	The same as tradition	Once grown up they use more water for bathing

			They will bathe at the source (until they marry) Start wasting water
Adult Females	Use a lot of for bathing and household responsibilities	The same as tradition	Use less water when daughters take over
Adult Males	Use a lot of water for bathing, but also waste water because they do not feel the pain of collecting it	The same as tradition	They do not change

*n = 100*

The study found that current practice is the same as traditional practice with regard to water use by the different gender and age groups in a household. Adult males use a lot of water for personal use, such as bathing and it is expected that they will waste water because they do not feel the pain of collecting water. This does not change over the life of an adult male. Minor boys use less water than adults as their bodies do not give out strong odours before maturity. However, once grown up, they change and use more water and it is expected that they will also start wasting water. Many will bathe in rivers and flowing streams until they marry or become too old for such behaviour. Adult females use a lot of water as, in addition to bathing, they are also responsible for household duties that require water (i.e. cooking and cleaning). As their daughters (or daughters-in-law) take on household duties the adult women (now more elderly) will use less water. Similarly, minor females use less water, but as they assume the responsibilities of adult women, they will use more water.

These findings point out that water is a very important resource in life and is very difficult to live without. This shows that even when water is scarce females also who suffer most in collecting water need more of it for many reasons. Water is needed for bathing and to perform household duties in a clean environment. Male counterparts use less water when young. Such a behaviour changes with age. More water for bathing is needed even if water is scarce.

#### **4.3.2.2. Community perceptions about improving water supply**

This section presents the community's views on their perception on how to improve water supply. Presented here is what they think about improvements made, and how they think this can be improved.

The study findings suggest that the community under study perceive local municipality/ government to be the main supplier, but they seem dissatisfied with the whole process. [Figure](#)

26 shows a water-can sent by the municipality to fill the community water tank. Although the water-cans supply the community with clean water, sometimes there are long delays between deliveries of water to fill up tanks. Twelve percent (12%) of the respondents said there should be specific time frame for water collection. In answering how, they further suggested that there must be water committee to monitor water distribution at allocated time frames. Committee members have to liaise with relevant responsible municipality officers to supervise water-can drivers as the drivers sometimes sell water that is meant to be delivered for free to the community.



*Figure 26: Water-can to fill up the community tank*

To improve water supply, 19% of the respondents felt that there should be equal supply of water to all households. These respondents further felt that there must be a piped water supply to every household, with each household getting an equal amount of water. They feel that no

household, no matter how many people are in it, should get more than the current allowance 50 litres per day, rationed twice day in 25 litre allocations. This should be adhered to whether or not it is enough.

Thirty-one percent (31%) of the respondents said water-cans must be available and must be monitored from municipal offices. They feel that municipality officers should have a constant follow up, whether the water allocated a certain community reaches that community. Similarly, 38% of the respondents said municipality must be in control of the water supply which can discourage water-can drivers from selling water. These respondents also felt that government is fully responsible for water supply within households. They felt that community tanks should always be filled.

The respondents' answers showed that improvement on improved water supply is not satisfactory (i.e. does not meet their water needs). The majority of the respondents felt that it is upon local municipality/ government's shoulders to ensure improvement in water supply. Key findings regarding water collection and use are presented in Chapter 5.

#### **4.4. Water Management**

Water management is a critical part of water security. This section will discuss the findings regarding managing water quality, managing access and off-take quantities, management of 'used' water, how/when water sources are affected, control measures for water sources, the presence of water committees, the role of local leaders, conflict and conflict resolution, and ensuring water availability at all times. A brief conclusion will be presented after the discussion of the individual themes.

##### **4.4.1. Managing water quality**

This section discusses the methods used by respondents in managing water quality.

In terms of quality, a key element of this is separation of human and animal use of the same water sources. [Figure 27](#) shows an unprotected stream used by both humans and livestock as a source of drinking water.



Managing water quality is affected by four issues: contamination, dirtiness of the water, proximity, and taste. Contamination was seen as water that carries potential pathogens or harmful chemicals. Dirty water refers to water that appears unclean or is cloudy or muddy. Distance relates to how far they have to travel to get to the source of the water. Generally, these three factors discouraged the respondents from making efforts to manage water quality. For example, 86% of the respondents indicated that they do not manage dam water because contamination and dirtiness of runoff water that flows to dams is beyond their control. They noted that the water runs off land where animal and human waste and agricultural chemicals are present. They understand that further contamination could be managed, for example, by putting fences around dams, but they lack the resources to do so. It is further complicated by the fact that they do need the water for their livestock. Thus, despite water sources having contaminated water, they have no choice but to use that water.



Figure 27: Unprotected spring for human consumption livestock too rush for this water.

Managing water quality of rivers and streams saw similar responses. Some 86% of the respondents also indicated they do not manage the quality of the water in rivers. All of the respondents who have access to streams (6%) indicated they do not manage the quality of water in those streams. In both cases, the respondents argued that the water is contaminated or made dirty upstream and the rivers and streams are far from their homes. If they were closer, they might make some effort to at least keep animals away.

As for springs, respondents had mixed responses. It was observed that some springs had a cement ring around them to protect them from dirt and livestock. Some of these were intact, others were partly damaged. Some springs had no ring at all. Although all of the respondents were aware of the rings, not all of them (66%) perceived these rings as necessarily managing the water quality. Some (33%) felt that the presence of the rings meant that the water quality was 'semi-managed'. Of the 66%, manageability was about distance, indicating that the springs are too far away to manage. Another 22% indicated that the issue was more about the risk involved because of the distance. Only nearby springs with concrete rings keep livestock away from drinking water. Despite these findings, it was observed that the water in the all of the springs, even those with concrete rings, was of poor quality; it was dirty (sometimes due to overflowing) and there was evidence of human and animal waste in their proximity.

Seventy-two percent (72%) of the respondents had access to boreholes all of which are equipped with hand-pumps. All of the respondents indicated that boreholes are not easy to manage as they are not within anyone's household. In response to the questions about managing quality, 36% said it is too risky (because of distance) to manage boreholes and further they are not lockable (e.g. that they were not fenced and were thus accessible to animals). Another 36% said that the water is salty and therefore of poor quality, and there is nothing they could do about that. The rest of the respondents (28%) are no longer using boreholes; therefore, they never commented.

Forty-six percent (46%) of the respondents had access to tap water near their homes. All of them indicated the quality of the tap water is not managed. It is salty, and there is no way to change that. All of the respondents (100%) felt that the quality of the water delivered by the municipality by water-cans was managed. They assumed that the water was treated before it was delivered.

The respondents indicated that the quality of rainwater is managed at household level. All the respondents felt that the quality of rainwater was good. However, 37% indicated that the quality of the rainwater would not be good if gutters and containers were contaminated. As captured in [Table 6](#), only 9% of the respondents treat rainwater with 'Jik'. The majority simply collected and store it in closed containers and it is used without further treatment.

All of these findings suggest that the community does not take responsibility for water quality. They seem to feel that if the water is already of poor quality (i.e. contaminated, dirty, salty), then changing that quality is out of their control and cannot be managed. The only time they acknowledged that water quality was managed was in reference to the water supplied by the municipality. When following up on responses questions about water quality, the respondents were clear that they felt government should supply them with clean water.

#### **4.4.2. Managing access and off-take quantities**

This section discusses how off-take quantities are directly affected by access to water sources. Another aspect of control is around structured access and quantities collected. Access to and off-take quantities from dams are not controlled. Forty-two percent (42%) of the respondents acknowledged that dams are unprotected (i.e. that no one protects dams), and another 34% indicated that lack of protection leads to the water being contaminated by both humans and livestock. Despite this, 24% said dam water is always available unless there is drought.

Forty-three percent (43%) of the respondents said river water is not controlled because rivers are too far from households to effect any kind of control, while 60% of the respondents believe that river water is a natural (free) resource, and 6% said it is not controlled because it, like dams, is unprotected.

Thirty-six per cent (36%) of the respondents said boreholes are also not controlled because there is no need, while another 22% said it was because the water is very salty (i.e. this automatically limits off-take), and 42% said boreholes are too far and risky which also limits off-take.

The only water sources that are deliberately controlled are municipal water tanks and rainwater. Twenty-seven per cent (27%) of the respondents said tank water is controlled by the municipality who supplies it. Forty-nine (49%) said water is controlled because it must be equally shared, and 24% said water is controlled because it is clean and treated causing high demand. Sixty-seven per cent (67%) of the respondents indicated that rainwater needs to be controlled because it is only seasonally available; however (33%) said rainwater is not controlled. Finally, access to and off-take from taps is not directly controlled, but off-take is limited by the engine operator who switches off the pump to save fuel, thereby limiting off-take. See Figure 28.

The respondents prefer to take water from sources that are easily accessible. Further, there is a tendency to take more water from such sources which is consistent with Phillander (2012) and Chung, et al (2008).



Figure 28: An engine used at Itshodo for salty tap water

#### 4.4.3. Management of “used” water

This section presents the findings related to the activities associated with “used” water (e.g. water that has been used for bathing). [Table 12](#) presents management of “used” or “grey” water by the community of Ivuna area.

Table 12: Management of “used” water

“Used” water	Not used	Building Blocks	Watering	Recycling
Frequency	62	9	23	6

*n=100*

Used water was another factor in water management. Used water is recycled by 6% of the respondents; 23% stated that they recycle bathing water for irrigation purposes for their own backyard garden. Another 9% of the respondents use it for building blocks; although some respondents believe that soapy water is not suitable for building purposes as they said it causes structures to crack. Sixty-two percent (62%) of the respondents said they do nothing with used water. By way of follow up to responses, most of the respondents stated that they were too discouraged by drought and high temperatures to have backyards gardens.

#### **4.4.4. How/when water sources are affected?**

Water contamination is an important part of water management. This part of the study explored the prevalence and the causes of water contamination in the study area.

An aspect of this is how and when sources are affected whether it is occasional, seasonal or at all times. Responses showed that lack of proper sanitation is the main factor. Access to sanitation was ascertained through the household survey as well as focus group discussions. Only Itshodo residents have VIP toilets which were donated by MTN (i.e. they did not build them themselves). The rest of Ivuna residents have home constructed pit toilets made from mud and block. Other residents without toilets have to excrete in the bush. The study found that 67% of respondents have access to toilets, while 33% of respondents said they have no toilets. From this it appears that there was never a sanitation program in the area. People were financing themselves to construct latrine.

These results on households with toilets suggest that the country's water and sanitation sector policy target of 80% by 2015 (as discussed in Chapter 2 (section 2.2.2.) has not been met in Ivuna even by in 2016 (WHO, 2006 & Mbeki 2004). This does not bode well for the Ivuna community, because studies confirm that the lower the level of sanitation, the higher the risk of contracting water-related diseases (Blighnot, 2009).

#### **4.4.5. Addressing water shortages**

This section explores the different measures the respondents suggest to save water.

Twenty-six percent (26%) of the respondents thought that taps or tanks should be supplied to every household to encourage responsible use of water as no one takes responsibility at the current common collection points. Another 25% of respondents thought that poor pipes could

be the cause of water loss and that fixing them will help save water. Some 20% of the respondents felt that recycling of water can improve water availability, while 19% of the respondents believed that education on saving water could solve the problem of water shortages. Finally, 10% of the respondents felt that payment can reduce water wastage.

These results suggest that community members are conscious about water-saving measures for the sustainability of the water provision. This should be supported and encouraged. A culture of wise use of water, including rainwater recovery, should be cultivated.

#### **4.4.6. Presence of water committees**

This section explains the presence and the role played by water committees in ensuring water availability.

Respondents and focus groups discussions revealed that there were no individuals responsible for water infrastructure management. However, there were a few individuals responsible for community water tanks. The existing water committee is ineffective. The respondents in the focus group discussions indicated that this was due to a lack of co-operation among community members and poor attendance when meetings are called. It was suggested that committee members should be responsible in ensuring cleanliness of water sources and ensuring that repairs were made in case of breakdowns.

Most of the respondents did not know of the existence of the water committee; 89% were not aware of the existence of a water committee. The 11% people who knew about the existence of the water committee, noted that there was one female who is a committee member, which reflects tradition that women are not often in decision-making positions. There are no youth members on the committee. This appears to be because previously youth did not take water issues seriously, and it is only now that they seem to actively participate in community issues. As discussed, the significant percentage of child- and female-headed households suggests that the composition of water management committees needs to be reviewed to ensure that these two groups can have a voice on matter for which they have responsibility at home.

Despite the formal presence of the water committee, community members rely primarily on two individuals: one elderly community member in the study area who is a committee representative for his area ([Figure 29](#)) and one woman. The community members from the

study area turn to this elderly man when there is a water shortage to call the municipality officers for water supply. On asking the respondents why they go to him, the majority said there is no water committee, while others said he had been of good help for long, and now they know him in the offices. As an elder in the community, he is also engaged in both water and community related issues. They explained further that the woman is very active in organising water trucks too, using her resources in organising for water. Community members also contact her when they are desperate with regards to water shortage, especially when there are funerals, which need a lot of water.



*Figure 29: Elderly community member to whom the community turn for help with water issues*

#### **4.4.7. Water conservation**

This part of the study investigated frequency of rainwater harvesting by the respondents. The aim is to investigate the role played by Ivuna community members on saving water and to explore whether the community is aware of water scarcity in the study area, and what proactive role should they, as a community, engage themselves in.

All (100%) of the respondents conserve water, but only 54% have formal storage systems. These facilities and systems differ depending on affordability. [Table 13](#) shows the range of water storage practices.

*Table 13: Rain water storage*

Nature of water storage	Frequency
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Have a tank as a storage facility	19
Have tanks and small storage facility	5
Small storage facility	30
No storage facility	46

n=100

Although water shortage is common in the study area, 46% of the respondents still do not have water storage facilities. Nineteen percent (19%) of the respondents have tanks, 30% have no tanks but use small storage systems (e.g. clay pots and plastic containers), and 5% have both tanks and small storage facilities. Those with storage facilities noted that these facilities assist in water conservation during rainy seasons.

The study found that there were few means of water harvesting in the form of tanks, and diversion of drainage water to storage reservoirs. During rainy seasons, most of the available water was not conserved for future usage. Poor conservation of water could be attributed to lack of large tanks like ‘jojo’ tanks. This leads to respondents being forced to use contaminated water for drinking and household chores. This could also suggest that the majority of the rural households are grass thatched which makes it impossible to conserve water for food preparation. This further suggests that these people are living in poverty therefore intervention in the form of proper housing with tanks could be an option to improve the community’s living standards.

#### **4.4.8. Role of local leaders in water supply**

This section presents the role played by local leaders with regard to water supply.

The active role of local leaders on water supply is not visible to respondents; 96% said they are not active at all. However, 4% of respondents felt that they are active because they organise water tanks and appoint local people to be in charge of water distribution as in [Figure 30](#).

Inactive local leaders with regard to water supply could be the cause of lack of the management of water sources, noting that most of these sources were not properly managed. This finding highlights the need more studies on the role played by local traditional leaders. When interviewed face-to-face, contrary to statement of the respondents, the local leaders said that they are active in activities with regards to water supply, such that they also spend their



resources to ensure that the community get water. This disparity of perception could suggest that there is lack of co-ordination among stakeholders in the study area.



Figure 30: *Water tank controller with other community member to see whether water was rationed as per agreement.*

#### **4.4.9. Conflict and conflict resolution**

This section explores the presence and range of conflict related to water in the study area. It also discusses the strategies used by the respondents in resolving conflicts and range of conflict.

As discussed in Chapter Two (Section 2.1.1.4.), conflict in relation to water is well documented. [Table 14](#) below show conflict resolutions as suggested by the respondents. The researcher posed a question on whether there were any conflicts on water resources, and, if so how do they resolve them.

As shown in [Table 14](#), conflict is associated with the sources of water. The nature of conflict in all cases was verbal arguments. Conflict arises from many sources and may occur because of differing interests and values. They can occur within the same user groups often because of different perceptions regarding access, use and management of resources (Mwakaje & Sokoni 2005:50).

Table 14: Conflict resolutions

Source	Frequency	Nature of conflict	Frequency	At what point	Resolution(s)
Dam	28	Arguing	20	Washing next to the source	Not resolved
			8	Children swim	Beating
River	7	Arguing	2	When community members wash next to the source	Not resolved
			2	Community members do not want to share water	Not resolved
			3	Some community members do not want to stand on queue	Never resolved
Borehole	20	Arguing	10	When others bath next to the source	Not resolved
			7	When others empty others containers during severe shortage of water	Never resolved
			5	Elders do not stand on long queues	Sometimes it is discussed
			5	Others come with many containers at once during droughts	Never resolved
Tank	35	Arguing	22	Selfishness: Others want more water	Dividing water as agreed
			8	When others do not obey the rules	Disciplined
			5	Wasting water-Using containers with small openings	Disciplined
Stream	32	Arguing	14	Water pollution as other members wash next to the source	Give warning
			11	Others do not participate in stream maintenance	Not resolved
			7	Some members come with many containers	Not resolved
Spring	75	Arguing	59	Stealing other's water	Not resolved
			10	When others bath next to the source	Not resolved
			6	Elders do not stand on long queues	Not resolved
Tap	46	Arguing	26	When others block the source with pipes to fill in their tanks or big containers	Not resolved
			14	Others want to control the source	Not resolved

Source	Frequency	Nature of conflict	Frequency	At what point	Resolution(s)
			4	Breakage of taps	Not resolved
			2	Children fetch water and play with water	Disciplined
Rain water	42	Arguing	42	When other family members waste water	Disciplined

*n=100*

In this study, the most frequent (75%) conflicts occur at the springs; the most frequent cause (according to 59% of the respondents), over perceived stealing of others' water at springs, followed by others bathing next to the source (10%), and elderly people having not to wait long in the queue (6%).

Forty-six percent (46%) of the respondents indicated that conflict occurred around taps. The most notable causes include conflicts arising when others block access to fill their containers (26%), and people want to control the source (14%). Four percent (4%) stated breakage of taps, while 2% perceived playing of children next to the source as a cause. Unexpectedly, 42% of the respondents indicated that conflicts within families result when family members were perceived to be wasting rainwater.

According to 35% of the respondents, conflicts occur at the municipal tanks. The primary cause (22%) was that people were perceived as selfish, wanting more water than they deserve, knowing that the resource is limited. However, 8% thought that disobedience to the set rules caused conflicts, and 5% felt that it was caused by some members using containers with small openings such that water leaks to the ground, which further wastes the little that is available.

Arguing at streams (identified by 32% of the respondents) has three causes; water pollution caused by members that wash next to the source (14%), people not participating in stream maintenance (11%), and some members coming with many containers (7%). Conflicts also occur around the dam (28%), the main cause (22%) being people washing next to the source as seen in [Figure 31](#) (instead of taking the water and washing away from the dam). Eight percent (8%) stated children swimming as another cause because adults were concerned of children drowning in dams.

It was noted that most often these conflicts are not resolved, except where children were involved, in which case they were disciplined. The failure to address the root cause of the conflicts might cause the problems to recur time and again. These findings further highlight that child-headed households could be vulnerable to being bullied by community members, as they have no one to protect them and do not have the social standing to address the problems.

The study found that the main conflicts over water were due to greediness, or lack of patience if there are queues and conflicts of interest. Another cause was due to some community members not participating in resource maintenance, but only coming to collect water from these sources.

The main strategies for conflict resolution are discussions amongst themselves or being left unattended; but if it involves children they were disciplined. This implies that there is lack of proper strategies and structures for conflict resolution. It implies further that this situation will continue even in future unless proper skills and mechanisms of conflict resolutions are implemented.



*Figure 31: Some community members wash next to the water source*

#### **4.4.10. Ensuring water availability at all times**

Consistency of water supply to the households is critical. This part of the study explored the respondents' water coping strategies to ensure that water is available to their households at all times.

The study found that the household struggle most in winter when water shortages are severe. Historically, this was not a problem to local residents who would simply move to other sources of water during the dry season. Their main coping strategy is buying from water-cans or buying from water vendors, as local natural water sources are drying out. Digging deeper in the river if water is not yet dried completely may provide some relief. However, rapid population growth leading to more densely populated human settlements and environmental degradation have put greater pressure on water supplies. Currently, even in times of water scarcity, the people do not migrate. It is no longer an option because of lack of resources to settle in a new area; affordability of migration is a problem (Garden-Outlaw & Engelman, 1997:8).

Conclusions about water management are presented in Chapter 5.

## **CHAPTER FIVE: DISCUSSION OF FINDINGS**

This chapter discusses the findings presented in Chapter 4 in light of the primary research question of the study: What is the impact of water scarcity on the people's life? Followed by a secondary question: How does water scarcity impact on rural households?

It presents the conclusions and key findings with regard to water sources, water collection and use, and water management. This is followed by a general conclusion of the key findings in Chapter 4. This is then followed by a review of the findings in the light of livelihoods theory.

Seven key findings emerged from the findings presented in Chapter 4: Water is scarce, Men collect water, Means of carrying water has changed from head to wheel-barrow, Traditional natural water sources are drying out, increased vulnerability of rural communities, pressure to pay for water, and limited use of water harvesting. These findings suggest two themes: Vulnerability and Social Change. [Figure 32](#) captures the key elements of vulnerability.

This study provided rich broad information on linkages between water scarcity, vulnerability, livelihoods, water supply and rural households.

### **5.1. Conclusions from the key findings of the study**

### 5.1.1. Conclusions regarding water sources

The findings show that only tap water supplied by the municipality is safe and protected, and that people are extremely vulnerable to pathogenic diseases due to unprotected water sources. Municipality water is not always available and supply is expensive for rural communities with high unemployment rates. Poor supply is exacerbated by drought as local water supplies are dry, requiring that water be imported from other distant dams, which is very costly to government, as well as to the community at large. The findings also show that solutions to problems with water sources are temporary measures. Adding cement or ash makes water inconsumable, but is a solution for washing clothes, while boiling consumes a lot of fuel. Digging of new ponds to get clear water does not solve the problem of contamination. Solving the problem of natural sources drying up by waiting until it rains definitely shows that some problems are beyond their control and that the people are left at the mercy of nature.

These findings further show that hygiene is not prioritised as long as the community receives water, whether contaminated or not. It appears that, as long as they can perform household's tasks, they are 'fine'. The findings further show that there is a severe lack of infrastructure, such as reservoirs, where water could be treated before reaching communities. As communities in the study area are highly dependent on flowing rivers and streams, the need for treated water seems to be particularly urgent. These communities are vulnerable to water hazards on collection and usage - including diseases such as cholera – given their dependence on water from rivers and streams. Boreholes, designed to deliver potable water, deliver water which causes itchy skin and is hard to wash with it as it does not foam. And perhaps more importantly, boreholes are nearly non-existent in the study area. Those available are not maintained.

As the problem of scarcity escalates, it raises the question as to why plan to divert water from the Black Umfolozi to benefit farmers and the people of St Lucia at the expense of the (Ivuna/rural) community where the need for water is so critical for survival (Bate *et al*, 2011).

Another effect of drought confirmed by the findings of this study is that drying-out of natural water resources is related to an increase and deeper entrenchment of already extensive poverty. Drought can lead to food insecurity, strengthening the factors of the deprivation trap, making the community more vulnerable in all spheres of life.

Related to this is the impact of the drying-out of natural resources in the study area. Waiting in long queues contributes to entrenched poverty. Instead of being free to engage themselves in income generating activities, the people in this study lose time in long queues waiting for water. The state of water resources contributes to the vulnerability of community members to in many ways such as limited time to care for their young, often resulting in child neglect, malnutrition and stunted growth which lead to educational challenges.

This study confirms that women are still main water collectors, but that, increasingly, men are participating in this. Coupled to the long queues, the dangers and the other difficulties surrounding water collection, storage and use, the findings suggest that, if water scarcity continues, illiteracy among women will be maintained or will increase more than it is now. Similarly, children who are heads of households appear to represent a new dynamic in the already complex socio-political space surrounding water. Their change in status within the household has not been reflected in the decision-making processes in the community. Much like single mothers, children who are forced to head households have no voice, no power and are particularly vulnerable to all the disadvantages associated with powerless in society.

The study shows the extent of how water impacts on every aspect of life in the study area. The findings and the conclusions drawn from them highlight the need for renewed focus on resolving water issues in remote rural areas. The focus should be on protection of water sources, purifying water, and ensuring accessibility, in particular to the most vulnerable elements of society. It highlights the need to review the assumptions on which water policy is developed with regard to who is consulted and to whom is given power to decide. Previous studies have drawn attention the need to include women. This study suggests that children, irrespective of gender, who are heads of household must now also be considered for inclusion.

### **5.1.2. Key findings regarding water collection and use**

Water collection and use are very much influenced by water availability and the condition of the water. This study confirmed that the water supply is very poor in the study area. Drought and climate change have reduced the sources of water available to the community. The municipal water supply is not satisfactory. It may be because the population is disproportionate to water availability or water supply, or the cost of running this service may be too high for the local municipality. Whatever the cause, intervention is needed to reduce the ordeal faced by rural communities as recounted in this study. A clean drinking water supply in rural

communities is common in other parts of the country. These findings highlight the vulnerability of the area under study to severe shortage of water which implies that usage is hindered by water availability. It further indicates that some household tasks are not performed as required, are performed only during the rainy season, or are completely abandoned. All these highlights vividly show the negative impact of water scarcity on rural households.

Water collection is vital for every household. Study findings suggests that the majority of water collectors are women and children, but some men also collect water, which is something unusual with rural communities. This is not common in other parts of the country.

One key finding was that gender and water is a sensitive issue – especially when people are asked directly about it. Most women will not respond and most men and boys will adamantly reaffirm that collecting water is women’s work. Only a few women were willing to state that water collection should be done by whoever is available.

A second key finding was that there is an increasing number of female-headed and child-headed households. These heads of households traditionally have no voice in the community when decisions are to be taken about water. While there has been much discussion about the need to enhance the role of women, the study raises the question about giving children, who are heads of households, a voice in decision making. Policy-makers need to take this into consideration.

A third key finding was that although culture plays less of a role in water issues than in the past, it is still present. Water policy must take this into account as it may affect adoption and long-term support for water policy.

A fourth key finding was the social role of collecting water. For many women, it is an important part of their lives which they do not want to give up, despite the fact that it is a strenuous task. But the response to good rains bringing water close to the homestead suggests that convenience may outweigh the social aspect of water collection. Given the range of dangers related to water collection, bringing water to the homestead may be welcomed.

The idea of paying for water was met with varying responses. While there were some who felt water should be free, it was generally accepted that eventually people would have to pay for



water. Some felt they had no choice because they cannot collect water as in the past. Others were willing to pay as much as or more than R350 per month – in particular, people over 50 years of age. This suggests that water is viewed very differently by different segments of the community. And this stands to reason. Young boys and girls do not have the same responsibilities as adults, particularly adult women. Women have more responsibility than men, and men are seen as wasters of water. Compounding this is the high rate of unemployment and generally poor access to fresh water. Water policy will need to look at these factors carefully in each community.

The need for careful consideration of the local situation is supported by the unhappiness the respondents expressed about the current water provision policy. While the respondents want government to be fully responsible for providing water, they also want to be part of the decision-making process and to ensure that water delivery is done properly and is well controlled.

### **5.1.3. Conclusions about water management**

Water management is a critical part of water security. This section looked at managing water quality, managing access and off-take quantities, management of ‘used’ water, how/when water sources are affected, control measures for water sources, the presence of water committees, the role of local leaders, conflict and conflict resolution is also looked at ensuring water availability at all times.

As regards managing water quality, there are several factors in water contamination: respondents sharing water with livestock, washing next to the source and lack of proper toilets.. Water is not protected from human waste disposal. This is further compounded by the fact that most of water sources are unprotected. In terms of quality, a key element of this is separation of human and animal use of the same water sources. Ivuna residence uses water from unprotected water sources like kwa-Nsele dam for human consumption. Water is shared with livestock and wild animals.

Literature reviewed in Chapter Two indicates that there is a relationship among availability of water, access to water and water quality (DWA, 1994; Davies *et al* 1993). As clean water is needed every day for basic domestic consumption, regular supply is important for households. The supply (or the lack thereof) of clean water is influenced by water sources and how it is

collected which determines how water is used and stored. This places limits on productive use. It also influences attitudes about the importance of water quality. When water is scarce, as is the case with current water services in the study area, water quality is not a primary concern. The literature also stated that only households already relatively well served will look at quality (DWA, 1994).

**Managing access and off-take quantities:** This section discusses how off-take quantities are directly affected by access to water sources. Results show that off-take quantities may not meet household needs, a result of distance from water sources or household rationing.. Access to and off-take from dams are not controlled because they are shared by both animals and humans. The study further highlights that most water sources are not managed (they are unprotected and uncontrolled), in terms of quality and hygiene. Community tanks are the only water source that are marginally controlled and this is most likely because it is municipality driven.

**Management of “used” water:** Used water is another factor in water management. The majority of respondents do not recycle water. Only few use “used” water for different purposes like irrigation for backyard gardens and building blocks.

**How/when water sources are affected:** Responses showed that lack of proper sanitation is the main factor. Some households in the study area lack toilets. During rainy seasons water sources are affected by dirt.

**Control measures for water sources:** There are no visible structures to control water sources except municipality supplied water. Results suggest that community members are concerned about control measures in order to improve water availability at all times although payment for water is not considered as the best option.

**Presence of water committees:** The existence of water committees was not clear although some few individuals voluntarily manage infrastructure (repair broken taps and minor maintenance). There are also individuals responsible for municipality water control in terms of rations and time for supplying up water.

**Water conservation:** This part of the study investigated frequency of rainwater harvested by the respondents. All (100%) of the respondents conserve water, but some community members are limited by lack of storage facilities. Some of them cannot afford to buy jojo tanks or larger containers.

**Role of local leaders on water supply:** Local leaders are not visible enough in terms of their role in water management. Contrary to what the community revealed was that local leaders claim to play an active role in water management such that they even spend their money assisting communities with regard to water supply.

**Conflict and conflict resolution:** Findings revealed that there are conflicts at water sources. The nature of conflict in all cases is verbal arguments. Conflict occurs because of differing interests and values. Most of these conflicts are unresolved because there are no strategies put in place. This will continue to occur unless and until conflict negotiation strategies are incorporated into educational programmes.

**Ensuring water availability at all times:** Consistency of water supply to the households is critical. Households in the study area struggle in dry seasons especially in winter. They rely upon water vendors and municipality supplied water both of which may be unreliable during times of drought. Community members apply indigenous knowledge as their coping strategy, such as digging in the rivers if riverbeds are not completely dry underneath.

## **5.2. Summative Conclusions from the key findings (presented in Chapter 4)**

The demographics of the respondent in this study showed high unemployment, a high number of child-headed households, few community members with tertiary education, large household sizes made up mostly by females, an increased number of single parents and a large age gap among community members.

The findings reveal that women and children are the main water collectors, although men also participate in collecting water. It implies that people have to wake up very early to collect water when it is clean and clear and undisturbed by wild animals and livestock. Arriving early at water sources ensures shorter queues. This practice interferes with the possibility of water collectors engaging in other economic activities such as bead-making or mat-making.

Water collection places a heavy burden of time and energy on females, depriving them of a basic education as well as skills training through youth programmes which in turn affects their ability to find gainful employment or to learn crafting as a means to earn a livelihood.

Long hours spent at water sources particularly affects females with children. The dual role of water collector and mother makes it difficult to parent the children through the different stages of life beginning at birth. Children may spend most of the time on their own while adults collect water. This impacts negatively on the quality of nurturing needed for the children to become contributing members of their communities. The absence of lactating mothers negatively impacts on the feeding schedule for infants, depriving the infant of proper nutrition essential for adequate growth of both body and mind.

The study shows that the community is dependent upon natural resources which dry out in prolonged droughts leaving them vulnerable to water scarcity. As water resources disappear, there is a shift from human water collection to dependence on water-stations and water vendors. This shift makes water usage more difficult and less possible to perform household duties that are water related.

The government has tried to solve the problem of water scarcity by providing water cans, but supplies are inadequate in meeting community water needs. Presently, water deliveries take place during the day, making those who are responsible for water collection to be unable to attend school or to hold a job. This action impacts negatively on girls, in particular. In order to meet the needs of students and those employed, water deliveries need to be scheduled for late afternoons. The quality of the water from these water cans is also a concern as there are suspicions that unreliable sources are used for this water.

The study also looked at culture of used water management. Since the culture of used water management is not emphasized in this community, used water is still disposed rather than recycled, which affects optimal water usage. Even though there is a huge problem of water scarcity, people are not taught water preservation skills which may benefit them enormously. Recycling of used water is not commonly practised in some rural communities, including the study area with the exception of few households. This could be because there has never been any training on how to recycle used water.

Water and water sources in the study area are not managed with the exception of community tanks, which are managed properly, with community stand pipes being semi-managed. Poor management of natural water sources could be because of distance from most of the water sources, leading to lack of control on off-take quantities. Lack of storage facilities and

community infrastructure in water preservation (reservoirs) make it impossible to conserve water. Poor water management leads to water conflicts within the community which are ongoing and will continue without appropriate intervention by both the Water Committees and local leaders.

This study highlights that proper sanitation methods and proper equipment such as pit latrines are lacking in the area. Compounded by the fact that most water sources are unprotected, contaminated water becomes a lethal source of disease. Education and infrastructure are necessary to relieve community members of the responsibility not only of collecting water but also of treating water to render it safe for drinking and household use.

All of the foregoing issues increase and compound water scarcity, which can lead to many more life-threatening problems including poverty, poor hygiene and food insecurity. Therefore, speeding up programmes to provide clean water, including building of reservoirs where water will be treated before communities access it is vital. There also needs to be a programme to separate water for human/household use and livestock. Previously constructed dams which were aimed for livestock, are now shared by both humans and livestock – causing many health issues. A system that catches water exclusively for human use is needed.

A safe water supply from reliable sources (like Jozini dam) should be implemented in the form of community taps or stand pipes. The current dams are far apart and these were constructed some years ago. These were built during the implementation of the betterment scheme of the 1960s following the Tomlison recommendations of 1955. Population growth is no longer in line with the present available dams. There has never been any means to build new dams. Poor supply of water in this area creates a water insecure community.

Ivuna community is caught between changing worlds. They cannot migrate, and yet they are not yet fully serviced by the state. The result is that they are highly vulnerable to water shortages. Vulnerability extends itself to all sorts of unpleasant living conditions. Rural households end up vulnerable to wild animals while trying to search for water. Sometimes they are vulnerable to rape and exposed to criminals. They are also vulnerable to ill-health because of poor water quality. Other community members are vulnerable to food insecurity because of poor agricultural performance due to water scarcity. The little money that they might have

which should be spent on household needs, must be diverted to means of getting water – the most fundamental need.

### **5.3. Increased vulnerability**

The study findings suggest that vulnerability has four aspects: limited household water harvesting, natural water sources drying up, increase health risks and high unemployment. As shown in in figure36, these four factors are interrelated.

#### **5.3.1. Limited household-level water harvesting**

Findings revealed that only 54% respondents have formal storage systems due to their high cost. As noted in Chapter 4, few of the households in the study area practice water harvesting. The consequence of this is that it puts additional pressure on the existing water supplies, but more significantly, contributes to the growing dependence on imported water supplies (primarily, the municipality water tanks). As also noted in Chapter 4, the growing number of people turning to imported water leads to conflict over that water.

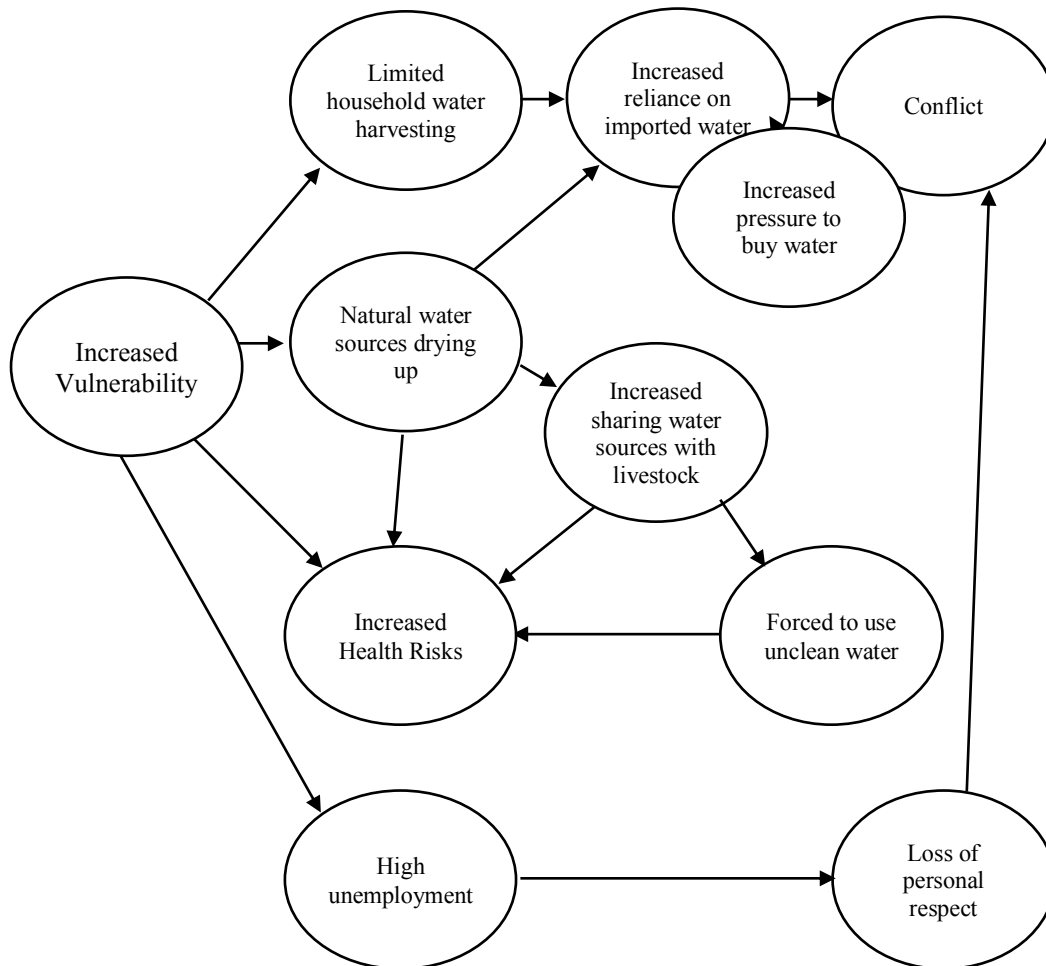
#### **5.3.2. Natural water sources drying up**

Study results showed that all of the natural water resources dry up during prolonged droughts as 82% of the respondents indicated serious water shortage.

Drying-up water sources, is one of the main drivers of increased vulnerability. Its three main consequences include increased dependence on imported water; forced sharing of water between people and livestock; and increased pressure to buy water. Sharing water with livestock creates health risks, directly by way of contact with livestock while fetching water, but more significantly, through being forced to use polluted water. As noted in Chapter 4, the increased dependence on imported water has a number of dynamics: it is a source of conflict and the water supply is not reliable.

This study confirmed that natural water sources are drying up. This could be because in the literature review it was stated that South Africa would be a desert in 2025 while other predictions stated 2030 (Sigenu 2006:1). Maybe such drying up is an indication or just warning signs to drought. According to the literature review, climate change is the key factor. The researcher confirms what was observed in that study area is life-threatening. Natural water

sources, which had been used for decades, are drying up. Even natural vegetation is drying up that could result in livestock dying. Those community members who are dependent on livestock for a living will suffer economically unless it rains sufficiently to increase water availability. The above statement by Sigenu (2006) was verified by the researcher in June 2015, who found the situation had worsened since the time of data collection. Dams were full of mud, and livestock had to be pulled by ropes by community members as they were getting stuck in mud.



### *Figure 32: Increased Vulnerability*

According to the findings, this drying up of water sources affects social cohesion and promotes social stratification. Community members and even family members have conflicts at water point sources and at households. Many of these conflicts are water related e.g. some members quarrel over emptying others containers in their absence. Other community members want to dominate water sources.

Having shown the water resources and uses to which water points are constructed, it is argued that the provision of clean water by the local government has not yielded the expected or intended satisfaction by rural communities. Lack of water provision in rural communities will continue to lead people to their local sources like rivers, streams, dams, hand dug wells and boreholes even if the water is contaminated and not fit for human consumption.

#### **5.3.3. Increased health risk**

Respondents highlighted that water resources have an increased health risk as follows: dams (54%), rivers (82%), boreholes (23%) streams (78%) and springs (63%). As noted above, this is the result of water resources literally drying up and of the failure of households to harvest water. Further, “poor health reduces work performance, reducing income and productivity further perpetuating a downward spiral into ill-health” (Hawkes & Ruel, 2006: 985). It is noted, however that domestic rainwater harvesting, if not managed properly, can also contribute to health risks (Kahinda *et. al*, 2007).

#### **5.3.4. High unemployment**

Nearly 70% of the respondents are unemployed according to research findings. High unemployment is both structural (i.e. part of the larger economic scenario of the study area) and directly related to water-related issues. One aspect is that unemployed households lose respect and social standing. This can contribute to conflict at municipal water supply points. Also, with increasing pressure to buy water, these households are more vulnerable as they often do not have sufficient funds to permit water purchases. Therefore, they are more likely to use



contaminated water sources, which leads to health risks, which reduces the household's capacity to find employment.

### **5.3.5. Conclusions about increased vulnerability**

The findings suggest that Ivuna is vulnerable to health hazards. This further implies that more health hazards can be expected to continue, even in the near future. Therefore, it is recommended that greater practical steps be taken to ensure that a water supply is accessible to rural communities.

There is severe water scarcity in the study area. This means that rural communities can no longer rely on the existing natural water sources in their current state. In line with the previous recommendation it is further recommended that the existing natural water resources be protected, and new dams and reservoirs should be constructed within easy reach of the households.

This community appears to be caught in the deprivation trap. This, of course, has implications beyond water issues. However, there are many water-related factors that manifest themselves in rural communities and keep them in poverty. Without access to clean water, emerging out of poverty is unlikely. An integrated approach in addressing such abnormalities of water supply in rural communities is needed.

## **5.4. Social changes**

The study highlighted a number of social changes related to practices around water. These are: Men collect water, Child-headed households, Neglect of community elders, Mode of water collection and Social cohesion. These are captured in figure 35, and then discussed.

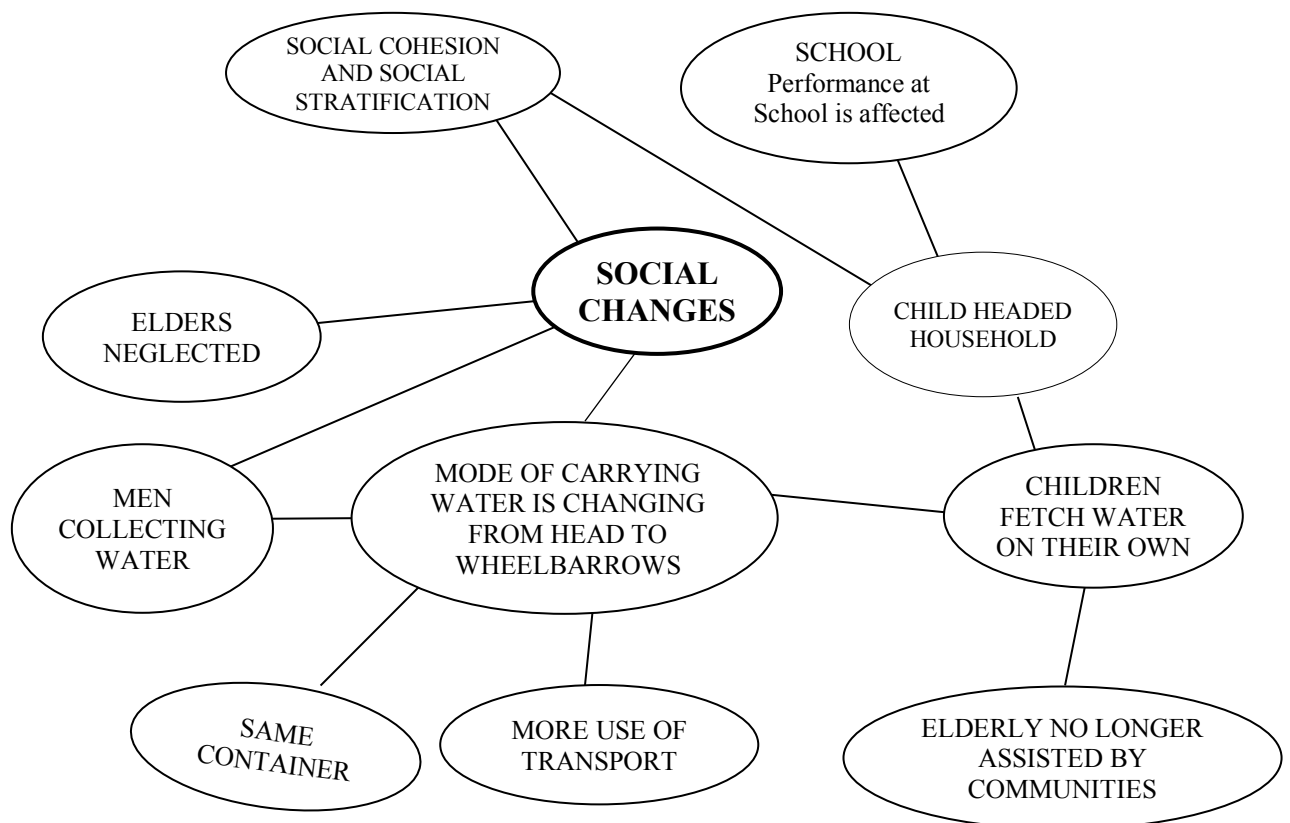
### **5.4.1. Men collecting water**

Thirty percent (30%) of the respondents felt that unemployed males should collect water while 7% of the respondents suggested that nowadays it is 50/50; therefore it is everybody's responsibility to collect water.

In the literature review authors discussed water collection as women's task (Panda, 2007; Hazel, 2008, Kerry, 1989) but this study shows that men are also water collectors. In a deep

rural area as the study area where traditions / beliefs are still observed and respected water collection by males confirms the real social changes. Male figures are expected to look after livestock and perform male assigned duties. Even if there was no male figure in a household but previously it was the duty of the community members including neighbours to look after each other. Below is

**Figure 33** highlighting the analysis of findings of this study on social changes related to water.



*Figure 33: Social changes related to water*

#### **5.4.2. Child-headed households**

Although not specifically captured in this study, it was observed that there are many orphaned (or effectively orphaned) and vulnerable youth in the study area who are economically and socially marginalized. Findings showed that 17% of the respondents are child headed households in this study.

The rural household structure is gradually changing. Literature indicates that elders, referring to pensioners by age, were most often the household heads, but this study shows that child-headed households are increasing. These children, as household heads, are the ones responsible for water collection and performance of other household requirements including the availability of food to other siblings. As the area of study is stricken by water scarcity, this makes life very difficult for these children to cope at school, which will increase the likelihood that they, too, will become ensnared in deprivation trap. An obvious fact is that majority of these children are dependent on social grants and thus cannot afford to pay water sellers, which means they have to fetch water on their own, which in turn takes up their time and makes them vulnerable to all the external factors identified in this study, including rape, snakes and criminals.

Water scarcity has a great impact on education as a whole as it affects schools in the area. Learners are expected to bring their 2l water bottles to school. Feeding schemes are affected as they are not excluded in the present situation, therefore it is often not possible for them to prepare meals for learners, which again plays in to the poverty cycle - hunger affects learners' performance at school, which will later impact negatively on employability as an adult.

#### **5.4.3. Neglect of community elders**

The study shows that there is a social change from a collectivist to an individualist approach. In the collectivist approach, communities care for each other, assist when there is a need, but in an individualist approach, competition predominates. The study showed that elders who stay alone are not assisted in water supply by community members unless there is payment in cash or in kind. Rather than seeing them as part of their collective responsibility, able bodied members see pensioners (who are often invalids) as a means of getting income. Given the long distance to water sources, the elders as they have no other option except to pay because they are physically too weak to collect their own water. Additionally, elders often have weaker immune systems which makes them more susceptible to various diseases resulting from

contaminated water as identified in this study. The risk of life-threatening illnesses is much greater for the elders in situations such as were identified in this study.

#### **5.4.4. Mode of water collection: from head to wheel-barrow**

This study shows that the previous water collection method is changing. Females used to carry water on heads but as of now some community members are opting for wheel-barrows carrying the same size of containers or adding more containers depending on water availability. Wheel-barrows are a better option in this area. This could be because males too are water collectors and may find it difficult to carry water by head.

Those who can afford buy water from water sellers who mostly use van cars to carry big water containers. The water that they buy does not mean it is treated but it is just water from the river.

#### **5.4.5. Social cohesion**

The findings showed that water points impact social cohesion. For some community members, who do not get leisure time due to heavy burdens at households, water points are a place to interact with others as they are waiting to collect water. Some respondents, however, do not approve this as they stated that this is the time for gossipers to discuss other people, resulting in social stratification and disunity.

Another social impact is born of reduced hygiene and clothes washing due to the scarcity of water. As a result, some people end up not being accepted by other community members due to the fact that they develop unacceptable odours. They may eventually end up in extreme isolation as a result.

#### **5.4.6. Conclusions about social changes**

Water issues in this community contributes to food insecurity. Lack of water affects the ability to engaging in food crop production. Water collection reduces time available to engage in other forms of income generation that could contribute to food security.

There is substantial social change in the study area directly related to its water issues. Humanity is decreasing as evidenced by the way children and the elderly are treated. Ubuntu need to be restored in rural communities.

The change in mode of water collection from head to wheel-barrow is another indication of social change which includes men collecting water. It is also indicative of the increasing distances people must travel to collect essential water. This has knock-on impacts in terms of time available for other activities, the allocation of funds (e.g. to buy water instead of food or other goods or services), and family and community relations.

The use of the sustainable livelihoods framework offered a more coherent and integrated approach to understanding poverty in the study area. It identified the range of assets and options open to households and clarified the constraints faced and opportunities available to them. While it is beyond the scope of this study, approach can serve as a programming framework to devise integrated support activities to improve the sustainability of livelihoods among poor and vulnerable groups by strengthening the resilience of their coping and adaptive strategies. The findings from this aspect of the study provide a foundation for addressing constraints of the community under study. The discussion follows the fundamental assets framework association with the sustainable livelihoods approach, covering natural capital, human capital, physical capital, social capital and financial or economic capital.

In this study, natural capital focused on the management of natural capital including management of water resource, maintenance of water pumps, effectiveness of management systems applied to water and the availability of fuel and spare parts. Human capital examined access to education, training, health and extension services. Physical capital investigated infrastructure such as wells, dams, boreholes, ipitsi and toilets. Social capital explored the organisational aspects including conflicts, the water committee and culture. Economic/Financial capital reviewed income levels and stability, savings, agricultural production, and disposable assets.

## **5.5. Drawing on the livelihoods assets**

This section considers the findings of this study through the lens of the livelihood assets

### **5.5.1. Natural and physical capital**

Water sources are natural capital, but they are very much interwoven with physical capital - in particular road and paths, fencing, pumping equipment and other water related structures. For ease of discussion, natural and physical capital are discussed concurrently.

Water is a constituent in every living organism, therefore every cell needs water. Without water there is no life. Water is a natural resource which needs to be handled economically. If natural resources like water are not conserved it will diminish, and unfortunately water has no substitute. Its presence or absence influences the rest of the natural assets.

The study area is clearly affected by drought and general scarcity of water. The area is dry as evidence by the type of vegetation found in the area, like thorny trees and aloes which survive in arid conditions. Some natural vegetation which had been useful to the community at large is drying out.

The water resources accessible to the communities in the study area include wells, rivers, dams, spring, community tanks, ipitsi (spring with concrete rings), boreholes, streams, rainwater and taps.

Most of the wells are dependent on rainfall. Given the prevailing and recurring drought availability of water is unreliable. Wells are unprotected and the water untreated. The respondents indicated that they use simple nets to filter water from these sources. But this does not kill bacteria or germs.

Dams are used for household tasks such as washing dishes and clothes; school children and elders use it for bathing. But the water itself is muddy therefore attaining any real level of cleanliness is not possible. This water is not used for infants and young children as it causes itchy skin after use. Dams are also used for building, irrigation and mainly for livestock. While dams have more water capacity, they are not protected or fenced exposing them to pollution and silting.

Boreholes exist in the study area, but they are not effective. The pumps are very heavy to drive and water itself is salty, thereby limits their use.

Rivers, wells and springs are reported to have better tasting water, but during rainy seasons the water becomes un-clear or muddy and dirty. As with dams, rivers are not protected from wild animals and are simultaneously used by humans and livestock making them vulnerable to contamination. Another considerable problem with rivers is that they are too far from the residents to access on foot, and generally must be accessed with motorised transportation.

There is ipitsi where people use small buckets and a rope to fetch water. The bucket is thrown at a certain technique to fetch water down and this is done to ensure that water is not full of mud. Ipitsi also needs to be covered for both health purposes and to prevent dangers of people particularly children drowning, though it depends upon the amount of water at that particular time. Government must be pro-active enough in assisting communities than to be re-active after bad occurrences. When fetching water from the community tanks, an open mouth container like buckets or containers with a large opening are the acceptable containers to fetch water with as containers with small openings seems to waste water. Also carrying of water home is a burden. Others prefer to use wheelbarrows to push heavy containers home. If water in community tanks could be always available this could also assist in reducing dependence on contaminated water due to lack of latrines which could leads to reduction of this community vulnerability to diseases.

In addition to the forgoing, it is important to note that previously water had been accessible from natural water sources within households. Due to climate change most of natural resources have dried out. Things have changed such that some respondents stated that they use whatever available water for their survival; they no longer use the term “clean” as it effectively has no meaning to them. The present situation promotes competition for water. The findings revealed that community members no longer care for each other, even child headed households are no longer assisted by other community members, neither are the community elders for whom access to water is difficult.

These people find themselves having to drink tea with salty water. They also complained that washing with salty water darkens the skin and makes hair very hard to comb, elders complain about it causing taunt muscles. For washing clothes, more powdered soap is needed and it does not foam as the water is ‘hard’. Even rinsing of clothes does not make their washing looking good, so cleanliness to them is a dream.

There is no sustainable water management, although some community members are there to control even distribution of water. However, this is only applicable to municipality supplied water. Some community members want to get more than others, which further causes conflict. Residents revealed that sometimes conflicts are caused by impatience by other dominating

individuals who do not want to stand on long queues or by those who unlawfully empty others containers.

In terms of practical management, most of these natural sources are not managed properly. It is the responsibility of certain individuals to clean around the sources and to empty a certain source and clean it if there is dirty in the water like faeces in a spring. The majority of these natural sources are not fenced which make them susceptible to contamination. Some community members wash their clothes next to the source which is a sign of poor management and was clear that such issues remain unresolved. Some springs and wells go dry because they lack maintenance, and if indigenous knowledge is applied they would use it to keep water flowing. Springs with concrete rings are also not fenced and cared for. Removal of sand and dirt around them should be done timeously so that they won't be blocked to ensure the water availability at all times. As technology is improving nothing is done to improve usage of these natural resources.

The findings also showed that most of the boreholes are not in use because they lack proper maintenance. There are no individuals in place responsible for infrastructural management. This partly a result of the boreholes being installed without community participation. Spare water pump parts that were supposed to be left within the community leaders for easy access and for the smooth running of water were not left. The absence of these spare parts has rendered these boreholes useless. The findings also revealed that sometimes taps are stolen and their replacement is delayed unless someone from the community spends his/her money for replacement- which apparently is very rare. Water is wasted while waiting for these repairs, and it appears that a male is expected.

Another area of water management is the water supplied through community tanks. In this, the community is dependent on local municipality. Community felt that the supply is unreliable as it sometimes takes 3 months to bring water during which time the community is without water from the municipality. Respondents were of the view that municipality should have better means of controlling and monitoring the supply of water to the community, because sometimes the municipal drivers sell water to individual families (at the community's expense).



Lack of proper control of supplied water, management of water pumps, effectiveness of management systems applied to water, and a lack of spare parts for repairing of broken parts exacerbate water scarcity which has a negative impact on household livelihoods.

Poor management and maintenance of natural resources has also resulted in a severe shortage of water. As the findings clearly highlighted, due to natural resources drying out community members are forced to search for water from sources which are far from their settlements requiring them to pay for transport which puts a further burden on their already strained budgets, and in particular reduces their ability to buy food and other necessities. Another outcome of poor management is the increase risk of diseases caused by unclean water and reduced capacity to maintain good hygiene.

At the very least, separate water sources should be constructed so as to prevent livestock from sharing water with human beings. Community members should also be educated on protecting fence from being stolen for individual benefit but should have that sense of ownership on such developments.

They need to segregate water uses (drinking, bathing, livestock watering etc.). Storage and communal tanks distribution systems and communal facilities need regular inspection. Protect water sources from livestock by fencing them in. Water sources need to be protected from faecal contamination by concrete rings or caisson and springs must be capped or construct a reservoir while dug wells must be deepened and be protected at the same time or may be extended laterally into the water bearing stratum and dams must have hard grounds to prevent mud.

Desalination is another recommendation to deal with the brackish water reported by the respondents. Clean, reasonably tasting water is needed for human consumption.

### **5.5.2. Social Capital**

To many of the respondents, collecting water is an enjoyable social activity. For them, going to the river or community stand points promotes social cohesion in meeting new people in the area or just breaking away from tiresome household tasks. It gives them the opportunity to talk and enjoy one another's company. Learners revise their schoolwork and just discuss school related issues. Sometimes they play, collect wild fruits, sing and dance while waiting in their

long queues. To others have collecting water from central points or shared sources promotes causes conflicts.

Sometimes children swim in the dam, and this causes conflict between children and community elders. Normally, such issues are left unattended as there are no proper ways of solving them. Some community members allow their livestock to use the same water sources as the people use. Cattle, pigs, ducks and other animals frequent the water sources polluting the water. Similarly, some people wash themselves and/or their cloths in the water sources where others collect drinking water. These cause conflict among themselves that are not easily resolved because every member feels to have a right to use these water sources.

Another social impact is on culture. Lack of water promotes individualism in the sense that it seems to be the survival of the strongest. In most water sources there is dominance by some community members. Child-headed households are more deeply entrenched in poverty as time that could be used for education and training is eaten up by the demands to locate, collect and manage water supplies. Similarly, the elderly are being marginalised and, instead being treated with the respect that social tradition dictates, they are effectively abused.

It is argued that social capital is one of the most important elements in effecting development. This study suggests that social capital erodes as water sources become more and more scarce and water quality declines through poor management.

### **5.5.3. Human Capital**

The study highlighted a number of issues around human capital. But the one that stands out is that the number of child-headed households is increasing. While this is not a result of water issues, the water issues do have a serious impact on these families and the children who head them. First, those children who are heading households have a dual role to perform. They are parents to other siblings and are, simultaneously learners at school- they are children. There is no doubt being a child and a household head negatively impacts their school performance. The demands of managing the family water supply exacerbates this. Their chances of developing themselves for future employment are greatly diminished. This does not help their future, neither the future of the community.

Another issue of human capital that stands out in this study is the impact of the water situation on human health and risk of physical injury. Through various agencies (including how they treat 'dirty' water) related to water quality and cleanliness community member are exposed to a variety of diseases and ailments. Similarly, owing to the distances, exposure and geography of the land between house and water source, those collecting water (especially women and children) are at risk from rapists, from criminals that forcefully take their possessions, and from wild animals that can harm them (e.g. snakes). The risk is made greater because very few of these vulnerable people are accompanied to water sources. All of these diminish human health and thereby the human capacity needed for their livelihoods.

#### **5.5.4. Economic Capital in the study area**

Findings in the study area are in line with what other scholars suggested in chapter two (Kariuki 2008 & Kuzwayo 2002). They also stated that water resources play a crucial role in economic development in households and industries. The water issues discussed throughout this dissertation occur in an economic context which finds the majority of the respondents being unemployed. There is a tragic interplay between poverty, the drought, water sources and the possibility of economic activity and the productivity of the economically engaged.

Lack of water hinders them from practising income generating activities (e.g. agricultural production) to augment their livelihoods. It even hinders their subsistence farming which, again, makes them more vulnerable - specifically increasing their vulnerability to food insecurity. As natural sources are drying out, the distance to other sources puts more pressure economically on households and makes water collection for things such as irrigation impracticable. Paying to transport water from distance sources also puts pressure on household economy. Even remittances received from family member living and earning elsewhere are often used to pay for water. Child-headed households and the elderly are particularly susceptible to these financial and economic pressures.

The lack of economic resources and poor agricultural practices results in food insecurity of the community members thus making them physically weak (which is further compounded by the rough topography of the study area). The people in the study are poor and are increasingly (directly and indirectly due to water related issues) ensnared in a deprivation trap. There being no other industries, crop production and animal production remain the only potentially viable option. But this is directly dependent on water, therefore the likelihood of a perpetually low

standard of living is high for this community unless alternative forms of income can be established.

## CHAPTER 6: SUMMARY OF THE THESIS

This chapter summarises the entire study. It starts with a summary of the key findings and evaluates the extent to which the study succeeded in achieving its objectives.

As stated in Chapter 1, the study sought to understand the extent of water scarcity at Ivuna and its impact on households, livelihoods and vulnerability. The aim is to draw the attention of relevant stakeholders to the situation at Ivuna with the hope of action being taken to address this community's plight.

A key recommendation from this study is that Ivuna should be more formally incorporated in decision-making processes by the local municipality with regards to water supply. Further, although the data cannot be generalized, the information from the study could shed light on other water service providers in solving water supply problems in other areas of South Africa.

### 6.1. Summary of key findings

The study revealed a number of critical findings related to water sources, water collection and use, water management, and increased vulnerability. These are presented in summary form as follows:

#### **Water sources**

- Only tap water supplied by the municipality is safe and protected, and that people are extremely vulnerable to pathogenic diseases due to unprotected water sources.
- Women are still main water collectors, but, increasingly, men are participating in this.
- Policy focus should be on protection of water sources, purifying water, and ensuring accessibility.

#### **Water collection and use**

- Gender and water is a sensitive issue.
- There is an increasing number of female-headed and child-headed households.
- Although culture plays less of a role in water issues than in the past, it is still present.
- Collecting water still has a strong social component.

### **Water management**

- There are serious challenges related to managing water quality, managing access and off-take quantities, and the management of 'used' water.
- Lack of proper sanitation is the main factor.
- There are no visible structures to control water sources except municipality supplied water.
- The existence of water committees was not clear
- All of the respondents conserve water, but are limited by storage facilities.
- Local leaders are not visible enough in terms of their role in water management.
- Conflicts over water occur because of differing interests and values, and are unresolved because there are no strategies in place.

### **Increased vulnerability**

- The area under study is vulnerable to health hazards.
- More health hazards can be expected to continue, even in the near future.

This study demonstrated that there is the need to adequately understand water sources in terms of the water availability, water collection process and distance from households to water sources. Also protection of these water sources, water storage and water uses needs to be well understood. It showed that water is central to every human activity and that issues that affect availability, access, collection and quality impacts on every aspect of household and community life. In particular, understanding the impact of water scarcity on livelihoods, what aspects of the household are particularly affected and their impacts is important. The nature of vulnerability and social dynamics when rural households use different water sources is essential before designing water projects. Interventions that require or affect the water sources in the intended area of development should consider the extent of vulnerability. In some ways it can be said that if there are problems with water (supply, access, quality) in a community, there will be corresponding problems in the social and economic life of that community.

Specifically, the study also found that the community in the study area has experienced significant social and economic changes in the light of farming and increased vulnerability in relation to water. These changes occurred at the community and household level - no one was left unaffected by the prevailing water situation. Based on the literature on livelihoods in chapter two the community under study is severely vulnerable when using livelihood

framework. Natural resources are drying up which poses a threat for future generation's sustenance at long run. Study results senses uncertainty about the future coping strategies and the recovery from stress. In particular water sources have more significant impact on households and household livelihoods of the vulnerable- in this case the elderly and child-headed households. The study also showed the ability of rural community members to survive natural stresses and changes - but clearly underscores that mere survival is not an acceptable and ongoing-term state. While according to DFID (1999) a livelihood is sustainable when it can cope with and recovery from stresses.

This study has demonstrated that there is a lot that needs to be done so as to improve the rural livelihoods with reference to water availability. The study clearly suggests water resources affect communities at the level of culture - particularly affecting deep traditions such as caring for one another in times of need, collective collaboration is giving way to individual competition.

Water as a natural asset is supposed to be available to all communities as stated in South African Constitution (Act 108 of 1996 & Nealer, 2009:74), especially because it is the source of life and every human being needs clean water for survival. Everyone needs to have access to good quality water for a healthy body and yet, in Ivuna, the people are thwarted at every turn in relation to this basic right. They are forced to walk long distances, carrying only survival quantities of water- amounts that are not sufficient for all their daily chores. Health, education and security are all diminished as stated in the literature review in chapter two (DWA, 1994:34, Wenhold, 2007:327-336 & Hall et al, 2006:58).Therefore, urgent intervention from all stakeholders is required.

An important implication underlying the findings of this study is the sense that the community is waiting. It is not taking genuine ownership - even in small ways - of the situation. An example of this is the propensity to wait for a man to fix (or even obtain spares for) the boreholes and taps. Given the particular role women play in water collection, management and use, training women to repair and otherwise maintain water sources it could change the water situation for the better. Another example is the relationship with the municipality over water deliveries. This again raises the question of complacency and dependence.

The state shows commitment in the bill of rights and in other government gazettes as highlighted in chapter two but the actual implementation is somehow slow in meeting the citizen's water basic needs. Especially in rural communities water scarcity seems common. The study findings sense poor intervention between National water Act of 1996 and Water Service Act of 1998 because Water Act ensures that water is everyone's right but Ivuna community is denied their human right. Poor or lack of sufficient water supply is a deprivation of one's right. Water Act puts emphasis on equality in water distribution but some poor people especially in rural communities seem discriminated in the supply of this basic need. In the study area it also came up that access is hindered by lack of skills and resource management. Study finding suggested that although there is Free Water Service Act of 25l per person per day, in rural areas it seems a challenge at Nongoma local municipality, which is an indication that framework is in place but its implementation is too slow. Decision makers lay the framework for water resource management but lacks monitoring and commitment.

While a case study such as this cannot be generalised, the findings are not out of line with finding of other studies on the inclusion of women in decision making at different levels to state their water needs Hazel 2008 & Nyamu- Musembi *et al* 2004). The study at Ivuna is showing the extreme vulnerability of remote rural communities in relation to water sources because of different topography, community beliefs and customs to water related issues. Boreholes are drilled but sometimes water cannot be pumped out due to severe water scarcity underground. Also natural rivers are very far from households with no/ gravel roads to water resources which complicate further the coping strategies of mitigating water. Due to gender stereotyped assigned roles, some rural communities will not expect male counterparts to fetch water for the household which is one of the roles performed by males in the study area.

Findings suggests that in addition to addressing the technical aspects of water issues, restoring community ownership of its resources and the broader sense of collectivism are also urgently required. Without this, the technical solution will not be sustained. If decision makers are prepared to view practices at local scale level and properly consider community's needs and experiences - including the immediate technical issues and more subtle underlying dynamic issue - they would be able to develop specific policies or coping strategies that are relevant and can be sustained.



## **6.2. Objectives of the study**

The specific objectives of the study were as follows:

- a) Establish the extent of water scarcity at Ivuna including investigating water resources and their use;
- b) Determine the impact of water scarcity on the households at Ivuna;
- c) Establish what aspects of the households are particularly affected and to what extent they are affected; and
- d) Establish the nature of vulnerability at Ivuna.

The results of each of these is presented below.

### **6.2.1. The extent of water scarcity at Ivuna and a review of water resources and their use**

The study confirmed that water is very scarce in all part of Ivuna. Due to water scarcity, community members use different water resources for different uses. For example, rainwater and municipality supplied water are usually kept for drinking and making tea, while water from other resources like rivers, springs and streams are used for cooking and other households tasks such as washing dishes, personal bathing and washing clothes. The study also determined that contaminated water is not used for the household tasks because of the risk to health.

The study revealed one significant exception. Sometimes, some of Itshodo community members use the contaminated from Itshodo dam these same household tasks. They indicated that due to water scarcity they had no other choice – despite the risk.

Boreholes and tap water are regarded as salty in normal circumstances and are not used for drinking and tea-making. However, during droughts water from these two sources are used for all household tasks in spite the fact that the water causes itchy skin after bathing, is very hard to wash with and has a salty taste.

This is a clear indication of the extreme situation at Ivuna. So scarce is water that they are willing to take health risks by using contaminated – because that is all that is available.

### **6.2.2. The impact of water scarcity on the households of the people at Ivuna**

Respondents stated that there are times where they do not have access to water, let alone clean water, unless they buy it from vendors or it is supplied by the municipality, the latter of which is very unreliable. Community members dependent on oral medication taken after meals, do not take treatment as required; they have no water and often go without eating as they are away from their homes searching for water. Water scarcity increases health risks.

Also there is a progressive social change where unemployed males assist with water collection, which some community member's view as socially unacceptable and being demeaning to males. Further, water scarcity compromises the level of cleanliness within households. This includes such things as having to wear clothing several times without washing them and less thorough cleaning in the house.

### **6.2.3. Aspects of the households are particularly affected by water scarcity**

The study showed that water scarcity particularly affects three areas of the households: health; the ability to earn an income; food security. In addition to issue around taking medication, water scarcity increases the use of unpurified and potentially unhygienic water, which increases the risk of disease. Water scarcity limits the ability to produce any products requiring water such as growing crops and making izinkamba (clay pots), amacansi and small-scale baking, thereby reducing option to generate income. Water scarcity affects increases the risk of food insecurity by (a) reducing the capacity to grow food, and (b) diverting money intended to purchase food to purchasing water. It also affect the ability of mother to nurse their children.

Another dimension of this is that there is an increasing number of female and child-headed households. Because these households have less power in the community, they are more keenly affected by water scarcity and have fewer resources to address the challenge.

### **6.2.4. The nature of vulnerability in the study area related to water scarcity**

The findings suggest Ivuna is vulnerable in a number of ways directly or indirectly due to water scarcity. People are particularly vulnerable to health hazards, which can be expected to continue and increase as water becomes more scarce. Water scarcity makes their livelihoods less resilient – giving them fewer options to generate income. They are more prone to being

perpetually caught in the deprivation trap. Without access to clean water, emerging out of poverty is unlikely.

The elderly and disabled experience the greatest severity of vulnerability because water scarcity leads to them being abused and/or abandoned by the community. Similarly, girls are also vulnerable to all sorts of social ills, including rape, while searching for water in distant water sources. They are also prone to illiteracy because of poor performance at school and sometimes drop out which later put them vulnerable to poverty. Again, child-headed households are particularly vulnerable because of their lack of a voice in any community decision-making processes; they are left to only to hope that others will speak on their behalf.

### **6.3. Scope for future work**

This study was a preliminary investigation, constrained by time and resources. The scope of the study was limited to the exploration of rural water resources: an exploration of access, usage, characteristics and implications for rural households at Ivuna -Nongoma. The findings touched on many issues that could not be investigated, but which deserve investigation. Future work should investigate:

- (1) In greater depth, the causes of drying out of natural water resource,
- (2) The effect of water access, availability and management on culture and social norms.
- (3) The effect of water access, availability and management on vulnerable households, in particular the elderly and child-headed households; and
- (4) Alternatively, methods for protecting, collecting, conveying, storing and purifying water in rural areas where natural and economic resources are scarce.

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## APPENDIX 1

### ETHICAL STATEMENT

My name is Kunene Tholakele Rose-Mary and I am student at University of KwaZulu-Natal (UKZN) in Pietermaritzburg and I am studying towards the Master's degree in Agricultural Extension and Rural Resource Management in school of Agricultural, Earth and Environmental Sciences.

I am conducting a survey which is part of a research project designed to investigate rural water source typologies an exploration of access, usage, characteristics and implications for rural households at Ivuna Nongoma KwaZulu-Natal.

I would like you to participate in my study. The study will pose no risks to you or to your household members. You may refuse to answer any question(s) without penalty or to discontinue the interview at any time without providing a reason for doing so. All information that you give to me will be kept confidential.

“I have read the information sheet about this study (or understood the explanation of it given to me verbally). I have had my questions concerning the study answered and understand what will be required of me if I take part. I agree to take part in this study”.

Signature \_\_\_\_\_ [or mark]

Date \_\_\_\_\_

Witnessed \_\_\_\_\_

## APPENDIX 2

### Individual Consent to disclosure of name in the study

I \_\_\_\_\_ ( name of individual), do hereby authorize Kunene, Tholakele Rose-Mary of UKZN Pietermaritzburg to disclose my name to be used only for the purpose of submission of a Master's thesis on Rural water source typologies an exploration of access, usage, characteristics and implications for rural households at Ivuna Nongoma KwaZulu-Natal.

By signing below, I agree to have my name disclosed in the report.

Signature of individual giving consent \_\_\_\_\_

Date \_\_\_\_\_

APPENDIX 3

Interview Schedule

**Rural Water Resources: An Exploration of Access, Usage Characteristics and Implications for Rural Households at Ivuna, Nongoma, Kwazulu-Natal 2012**

**SECTION 1: DEMOGRAPHICS**

1. Gender: 

Male	Female
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      2. Age 

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      3. Ethnic Group: 

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4. Marital status: 

Single	Married	Divorced	Widowed	Other: <table border="1"><tr><td> </td></tr></table>	

**EDUCATION**

5. Highest level of education obtained 

--

**EMPLOYMENT STATUS & HOUSEHOLD SIZE**

6. Are you the head of household? 

Yes	No
-----	----

6.1.If no, who is the head of household? 

--

      Age 

--

6.2.Gender of head of household? 

Male	Female
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7. What is the employment status of the head of household? 

Unemployed	Employed	Self-employed	Other (specify)	
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**SECTION 2**

**WATER AND WATER SOURCES:**

8. Who fetches water for the household?

Who	Status in HH/Age	Comment (e.g. time of day/year)	Does anyone accompany them & reason	Specific source

9. List the type(s) of water sources that you normally use.

Source	What is the water used for	How is the water collected	What quantity is Collected/ time	Availability issue	Distance from Homestead	Time of collection (& reason) (e.g. safety)
Dam						
River						
Stream						
Borehole						
Tank						
Tap						
Spring						
Rain Water						

10. Arrange your water sources according to your order of preference.

SOURCE	Order of preference	Reason (accessibility, quality, distance)	
Dam			
River			
Stream			
Borehole			
Tank			
Tap			
Spring			
Rain water			

My initial interpretation of the reason	
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11. What do you do when there is a problem with the water supply?

Source	Problem	Action when there is a problem
Dam		
River		
Stream		
Borehole		
Tank		
Tap		
Spring		
Rain Water		



12. Describe the water quality from each source at different times of the year and weather

Source	Cloudy	Under what circumstances	Dirty	Under what circumstances	Taste	Under what circumstances	Clean	Under what circumstances
Dam								
River								
Borehole								
Tank								
Stream								
Spring								
Tap								
Rain water								

13. Who is in control over water availability from that source?

Source	Who controls water availability	Reason/Comments
Dam		
River		
Borehole		
Tank		
Stream		
Spring		
Tap		
Rain water		

14. During rainy seasons do you conserve water?

 Ye No

If yes, how?

---

---

15. Describe some of the things that can go wrong with the water sources and who is responsible for solving it?

Source	Kind of problem	Who solves it	Comments
Dam			
River			
Borehole			
Tank			
Stream			
Spring			
Tap			
Rain water			

16. Identify any payments towards the management of water sources, how much is paid, to whom and how finance is managed

Source	Payment Y/N	Amount Charged	Paid to	Means/Method of payment	What happens to the money After it is paid
Dam					
River					
Bore hole					
Tank					
Stream					
Spring					
Tap					
Rain water					

17. Do you have local water committee?

 Yes

 No

If yes:

When formed	How was it formed	Number of members	M	F

18. Describe any hazards or physical problems related to each of the water sources. (e.g. snakes, cholera)

Source	Describe	At what point (collection, storage, use)
Dam		
River		
Borehole		
Tank		
Stream		
Spring		
Tap		
Rain water		

19. Are there any conflicts in relation to water and water sources?

Source	Describe conflict	At what point	How the conflict is resolved
Dam			
River			
Bore hole			
Tank			
Stream			
Spring			
Tap			
Rain water			

20. Discuss any issues related to water, water sources and water use as affect by livestock and how this is managed

Source	Describe affect by livestock	At what point	How this managed
Dam			
River			
Bore hole			
Tank			
Stream			
Spring			
Tap			
Rain water			

21. Discuss sanitation systems in your area (toilets, washing household, bathing)

<b>Water impacting Activity</b>	<b>Systems used</b>	<b>Sanitation issue/ Contamination</b>	<b>How sanitation issue is managed</b>
Human waste management			
Bathing			
Washing clothes & bedding			
Washing cooking & eating utensils			
Washing floors & walls			

22. What do you do with 'used' water?

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SOCIAL DYNAMICS

23. Differing roles in collecting water

	What is the traditional role in collecting water	What is actually happening	When/How do roles change over time
Minor Females			
Minor Boys			
Adult Females			
Adult Males			

24. Differing roles in using water

	What is the traditional role in using water	What is actually happening	When/How do roles change over time
Minor Females			
Minor Boys			
Adult Females			
Adult Males			

25. Discuss collecting water for elders of the community?

Source	Who collects water for The elders from?	Are they getting paid How much?	Comment on collecting water for elders (e.g. payment, system, etc.)
Dam			
River			
Stream			
Bore hole			
Tank			
Tap			
Spring			
Rain Water			

26. Do elders of the community get equal water from municipality supplies with other community members?

Ye

No

Can you tell me more for your answer?

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27. If the elder does not have money to pay for the supply what do other community members do to assist elders?

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28. What is the community's perception towards males collecting water?

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29. Tell me what traditional or cultural issues are attached to water collection?

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30. Discuss any collective water systems that are working well.

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31. Discuss any innovations around water system/collection.

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32. Discuss any social activities that take in the process of collecting water?

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33. In what way are the local traditional authorities involved in water supply?

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34. If the government provides the community with tap water, will you be willing to pay for your water service?

 Ye No

If yes, how much would you be willing to pay	
Why?	

If no, why?	
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35. What would you recommend to be done in order to prevent water wastage?

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36. How does rainfall affect your water collection?

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37. What do you think should be done to ensure that everyone has water all the times?

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38. What do you think must be done to control water supply?

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39. Anything else regarding water issues

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APPENDIX 4

QUESTIONNAIRE FOR FOCUS GROUPS

RURAL WATER RESOURCES: AN EXPLORATION OF ACCESS, USAGE, CHARACTERISTICS AND IMPLICATIONS FOR RURAL HOUSEHOLDS AT IVUNA: NONGOMA: KWA-ZULU-NATAL

Discussions would come from four leading questions. The researcher will probe for more information based on these questions.

1. WATER SITUATION IN THE STUDY AREA

Please tell me about the water situation at Ivuna.

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What water sources are available in this area?

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Which water sources are mostly preferred and why?

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How are the traditional leaders involved in water issues?

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What is the role of municipality in water related issues?

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2. Water Resources Management

How are the water sources managed?

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Who are actively involved in water related issues?

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Is there any water committee in the area?

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How were they elected?

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Are committee members play an active role in the community?

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3. SOCIAL RELATED QUESTIONS

What is their perception around water and the following?

i. Accessibility

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ii. Usage

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iii. Age

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iv. Culture

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v. Safety- to and from water sources

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vi. Social cohesion

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vii. Conflict

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viii. Implications

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4. ECONOMIC ASPECT OF WATER IN THE STUDY AREA

Tell me about water and economic development in the area.

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What water related income generating programmes do you have?

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Reasons

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5. Is there anything you would like to tell me which is water related?

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